Analysis of the state of play of the European Research Area in Member States and Associated Countries: focus on priority areas

Final report

Written by

Research and Innovation

EUROPEAN COMMISSION

Directorate-General for Research and Innovation
Directorate B — Innovation Union and European Research Area
Unit B.2 — ERA Policy and Reform

E-mail: RTD-PUBLICATIONS@ec.europa.eu

European Commission
1049 Brussels
BELGIUM

EUROPEAN COMMISSION

Analysis of the ERA state of play in Member States and Associated Countries:

Focus on priority areas

Final report

Michael Dinges, Romain Bouttier, Helene Schiffbänker, Florian Holzinger, Annelieke van der Giessen, Janne Lehenkari, Matthias Deschryvere, Hanna Kuittinen, Christian Rammer

Directorate-General for Research and Innovation
European Research Area

2014

EUR 26550 EN

Europe Direct is a service to help you find answers to your questions about the European Union.

Freephone number (*)**:**

00 800 6 7 8 9 10 11

(*) The information given is free, as are most calls (though some operators, phone boxes or hotels may charge you).

LEGAL NOTICE

More information on the European Union is available on the Internet (http://europa.eu).

Luxembourg: Publications Office of the European Union, 2014

ISBN 978-92-79-35570-7
doi:10.2777/6362

Contents

EXECUTIVE SUMMARY

BACKGROUND AND PURPOSE

The European Research Area (ERA) communication 'A reinforced European Research Area partnership for excellence and growth' ([1]) defines a number of actions for Member States detailed in five priority areas, dealing with: (1) more effective national research systems; (2) optimal transnational cooperation and competition; (3) an open labour market for researchers; (4) gender equality and gender mainstreaming in research; and (5) optimal circulation, access to and transfer of scientific knowledge. For each Member State action the European Commission has set up a number of indicators and sub-indicators, which relate to key evaluation questions concerning the degree of development of actions in the Member States and associated countries.

Against this background, the main objective of this study was to assist the European Commission in identifying and analysing the current baseline situation in each Member State and a limited number of associated countries for each action defined in the ERA communication. Concrete study tasks involved:

- revising and refining provided ERA progress indicators and sub-indicators proposed by the Commission concerning Member State actions in each of the five priority areas;
- collecting quantitative and qualitative data for each action at national level to estimate the indicators associated with each of these actions;
- analysing the state of play as regards the actions identified in the Commission communication in each Member State and a limited number of associated countries.

Methodology

Based on the existing preparatory work of the European Commission, the study team provided the European Commission with up-front suggestions for modifications of the indicators, which were then used as a baseline for data collection. As most of the underlying data stem from qualitative text sources, the majority of indicators focused on an identification of the existence of national measures. Therefore, the majority of indicators were Likert scale indicators and nominal indicators (dichotomy yes/no).

The data collection analysis was performed by a team of national country correspondents, which was supported by a team of priority area correspondents. The priority area correspondents provided country correspondents with (a) guidelines for filling the indicators and (b) a list of available secondary sources for retrieving the indicators. For each Likert scale indicator a rating guideline was provided to the country correspondents in order to ensure coherence of assessment. The results of the data collection were provided in indicator sheets and country reports.

The indicator sheets were translated into an electronic database. An assessment of the availability and reliability of the data collected was performed in order to (a) ensure the quality and transparency of the data collection and (b) provide suggestions for improvement for similar exercises in the future.

([1]) European Commission communication, 'A reinforced European Research Area partnership for excellence and growth', COM(2012) 392 final (http://ec.europa.eu/research/era/pdf/era-communication/era-communication_en.pdf).

Making use of descriptive statistics, the degree of development of measures in the Member States and the associated countries was highlighted at an aggregated level and among EU Member States by using colour-coded metrics. By means of text analysis underlying policy measures/actions under each indicator, for each priority area typical sets of measures were drawn up and highlighted.

MAIN FINDINGS

More effective national research systems

Efforts to make national research systems more effective have resulted in changes to the institutional funding of higher education systems and increasing shares of project-based funding, for which core principles of peer review are applied in the vast majority of EU Member States. However, European researchers and research funding organisations (RFOs) still face very different conditions as regards the available volume of public research funding and the terms and modalities for receiving research funds, mainly due to differences in the share of institutional funding for higher education institutions (HEIs). The trend towards further redefining and fine-tuning institutional funding systems persists. Incremental funding (i.e. funding based upon historic patterns) systems are increasingly being replaced by formula-based approaches and contract approaches. Various Member States have launched actions for establishing performance-based research-funding systems in order to provide incentives for institutions to spur excellence in research. However, it was impossible to highlight what shares of institutional funding have been allocated by means of competitive measures (i.e. through evaluations and performance indicators).

Output indicators used in institutional funding systems predominantly relate to PhD output, third-party funding and research output (journal publications). However, in many institutional funding systems, input indicators (number of researchers, number of enrolled students) still play a dominant role in indicator-based funding systems. Recent reforms of institutional funding systems seek to reduce the complexity of allocation mechanisms.

Optimal transnational cooperation and competition

International cooperation in research is often mentioned as a priority in national research strategies. However, the level and type of cooperation varies greatly among EU countries. Only a limited number of EU countries have a long-standing tradition of research collaborations with a distinct focus and joint agreements on procedures. In other countries (e.g. the Netherlands), bilateral/multilateral research collaborations are predominantly oriented towards countries outside Europe, and in several countries many collaborations, agreements and memoranda of understanding exist, but not all seem to be very active and some could even be considered dormant. Further analyses could provide a better view of activities carried out through bilateral and regional agreements, distinguishing between agreements with countries inside the EU and those with non-EU countries.

Multilateral programmes addressing grand societal challenges are mainly restricted to joint programming initiatives (JPIs) and EU-funded initiatives. With the exception of Poland and Romania, virtually all of the EU Member States in Central and Eastern Europe, as well as the Baltic States and Southern European countries, participate in only a very limited number of JPIs. All calls launched by JPIs were implemented by using a virtual common-pot funding basis, in which funds are provided by the national/regional agencies to the successful national applicants.

The importance of excellent research infrastructures for achieving excellent research is widely acknowledged by countries and is represented in national roadmaps on research infrastructures. However, doubts were raised regarding whether some national roadmaps can really be considered roadmaps, as no specific plans were incorporated on how to achieve the targets set and coherent harmonised approaches are missing. Specific measures to support cross-border access to research infrastructures, either financially or by providing information or establishing common rules for access and use are only provided by half of the countries under consideration. A number of countries have more general programmes supporting international research collaborations in which the focus of financial support seems to be more on providing funding for foreign research visits or stimulating doctoral candidates to pursue studies in other countries than on providing specific access to certain research infrastructures.

An open labour market for researchers

Legal rules establishing open and transparent recruitment procedures in HEIs and public research organisations (PROs) were implemented only in a minority of countries due to a decentralised approach being used in several Member States and associated countries. Soft coordination and contractual measures were also developed in order to reach high standards of openness and transparency and maintain the autonomy of HEIs and PROs in their recruitment processes.

The analysis revealed that the international dimension in selection panels is very limited. As is underlined for gender issues with the presence of females on the panels, the presence of international panellists could limit possible discrimination in the recruitment of non-national residents.

While the investigation in this exercise focused on the existence of appropriate procedures, it was not able to measure the outcomes of the process. However, a mismatch is possible between the existence of appropriate rules and an effective, open and transparent system. For future exercises, it would be relevant to compare these results with the perception of the recruitment system by researchers. This would require the setting-up of appropriate surveys to measure it.

Gender equality and gender mainstreaming in research

Measures to remove barriers relating to the recruitment and career progression of female researchers are implemented differently at each career level and in different EU countries. In quite a number of countries a lack of political awareness becomes visible due to their inability to provide any measures or data relating to gender equality and gender mainstreaming in research.

While measures for placing more women on committees/boards in HEIs and RFOs are quite common, measures identifying gender biases in career progression procedures (audits and *ex ante* assessments on gender-biased procedures in recruitment, promotion and research funding) are rarely implemented and need to be addressed more strongly in the future.

The adoption of measures relating to the recruitment, retention and career progression of female researchers is only realised 'to a low degree' in every second country. At the same time, national targets/quotas and awards/prizes can be found in about half of the countries, while performance agreements considering the gender dimension are rare.

Although there have for many years been various policies at European and national level addressing the under-representation of women in science and research, the representation of women at different stages of the scientific career ladder still represents

a 'leaky pipeline': at PhD level women are already in the majority in some countries, and ERA-wide their participation tends to equal that of men, but in grade A positions only 20 % are women. Hence professorship is still a very male-dominated position and far from being gender balanced.

The majority of countries have implemented measures fostering institutional change on gender, but hardly on a legal level, and public funding is provided only in some of these countries. To raise awareness on dimensions of cultural change, more efforts are needed to implement measures relating to gender bias in recruitment, promotion and funding procedures.

The representation of women on committees that shape the research system is still limited. Measures to ensure that at least 40 % of the members of jury panels (decision-making bodies) in funding agencies are women (the under-represented sex) are rare, and no valid data on women on committees involved in recruitment/career progression are available. This underlines that, in order to achieve further progress, such measures need to be pushed and promoted, and indicators need to be improved.

Optimal circulation, access to and transfer of scientific knowledge

Open access to publications is becoming a common approach in Europe. In certain countries public authorities are playing an important role, using incentives or mandatory requirements. However, in a huge majority of countries key players are stakeholders acting as precursors, sometimes supported by their public authorities for the dissemination of the practices.

Whilst open access to publications is becoming well established and well known, this is not the case for open access to data and for the deployment of e-infrastructures. Understanding remains limited due to the lack of robust sources.

The investigation highlighted that the first activities in these fields come from stakeholders acting as precursors. However, public authorities often play a key role in the development due to the need for centralised infrastructures and management, and due to the higher costs. This involvement can be as a main player or as support for (a group of) stakeholders. Important differences in activities and means were identified between countries. Some are developing ambitious infrastructures and instruments (acting as precursor states/regions), whereas no or nearly no actions were identified in several countries.

Knowledge transfer between the public and private sectors was identified as a shared priority in all countries. Moreover, the high level of measures and activities shows that public authorities around Europe are actively engaged in increasing the contribution of public research to their competitiveness. A huge diversity of measures was detected, even on the same issue in a single country. All kinds of instruments are used, from legal measures to financial support and coordination activities. In this context a key issue is the measure of the efficiency of these activities, in order to identify the most appropriate ones and analyse their replicability from one country to another. However, there are currently no robust instruments, other than competitiveness indicators, to measure the efficiency of these actions. Such measurements could be undertaken through a case-by-case analysis taking into account the socioeconomic specificities of the countries.

CONCLUSIONS AND RECOMMENDATIONS

The report provides a picture of the degree of adoption of policies by Member States and selected associated countries one year after the endorsement of the ERA communication. The analysis highlights that only half of the Member State indicators are implemented at least to a medium degree by a clear majority of countries ([2]). This rate is particularly low for priority area 4, 'Gender equality and gender mainstreaming in research'. This situation can be explained by several factors such as the short time between the endorsement of the communication and the production of this report.

It seems that the degree of development of policies is higher in Nordic and western European countries than in Central and Eastern European Member States. The situation of Southern European Member States varies from one country to another. A distinction between Member States and associated countries did not appear to be relevant. Indeed, Norway and Switzerland show a high degree of development of policies compared to a majority of Member States.

Public authorities may use different means to implement public policies, such as laws and other regulatory instruments, coordination activities, dissemination of knowledge to increase awareness and financial incentives. During this investigation, the qualitative analysis showed that the possibility to compare such different measures is limited. That is why it is advised, when relevant, to add a second level of analysis to binary indicators to identify if a measure is a mandatory requirement, a soft measure or a financial measure, in order to allow better clustering of countries.

The results presented by this report highlight that the measures recommended by the ERA communication are still not fully implemented at national level. This underlines the need to develop a robust monitoring instrument. It will be possible only if appropriate sources are available. However, it was identified during the data collection for this report that such sources covering all the items of the ERA are missing. A coordinated approach will be set up to develop the sources feeding an ERA monitoring tool. It will also take into account the need of regular and coordinated updates.

The degree of centralisation in terms of public authorities being responsible for research and innovation, the degree of autonomy of stakeholders (HEIs and PROs) and the respective externalisation of research policies to dedicated agencies, and the division of competences between national and local authorities, are very different among EU Member States. An ERA monitoring instrument needs to capture these differences and should therefore employ a multidimensional approach including the following.

- Public authorities (including national and local authorities, as well as public funders): identification and characterisation of measures implementing the ERA communication.
- Stakeholders/implementers (including HEIs and PROs): assessment of the effective implementation of measures relating to the ERA communication. A survey such as the one launched in 2012 by the Commission could be the tool used to collect the information.

([2]) A 'clear majority of countries' is defined as at least two thirds of the selected countries.

- Researchers: they are, for certain aspects, users or beneficiaries of the items of the ERA communication. A survey of this community could provide a less institutional assessment of the real situation in each country and on the state of the mobility of researchers in Europe.
- Performance indicators: it is necessary to identify the needs and challenges of different countries and the gaps between policies implemented and results. Indicators based on results are more easily identifiable for certain aspects such as the proportion of females in research, but are more difficult to define for other issues.

1. INTRODUCTION

1.1. The concept of the European Research Area

The ERA was initiated in 2000 by the Lisbon Council with the objective of creating a single European market for research, embracing free circulation of knowledge and international connectivity ([3]). Since 2000 the ERA has been a central concept guiding European research policy. The rationale for creating the ERA was the important role of research and development (R & D) in generating economic growth on the one hand, and the fragmented and inefficient coordination of R & D activities at European level on the other.

Since 2000 several achievements with regard to the ERA have been accomplished, and over the years several initiatives to integrate national research activities have been introduced. For example, the establishment of the European Research Council (ERC) has successfully supported the competition-driven excellence of research. The ERA-NETs, together with initiatives under Article 185 of the Treaty on the Functioning of the European Union (TFEU), have paved the way towards joint coordination of regional, national and European research programmes, and Marie Curie actions have facilitated researcher mobility in Europe. The Member States have, for example, agreed upon initiatives towards improved coordination of research infrastructures (European Strategy Forum on Research Infrastructures — ESFRI) and begun to address the grand challenges in cooperation with JPIs.

1.2. European Research Area Member State actions and indicators

The ERA communication is based upon the results of a public stakeholder consultation ([4]) and on an extensive impact assessment ([5]) that evaluated the strengths and weaknesses of the past progress and possible future developments. The communication defines a number of actions for Member States, stakeholder organisations and the European Commission in the following five priority areas, in order to achieve progress regarding the ERA:

- priority area 1 — more effective national research systems (PA1);
- priority area 2 — optimal transnational cooperation and competition (PA2);
- priority area 3 — an open labour market for researchers (PA3);
- priority area 4 — gender equality and gender mainstreaming in research (PA4);
- priority area 5 — optimal circulation, access to and transfer of scientific knowledge (PA5).

For each Member State action in the respective priority areas the European Commission has set up a number of indicators and sub-indicators relating to key evaluation questions concerning the degree of development of actions in the Member States and associated countries. These were specified in the terms of reference of the study and constituted the minimum type of information that needed to be screened and collected in the course of this study.

([3]) European Commission communication, 'Towards a European research area', COM(2000) 6 final.
([4]) See http://ec.europa.eu/research/era/consultation/era_consultation_en.htm
([5]) Commission staff working document 'Impact assessment accompanying the document "A reinforced European Research Area partnership for excellence and growth"', SWD(2012) 212 final (http://ec.europa.eu/research/era/pdf/era-communication/era-impact-assessment_en.pdf).

1.3. Objectives and tasks of the study

Against this background, the main objective of this study was to assist the Commission in identifying and analysing the current baseline situation in each Member State and a limited number of associated countries for each action defined in the ERA communication.

The tasks of the study consisted of:

- revising and refining the ERA progress indicators and sub-indicators proposed by the Commission concerning Member State actions in each of the five priority areas;
- collecting quantitative and qualitative data for each action at national (and regional, if deemed appropriate) level to estimate the indicators associated with each of these actions;
- analysing the state of play as regards the actions identified in the Commission communication in each Member State and in a limited number of defined associated countries.

Hence, the study included the following data-gathering and data collection tasks.

Data-gathering tasks:

- identification and collection of official statistics and available data, as well as analysis of legal and other barriers;
- revision and refinement of a set of indicators for each action and an overview of information gaps in quantitative and/or qualitative data, justifying the selection of one or the other;
- presentation of a methodological note for each action, containing an indication and justification of the data collection methods used and a thorough analysis of the quality, comparability and relevance of the data;
- suggestions for possible additional ways/indicators to fill in information gaps in the future;
- organisation of all data gathered in a Microsoft Office Access database.

Data-analysis tasks:

- a presentation of the state of play in Member States and associated countries, where relevant, as regards the actions defined in the Commission communication;
- identification of best practices and barriers hampering the implementation of some actions;
- development of a typology of countries for each priority area;
- an analysis of relative importance and relevance of the underlying indicators in each priority area in the Member States and associated countries where relevant;
- support analysis using graphs, tables and maps, as well as country profiles in annex.

1.4. Study results and structure of the report

The present report provides the results of the final study output, which is based upon an analysis of the ERA baseline database, established in the course of this study, which has been delivered to the Commission services.

Chapter 2 of this report details the methodological approach of the study and provides an assessment of the relevance and usability concerning the indicators. A detailed discussion of the indicators is provided in the methodological note report (Annex III).

Chapter 3 of this report provides a thorough qualitative and quantitative analysis for each priority area. The indicator template used for data collection is provided in Annex I to this report. The descriptive statistics and graphs for all indicators for each priority area and Member State action are provided in Annex II to this report. The country reports, which resulted in the course of the data collection exercise, are provided in underlying country reports and all graphs and tables supporting the analysis are provided in Annex IV to this report.

Chapter 4 provides the recommendations of the report. It provides a summary concerning the overall degree of development of actions in the Member States and recommendations concerning the development of indicators. In this respect, Annex V to this report provides a proposal for a new indicator template.

2. METHODOLOGICAL APPROACH

2.1. Establishing the indicator base

For each priority area identified by the ERA communication, a set of indicators and sub-indicators was defined by the Commission's services. Based on the existing preparatory work of the Commission the goal was to slightly modify the indicator bases and the breakdown of sub-indicators, and to provide consequent suggestions for improvements. The goal was to have an indicator set that would meet the requirements, i.e. providing sufficient evidence base regarding the progress of the ERA in Member States. In setting up the indicators the following prerequisites were considered:

- each indicator should be easily understandable by the stakeholders without further refinement or lengthy explanation;
- each indicator should be meaningful, readily comparable and should offer clear and specific conclusions;
- each indicator should be readily measurable and not too difficult to collect in terms of the time and financial resources required.

In order to build the indicators, the approach was to develop numerical indicators assessing the degree of development of measures regarding the ERA. Thus the indicators were developed in different measurement scales including indicators measured in ratio (percentage), interval (euros, number of units), ordinal (Likert scale) and nominal (dichotomy yes/no) scales.

A key challenge was the provision of an assessment for a wide majority of facts that are not measurable as such. This is why Likert scales were used in order to provide an understanding of the level of adoption of policies and measures based on several sources of information. The Likert scale rating was performed using the following model:

- systematically
- to a high degree
- to a medium degree
- to a low degree
- never.

For each Likert scale indicator a rating guideline was provided to the country correspondents in order to ensure coherence of assessment.

Based on the indicator structure a common template and guidelines for data collection were established ([6]). The data collection template included the following items for each indicator and sub-indicator.

Implementation	Year of implementation	Legal text (yes/no)	Reference to the source used	Major indicator limitations	Comments on the assessment made

2.2. Data-gathering approach

The data collection exercise focused on the assessment of the effectiveness of measures or actions implemented by public authorities regarding the ERA. The notion of 'public authorities' comprises ministries and other government bodies at national level. This was extended to local authorities for countries in which education and research are mainly the

([6]) The data collection template can be found in Annex 1. The methodological notes report details the methodological approach of the study and highlights respective data gaps.

competence of sub-national authorities and agencies, where research policy and/or funding have been transferred to this type of body. The information was collected for each of the 28 Member States and the following associated countries: Iceland, Israel, Norway, Switzerland and Turkey.

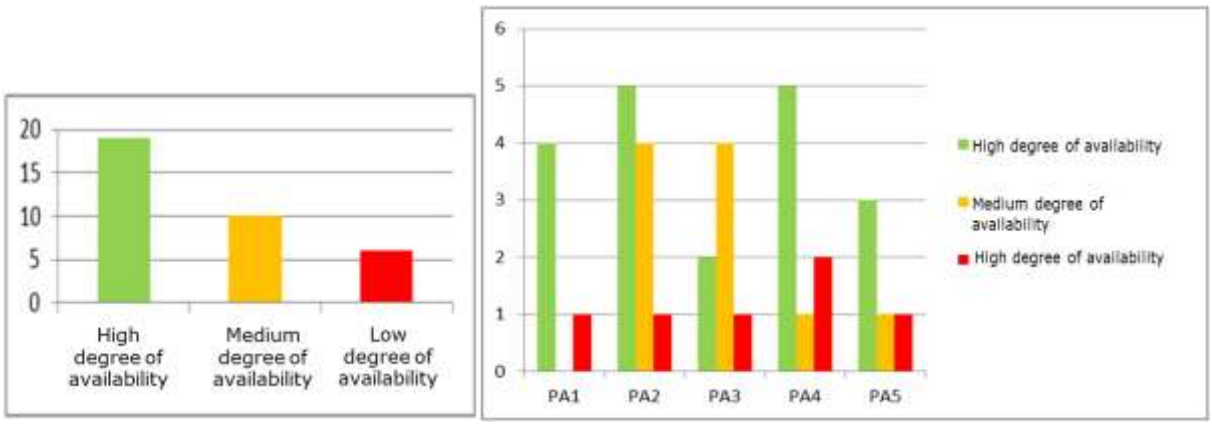
The data collection method was narrowed down to include only desk research on available documentation at European and national level. The data was collected through the following steps:

- Identification and collection of relevant data from statistical databases and text sources at European Level (Erawatch, pan-European surveys and studies),
- Screening and collecting the relevant data from available sources at national level, including:
  - legal texts when available,
  - policy documentation,
  - information available on national government web pages,
  - other national secondary sources (studies, reports, etc.).
- Filling in the data collection template in accordance with the guidelines, including the assessment of each indicator and sub-indicator, together with the notification of indicator limitations, comments on assessments made and adequate reference to the data sources applied.

2.3. Data analysis: availability of data and data quality

The goal of the assessment of the availability and reliability of data collected was twofold. The objectives were firstly to ensure the quality and transparency of the data collection, and secondly to give suggestions for the improvement of future exercises. For each indicator and its sub-indicators, the analysis ensured that the information collected covered a sufficient number of countries to provide a reasonable basis of analysis. Figure 1 shows that the availability of data was acceptable (high degree or medium degree of availability) for 29 indicators and problematic for six indicators.

Figure 1: Degree of availability of data — overall and for each priority area



Source: ERA baseline database.

In general, the low degree of data availability was caused by:

- a lack of quantitative data in fields where robust statistics do not exist;
- a lack of information/secondary source due to the newness of the area analysed.

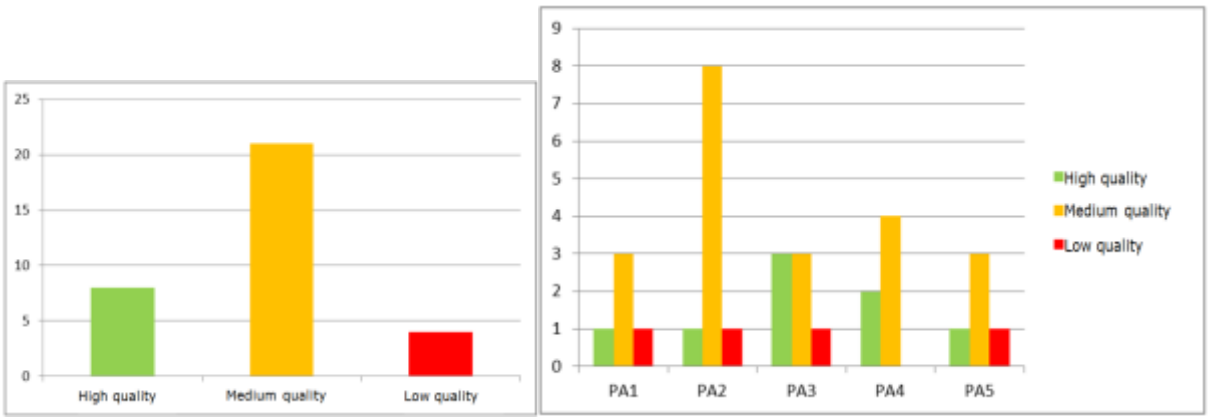
Whilst the indicators with lowest rate of available data were equally distributed between the priority areas, the indicators with a medium degree of availability were more concentrated in priority areas 2 and 3. This was associated with a higher share of sub-indicators relating to information on budget allocation, which were rarely available, and assessments based on secondary sources that are not standardised enough to provide the same level of information for all countries.

To measure the degree of reliability of the collected information the so called SMART assessment was applied. It analysed if the information was comparable due to a correct level of specificity, measurability, acceptability and relevance of time-bound information. The analysis highlighted that the quality of the information is low only for a limited number of indicators. In all these cases this is the result of the very low degree of availability of information or a lack of robust, comparable information.

Figure 2 also denotes the limited number of indicators with a high quality level and the predominance of a medium quality of comparison, independently of the priority areas. This was caused by a series of factors, including:

- the impact of the medium degree of availability of data in certain cases;
- the lack of uniformed comparable statistics in certain priority areas;
- the lack of specificity of sub-indicators that refer to policy orientation but are hardly convertible as such for an assessment;
- the diversity of systems and of sharing of responsibilities between national public authorities, local authorities, public funders and stakeholders;
- the diversity of means used by public authorities, such as mandatory rules, soft measures, financial incentives, etc.

Figure 2: Degree of reliability/quality of data — overall and for each priority area



Source: ERA baseline database.

2.4. Assessment of the appropriateness of the approach

The chosen analytical approach is relevant for the identification and assessment of measures and actions regarding the ERA at Member State level and to provide a picture of the degree of development of policies in each ERA priority area. This corresponds with the European Commission's need to have a better overview of the implemented measures in order to pursue its monitoring activities.

However, the method chosen may not provide a sufficiently reliable basis for the provision of robust country rankings, and a monitoring system is not an appropriate tool to measure the effectiveness of Member State actions. Hence, a relevant part of the implementation of the Member State actions concerning the ERA remains out of the scope of this data-gathering and data-analysis study, including the following:

- The effectiveness of measures: the existence of a policy measure does not mean that it appropriately addresses the issue in reality,
- The diversity of governance systems of research and innovation actors, comprising systems where the initiative is mainly at the level of HEIs and PROs versus more centralised systems,
- A lack of measures: where no measures exist, this does not automatically imply a policy deficit. It is possible that certain policy aspects may not need to be addressed (any more) in certain countries or are already addressed by other means or actors,
- Wider cultural and economic aspects: identifying and assessing only the existence of specific policies does not take into account the political, cultural and societal differences between countries and their challenges in regard to the five priority areas.

For these reasons the development of a robust comparative tool for assessing ERA progress shall also take into account several dimensions such as the initial performance of the research and innovation systems and activities carried out at stakeholder level (HEIs and PROs) contributing to the implementation of the ERA.

2.5. Illustration of the methodology: an example of the collection and analysis of information for an indicator

This section presents the methodology and analytical framework through the example of the indicator 'Assessment of the degree of adoption/implementation of national knowledge-transfer strategies focusing on knowledge transfer between the public and private sectors' (MS46_46), which is one of the five indicators identified for priority area 5 'Optimal circulation, access to and transfer of scientific knowledge'.

The metric for this indicator is a Likert scale assessing the degree of adoption/development of national knowledge-transfer strategies focusing on knowledge transfer between the public and private sectors. It is complemented by 10 sub-indicators using two types of metric — nominal scales (dichotomy yes/no) and interval (euros, number of units) — as indicated below.

Box 1: Indicator and sub-indicators relating to the degree of adoption/development of national knowledge-transfer strategies focusing on knowledge transfer between the public and private sectors

Indicator: **MS46_46**	**Assessment of the degree of adoption/development of national knowledge-transfer strategies focusing on knowledge transfer between the public and private sectors**		
Sub-indicator:		(1)	Metrics:
MS46_46a	Support for networking and communication activities with the private sector	(2)	Yes/No
MS46_46b	Support to hire professors or staff whose primary occupation is in the private sector and not in the higher education sector	(3)	Yes/No
MS46_46c	Support for the implementation of research training agreements with private-sector organisations	(4)	Yes/No
MS46_46d_1	Support for structured programmes for placements in the private sector (e.g.	(5)	Yes/No

	internships) for researchers		
MS46_46d_2	Support for structured programmes for placements in the private sector (e.g. internships) for researchers	(6)	Annual budget allocated in EUR
MS46_46e	Support for the implementation of bilateral agreements with non-public organisations for specific projects	(7)	Yes/No
MS46_46f_1	Support for IPR, including patents	(8)	Yes/No
MS46_46f_2	Support for IPR, including patents	(9)	Annual budget allocated in EUR
MS46_46_1	Support for the creation, management and/or follow-up of spin-offs	(10)	Yes/No
MS46_46_2		(11)	Annual budget allocated in EUR

The main sources used to collect information on each sub-indicator were the country profiles of the 'Researchers' report 2012', in particular Chapter 6 relating to the collaboration between academia and industry, complemented by Erawatch country reports and national sources. These sources provided relevant information to conduct an assessment of 77 % of the countries. However, the difference in the availability of data between sub-indicators using an interval metric (only 23.3 % of assessment) and qualitative sub-indicators (84 % of assessment) is very high. This is why the general assessment of this sub-indicator is qualified as being of medium quality in the methodological note provided to the European Commission.

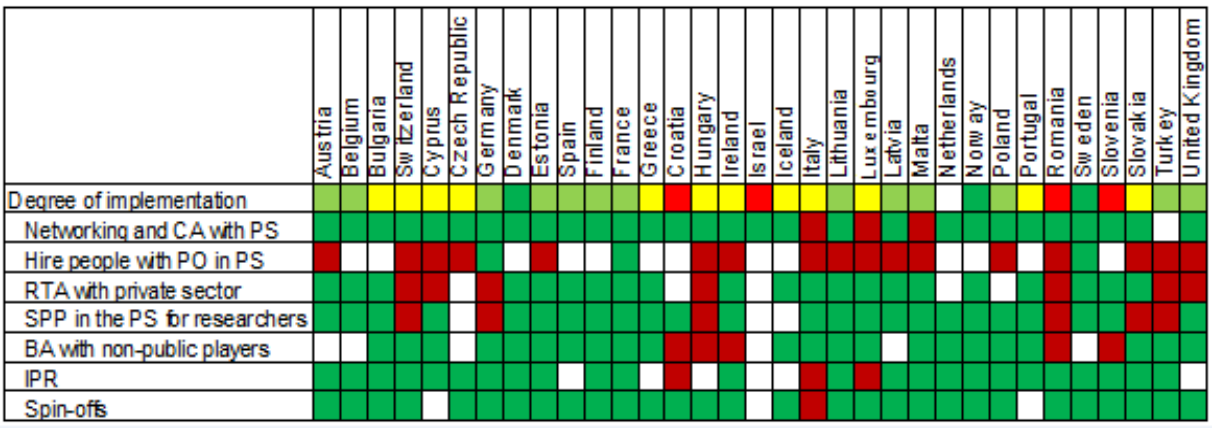
The indicator itself was assessed using the information collected for each sub-indicator. For the determination of the value of the Likert scale, each country expert used the following guidelines.

Box 2: Guidelines for the determination of the Likert scale for indicator MS46_46

Assessed 21 (systematically): when robust measures are adopted at national level covering all the aspects assessed by the sub-indicators.
Assessed 22 (to a high degree): when robust measures are adopted at national level covering a majority of the aspects assessed by the sub-indicators.
Assessed 23 (to a medium degree): when measures at national level cover several of the aspects assessed by the sub-indicators.
Assessed 24 (to a low degree): when measures at national level cover a few of the aspects assessed by the sub-indicators.
Assessed 25 (never): when no measures at national level focusing on knowledge transfer between the public and private sectors were identified.

The results of the assessment by country of this indicator and its sub-indicators are summarised in the table below. Sub-indicators using an interval metric were excluded as the quality of the assessment was not high enough, as explained above.

Table 1: Assessment by country of the degree of adoption/development of national knowledge-transfer strategies focusing on knowledge transfer between the public and private sectors

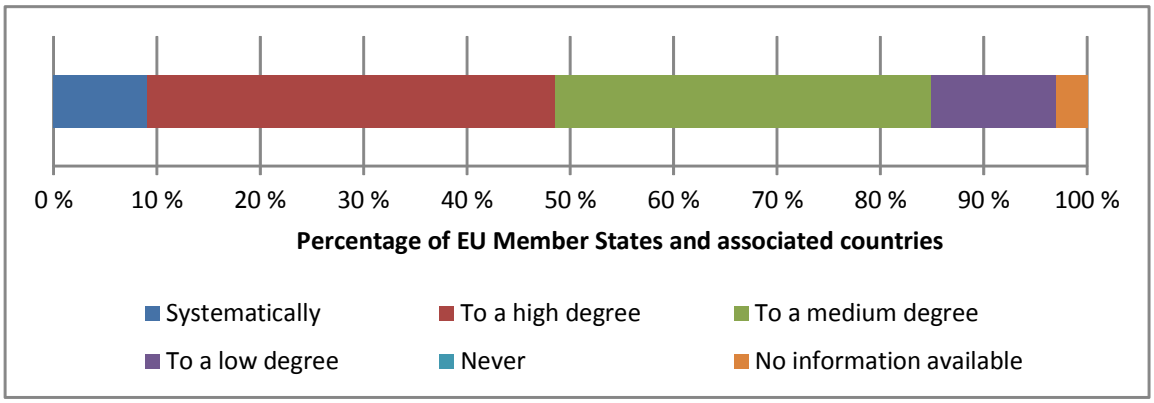


Note: Likert scale colour codes (degree of implementation row): dark green — systematically; light green — to a high degree; yellow — to a medium degree; light red — to a low degree; dark red — never; white — no information.
Other rows: green — yes; red — no; white — no information.
Abbreviations: CA — communication activities; PO — primary occupation; PS — private sector; RTA — research training agreements; SPP — structured programmes for placement; BA — bilateral agreements.

Source: ERA baseline database.

Finally, the assessment of the indicators is presented in an aggregated way to show the global degree of development of policies and measures, as presented in the figure below.

Figure 3: Degree of adoption/development of national knowledge-transfer strategies focusing on knowledge transfer between the public and private sectors



Source: ERA baseline database.

This figure focuses only on the assessment of the indicator, but reflects indirectly the information collected for the assessment of the sub-indicators. The analysis conducted in Chapter 3 is based on these results, as well as the qualitative information collected for each indicator and sub-indicator in the country reports. The box below presents an extract from the French country report relating to the indicator.

Box 3: Extract from the section of the French country report relating to the degree of adoption/development of national knowledge-transfer strategies focusing on knowledge transfer between the public and private sectors

It is one of the ANR's major objectives to intensify research partnerships between public institutions and French companies. To meet these challenges, ANR has put in place — in addition to its targeted and bottom-up collaborative calls for proposals — specific instruments in the form of programmes called 'Carnot', 'Emergence' and 'Industrial chairs'.

Industry agreements for training through research (CIFRE — Conventions Industrielles de Formation par la Recherche) have the objectives of strengthening exchanges between public research laboratories and business, promoting the employment of doctors in business and contributing to the process of innovation of French companies. CIFRE is funded by the Ministry of Higher Education and Research (MESR — Ministère de l'Enseignement supérieur et de la Recherche) and implemented by National Association of Research and Technology (ANRT — l'Association nationale de la recherche et de la technologie). One thousand three hundred and fifty new agreements were signed in 2012.

Laboratories and common structures for public–private research (S.C.R — les laboratoires ou structures communes de recherche public/privé) are the most integrated form of research partnerships. Two hundred and fourteen structures are identified. One of the objectives of the Carnot programme is to engage the Carnot institutes more closely in business. The Carnot label, established in 2006, is a label of excellence awarded by the MESR to research institutions in France. It is intended to foster research partnerships in order to conduct research in public laboratories in partnership with socioeconomic actors, especially with companies.

France Brevets was created as part of the future investment programme. France Brevets is an intermediary between patent holders and potential users. This new player in the sphere of innovation will improve the value of public and private R & D, including the use of patent pools into coherent clusters and the implementation of development strategies in France and internationally. Launched on 9 June 2011 with a capital of EUR 100 million, France Brevets is a French investment fund specialising in intellectual property. Its mission: to enhance corporate patents and PROs.

The MESR supports business incubator centres that are an accompanying structure to create an innovative company. Their primary mission is to promote the transfer of technologies developed in public research laboratories to the private sector through the creation of enterprises. They provide support in terms of accommodation, counselling and research funding. Thirty registered multi-sectorial business incubator centres have been established. They were created primarily by higher education and research institutions (EPSCPs — établissement public à caractère scientifique, culturel et professionnel; and EPSTs — établissement public à caractère scientifique et technologique) under the provisions of the law on innovation and research in 1999.

3. ANALYSIS OF THE STATE OF PLAY FOR EACH PRIORITY AREA

The following sections provide an analysis of the state of play in the EU Member States and the selected associated countries as regards the development of the actions defined in the ERA communication. The comparative analysis presented in this chapter aims at providing a synthetic view concerning the advancement of the ERA communication 'A reinforced European Research Area partnership for excellence and growth'. An overview of the situation in each Member State and figures and tables showing the situation in each priority area have been provided to the Commission services.

We highlight the degree of development of measures in European Member States and associated countries. By means of qualitative text analysis of the underlying policy measures/actions in each priority area, typical sets of measures developed by countries or distinct groups of countries are set out and highlighted. This also includes the provision of good practices as well as important barriers hampering development. Where relevant, the analysis also addresses the relative importance of the ERA's progress indicators.

3.1. Priority area 1: More effective national research systems

Making national research systems more effective requires a system of public funding of research which adequately responds to the challenges and capacities of the country's research-performing organisations. Competition for research funding at national level is expected to drive the effectiveness of innovation systems and trigger maximum value for public money invested in research. An increased level of competition is linked with excellence in research and it is argued in particular that: (a) scientists that are evaluated against international benchmarks have a higher quality of research; and (b) a competitive research funding environment is associated with increased productivity of the research system ([7]).

Indeed, several studies have found that increased competition between researchers can have a positive impact on research performance ([8]), and performance-based research-funding systems can provide powerful incentives within university systems (i.e. also having an impact on internal competition and allocation mechanisms within universities) ([9]). Therefore, to make progress in achieving the ERA, the European Commission asked Member States to introduce or enhance competitive funding through: (a) calls for proposals; (b) institutional assessments as the main modes of allocating public funds to research and innovation, introducing legislative reforms if necessary; and (c) ensuring that all public bodies responsible for allocating research funds apply the core principles of international peer review ([10]).

3.1.1. Assessment of the degree of development of (competitive) project funding

Research project funding ([11]) can be defined as money assigned to a group or an individual to perform a research activity limited in scope, budget and time, normally on the basis of the submission of a project proposal describing the research activities to be done ([12]). Although project funding is not necessarily competitive, the national level of

---

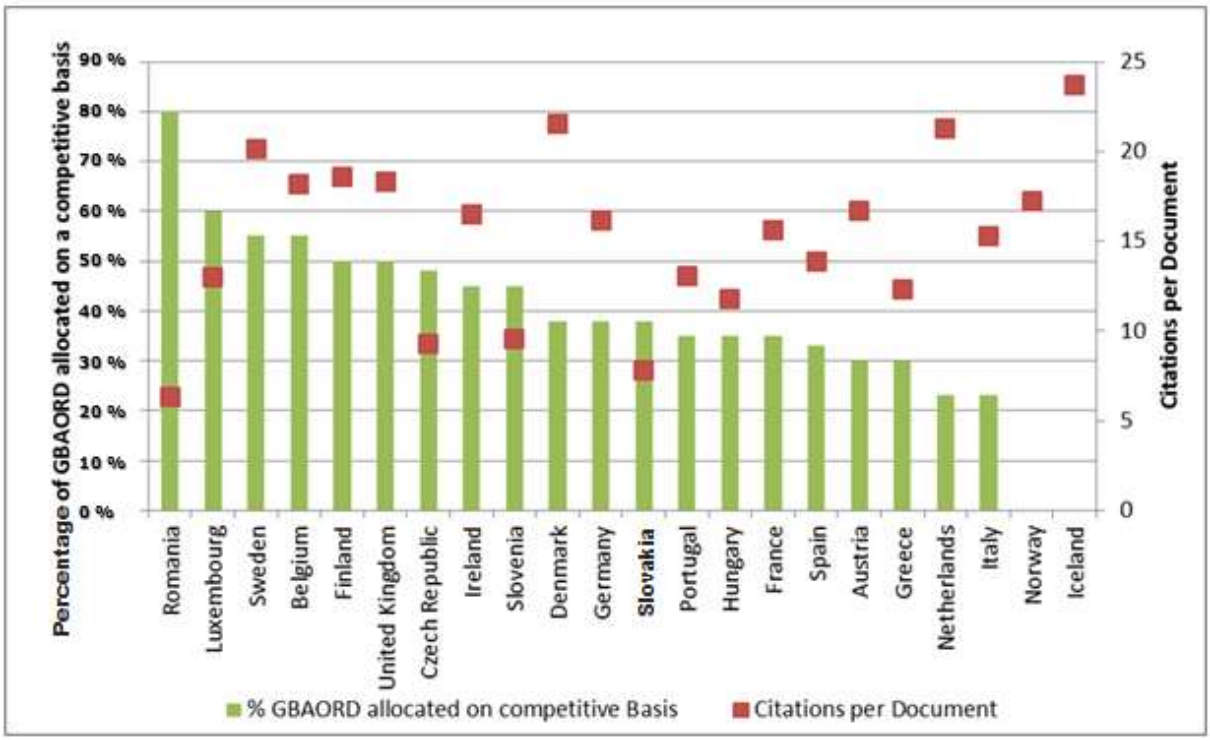
([7]) http://ec.europa.eu/research/era/pdf/era-communication/era-impact-assessment_en.pdf
([8]) See Georghiou, L., 'Effectiveness of national research systems', discussion paper for the 2013 ERAC Mutual Learning Seminar on Research and Innovation Policies, session 1, Brussels, March 2013.
([9]) Hicks, D., 'Performance-based university research funding systems', *Research Policy*, Vol. 41, No. 2, 2012, pp. 251–261 (http://works.bepress.com/diana_hicks/27).
([10]) European Commission communication, 'A reinforced European Research Area partnership for excellence and growth', COM(2012) 392 final.
([11]) Indicator MS1_01: Share of GBAORD allocated on a competitive basis.
([12]) Lepori, B. et al., 'Indicators for comparative analysis of public project funding: concepts, implementation and evaluation', *Research Evaluation*, Vol. 16, No. 4, 2007, pp. 243–255.

project funding is to a large extent competitive if respective allocation procedures are implemented (i.e. based upon a call for proposal and a proposal evaluation based upon certain selection criteria).

Several attempts have been made to categorise and measure the degree of (competitive) project funding at national level, using surveys of research-performing organisations and analysis of public accounts ([13]). However, despite being of the utmost importance for studying the effects of funding modalities on research performance, as of today no harmonised statistical data-gathering approach exists which would allow regular comparison of national levels of project funding across Europe, its distribution among different types of research actors and its evolution over time.

The most recent data on the share of government budget appropriations on R & D (GBAORD) allocated through calls for proposals are presented in Figure 4. Within the EU Member States for which data are available, between approximately 20 % and 80 % of GBAORD are allocated through calls for proposals. This implies that European researchers and research organisations still face very different framework conditions, not only as regards the volume of research funding resources but also as regards access to research funds ([14]). On average, approximately 40 % of GBAORD are allocated through calls for proposals.

Figure 4: Share of GBAORD allocated through calls for proposals



Source: OECD, based on preliminary data from the microdata project on public R & D funding of the working party of National Experts in Science and Technology (NESTI), 2009–10, Commission estimations for missing observations and SCImago.

([13]) See, for example, de Dominicis, L. et al., 'European university funding and financial autonomy — A study on the degree of diversification of university budget and the share of competitive funding, JRC-IPTS, 2011 (http://erawatch.jrc.ec.europa.eu/erawatch/export/sites/default/galleries/generic_files/JRC63682.pdf).

([14]) Neglecting the issue that the indicator does not take into account the different types of recipients of project funding measures.

Interestingly, all new EU Member States for which data are available already exhibit comparatively high shares of project funding, while their research performance (average number of citations per document) is still far from reaching levels of the EU-12.

Another group of countries is characterised by high shares of competitive funding and high performance (Belgium, Finland, Sweden and the United Kingdom). However, there are also a number of countries with considerably lower shares of competitive funding exhibiting similar research performance patterns (Austria, Denmark, Germany and the Netherlands). In these countries, general university funds (GUFs) for R & D account for large shares of public R & D spending.

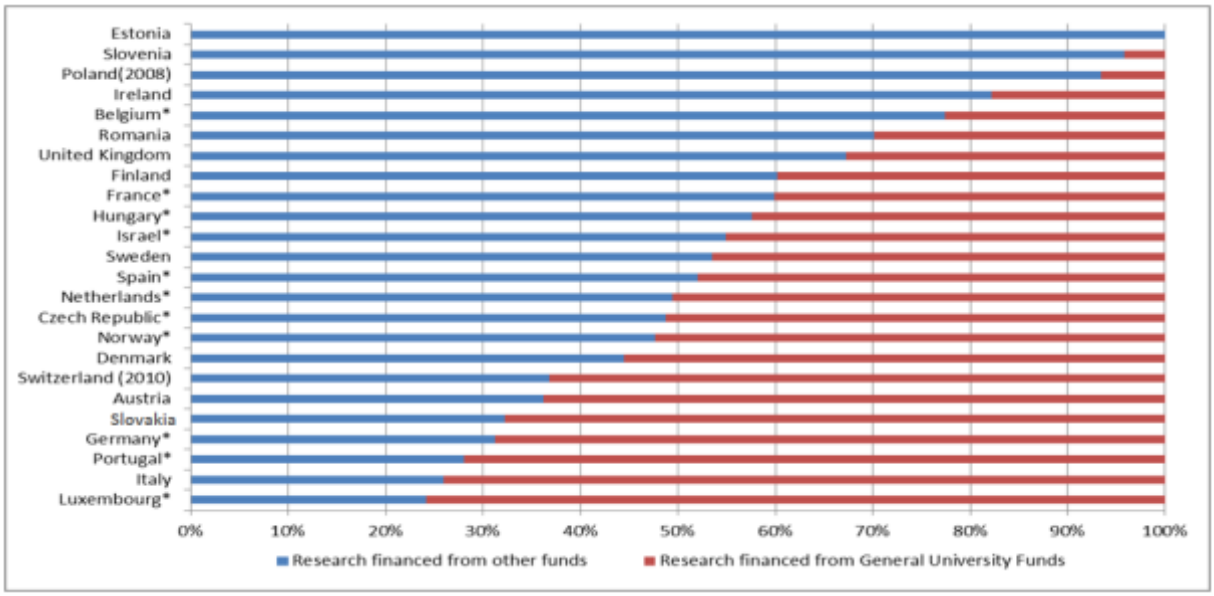
3.1.2. Assessment of the degree of development of measures which make institutional funding more competitive

Competition among actors within the research system can also be increased by implementing measures defining the allocation of institutional funding on a competitive basis (i.e. through the use of evaluations, performance contracts and formula-based research-funding systems).

At present, European monitoring of measures seeking to make institutional funding more competitive is confined to the higher education sector. Only a very limited number of pilot studies have focused on institutional funding procedures for PROs, which are even more diverse than HEIs and major players of R & D performance, in particular in Central and Eastern European EU Member States.

Among EU Member States and associated countries, GUFs account for very different shares of R & D performed by HEIs (higher education research and development — HERD) in Europe (Figure 5), implying that the degree of steering that can be achieved by the development of measures that make institutional funding more competitive is very different throughout the ERA. On average, GUFs account for 45 % of HERD in European Member States in 2011.

Figure 5: Higher education R & D financed by GUFs and other sources



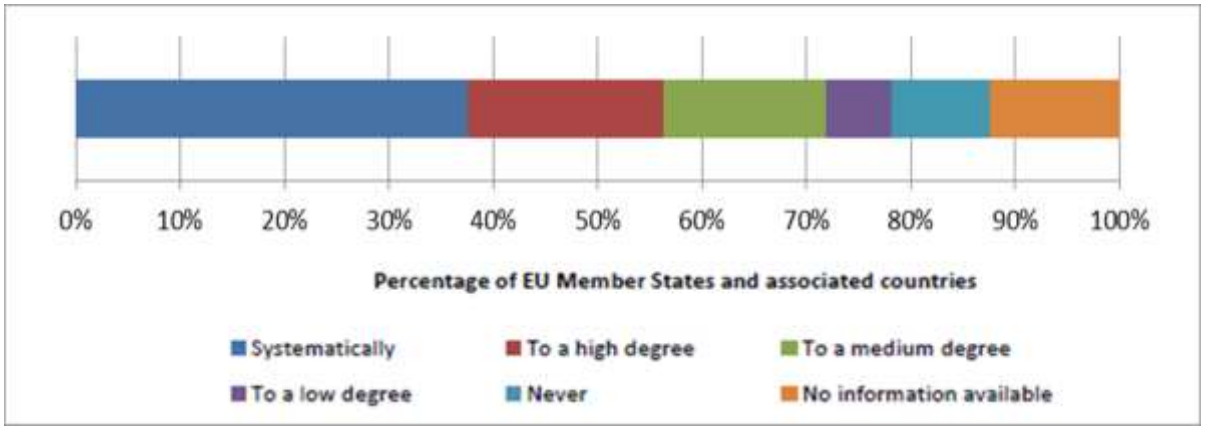
Source: OECD research and development statistics, extracted in September 2013. Data are for the year 2011. Figure comprises data from two datasets. The dataset 'Gross domestic expenditure on R & D by sector of performance and source of funds' was used as the main source for calculating the share of HERD financed by

GUFs (GUFs/total R & D expenditures conducted by the higher education sector). For countries marked with an asterisk (*), GUF data stem from the dataset 'Government budget appropriations or outlays for RD' (2011).

Today, many Central and Eastern European countries have rapidly reshaped their funding mechanisms and moved away from bureaucratic planning and negotiations-based approaches by making more use of market-based approaches when redesigning their research and innovation landscape ([15]). As Figure 5 consistently shows, the newer EU Member States in particular (Estonia, Poland, Romania and Slovenia) have put in place R & D funding systems in which GUFs are almost absent from public R & D funding.

Among the older EU Member States, Belgium, Ireland and the United Kingdom (pioneering performance-based research funding in Europe) show clearly below-average shares of R & D financed by GUFs.

Figure 6: Assessment of the degree of development of measures defining the allocation of institutional funding on a competitive basis



Source: ERA baseline database.

The results of the ERA state-of-play analysis in Member States and associated countries show overall a high degree of development of measures defining the allocation of institutional funding on a competitive basis (Figure 6).

A number of national actions for establishing performance-based research-funding systems have been launched in recent years in order to provide incentives for institutions to spur excellence in research ([16]). However, the actual status of development is very different among EU Member States and the funding systems are also found to be 'complex, dynamic systems, balancing peer review and metrics, accommodating differences between fields and involving lengthy consultation with the academic community and transparency in data and results' ([17]).

Four different approaches can be distinguished for public research: negotiation, incremental, formula funding and contract funding ([18]). Results from the ERA baseline

([15]) Jongbloed et al., 'Progress in higher education reform across Europe — Funding reform', 2008.
([16]) Jongbloed et al., 'Progress in higher education reform across Europe — Funding reform', 2008.
([17]) Hicks, D., 'Performance-based university research funding systems', *Research Policy*, Vol. 41, No. 2, 2012, pp. 251–261 (http://works.bepress.com/diana_hicks/27).
([18]) For a concrete definition, see Jongbloed et al., 'Progress in higher education reform across Europe — Funding reform', 2008, p. 47.

review show that trends emerging between 1995 and 2008 ([19]), in which incremental funding (i.e. funding based upon historic patterns) in many countries has been replaced by formula-based approaches and contract approaches, have persisted. The overall volume of block funds across Europe has continued to decrease and funding mechanisms detailed in legislation have continued to place more emphasis on performance.

While input measures such as the number of enrolled students actively participating in courses and the number of research staff continue to determine large shares of GUFs in many European countries, performance measures relating to certain output indicators such as the number of doctoral degrees awarded, income and increase of third-party funding (sometimes differentiated by source of income) and scientific publications (both quantity and quality) are increasingly used.

However, considerable differences concerning the weighting of indicators and also the time period for which funding is allocated (ranging from annual recalculations to multiannual allocations) can be seen.

- A number of performance-based institutional funding systems allocate joint funds for both teaching and research. Institutional funding items as such comprise allocations reserved for teaching, research and (sometimes) specific funds reserved for infrastructure investments or other strategic funds. The weighting between the different items of institutional funding differs considerably among EU Member States, and also regulations concerning the use of these funds are not coherent (autonomy in spending funds for certain purposes).
- Only in a limited number of European Member States are quantitative and qualitative assessment methods combined. For example, in Austria, funding for universities is actually based upon performance contracts set between the Ministry of Education and individual universities in which qualitative and quantitative indicators in nine performance areas are considered. Qualitative *ex post* assessments, which assess the quality of research and directly relate to funding aspects, are limited across EU Member States.
- Current reforms in performance-based funding systems increasingly seek to reduce the complexity of systems while increasing the efficiency and effectiveness of measures. Hence, for the large majority of EU Member States, at least some measures have been implemented seeking to make institutional funding more competitive. However, no consistent information exists concerning the share of institutional funding that is allocated on a competitive basis ([20]).

Countries with low indicated levels of development either show low levels of institutional funding or are currently pursuing strategies seeking to provide universities with greater autonomy on the one hand while introducing new performance frameworks on the other.

3.1.3. Assessment of the degree of development of the core principles of international peer review

Peer review constitutes a basic quality-control mechanism in the allocation of (project) funds. Although there are no uniform procedures for the implementation of peer reviews, good principles of international peer-review practices have emerged to which the peer-

---

([19]) Jongbloed et al., 'Progress in higher education reform across Europe — Funding reform', 2008.
([20]) ERA indicator MS01_02, 'Share of institutional funding allocated on a competitive basis' is rarely available and not comparable across EU Member States.

review process should conform, independent of the type of R & D instrument or research activity funded: excellence, impartiality, transparency, appropriateness for purpose, efficiency and speed, confidentiality, or ethical and integrity considerations ([21]).

In the EU Member States, data from the ERA baseline database show that the overall degree of development of measures/laws defining that research funding institutions have to apply the core principles of peer review can be considered as good. In 62 % of Member States and associated countries the status of development has been ranked either 'systematically' or 'to a high degree'.

International peer-review standards are applied for allocating national funding by funding institutions in more than half of the countries. In 13 countries all funding institutions apply these principles, while in four countries half of the funding institutions follow the international peer-review standards.

Funding institutions apply principles of international peer review, especially for academic-oriented R & D programmes, whereas funding for more applied R & D programmes geared predominantly towards industrial actors focuses more on market aspects, potential for realisation and economic impacts. Also, applying international peer-review standards does not automatically imply that these funding institutions are also involved in programmes and initiatives which mutually recognise the results of peer reviews in other EU Member States.

The development of measures is by and large via soft rules, and varies considerably among EU Member States. Only in about 30 % of countries are measures developed by legislative actions. In the majority of Member States research project funding is delegated to intermediary organisations (research councils, science funds, etc.). These organisations sometimes exhibit a high level of autonomy and are held accountable for installing proper funding procedures by means of evaluations, etc.

Germany and Sweden are also among the few countries with low levels of development, yet it has to be noted that the respective rankings of Germany and Sweden are low only because no formal government directives or recommendations exist which explicitly state that review processes have to adhere to specific criteria. In both countries a number of public and private research funding bodies exist which provide research project funds on a competitive basis ([22]). In particular, the scientific oriented research funding bodies in both countries adhere to most of the good-practice principles concerning the use of peer review in project evaluations.

3.2. Priority area 2: Optimal transnational cooperation and competition

Optimal transnational cooperation and competition in Europe is needed to achieve a critical mass of efforts and to address grand challenges with limited public research funds available. The European Commission has introduced several instruments, actions and initiatives to support pan-European collaborative research activities and research infrastructures, as well as pan-European competition for research funding. Pan-European research cooperation has been concentrated around these EU-wide initiatives (e.g. framework programme, European Space Agency — ESA), while national efforts stimulating and supporting transnational cooperation seem to lag behind. According to European Commission estimates, in 2010 only 0.8 % of national GBAORD were used for

---

([21]) European Commission, 'Voluntary guidelines on framework conditions for joint programming in research 2010', the High-Level Group for Joint Programming of Research of the European Research Area Committee (http://ec.europa.eu/research/era/docs/en/voluntary_guidelines.pdf). These principles have also been taken up by the European Science Foundation in its peer-review guide.

([22]) For Sweden see: http://www.forskning.se/download/18.1c247649124dd647eb780001024/

joint programmes identified by Member States, including those supported or co-funded by the European Commission such as ERA-NETs, Article 185 activities, etc. ([23]).

Progress in the existence of joint research agendas addressing grand societal challenges, mutual recognition of peer-review results (i.e. funding decisions), specific policies to facilitate cross-border interoperability of national programmes and progress in establishing and granting access to research infrastructures of pan-European interest are crucial for achieving the implementation of the ERA.

3.2.1. Existence of joint research agendas addressing grand challenges

Joint programming activities

Joint programming is a measure used to pool national research efforts in order to make better use of Europe's precious public R & D resources and to tackle common European challenges more effectively in a few key areas ([24]). Joint programming and the definition of joint research agendas support the exploitation of synergies, mobilise cross-border complementarities and allow the scale of effort and impact needed to address grand challenges to be achieved. The joint programming process was launched by a communication of the Commission in July 2008 ([25]) and the Competitiveness Council has adopted several conclusions since, to guide the development of the process.

Since 2009 10 JPIs have been set up ([26]): (1) 'Neurodegenerative diseases JPND', (2) 'Food security, agriculture and climate change', (3) 'Cultural heritage and global change', (4) 'A healthy diet for a healthy life', (5) 'Urban Europe', (6) 'Connecting climate knowledge for Europe', (7) 'More years, better lives', (8) 'Antimicrobial resistance', (9) 'Water challenges for a changing world' and (10) 'Healthy and productive seas and oceans'. Table 2 shows the participation of countries in JPIs.

Table 2: Participation of EU Member States and associated countries in JPIs

Country code	Country	Number of participations/ observer status	Neurodegenerative diseases JPND*	Food security, agriculture and climate change	Cultural heritage and global change	A healthy diet for a healthy life	Urban Europe	Connecting climate knowledge for Europe	More years, better lives	Antimicrobial resistance	Water challenges for a changing world	Healthy and productive seas and oceans
AT	**Austria**	7/1	■	■	□	■	■	■	■		■	
BE	**Belgium**	9/1	■	■	■	■	■	■	■	■	□	■
BG	**Bulgaria**	0/1			□							
CH	**Switzerland**	4	■	■					■	■		

([23]) http://ec.europa.eu/research/era/pdf/era-communication/era-impact-assessment_en.pdf
([24]) http://ec.europa.eu/research/era/what-joint-programming_en.html
([25]) European Commission communication, 'Towards joint programming in research: working together to tackle common challenges more effectively', COM(2008) 468 final.
([26]) For information on the joint programming concept see: http://www.era.gv.at/space/11442/directory/11767.html

CY	**Cyprus**	5		■	■	■	■				■	
CZ	**Czech Republic**	5	■	■	■	■				■		
DE	**Germany**	9/1	■	■	□	■	■	■	■	■	■	■
DK	**Denmark**	10	■	■	■	■	■	■	■	■	■	■
EE	**Estonia**	1/1		■	□							
ES	**Spain**	9/1	■	■	■	■	□	■	■	■	■	■
FI	**Finland**	9	■	■		■	■	■	■	■	■	■
FR	**France**	9/1	■	■	■	■	■	■	□	■	■	■
EL	**Greece**	2/2	■		□					■	□	
HR	**Croatia**	1/1	■						□			
HU	**Hungary**	1/1	■								□	
IE	**Ireland**	8	■	■	■	■	■	■			■	■
IL	**Israel**	3/1		■	□					■	■	
IS	**Iceland**	1										■
IT	**Italy**	10	■	■	■	■	■	■	■	■	■	■
LT	**Lithuania**	2			■							■
LU	**Luxembourg**	1	■									
LV	**Latvia**	1/2			□	■					□	
MT	**Malta**	1					■					
NL	**Netherlands**	9	■	■	■	■	■	■		■	■	■
NO	**Norway**	10	■	■	■	■	■	■	■	■	■	■
PL	**Poland**	8	■	■	■	■			■	■	■	■
PT	**Portugal**	3/2	■		□		□				■	■
RO	**Romania**	6		■	■	■				■	■	■
SE	**Sweden**	9/1	■	■	■	■	■	■	■	■	□	■
SI	**Slovenia**	3/1	■		■	■		□				
SK	**Slovakia**	3	■		■	■						
TR	**Turkey**	7/1	■	■			■	□	■	■	■	■
UK	**United Kingdom**	9	■	■	■	■		■	■	■	■	■
	Number of participants/observer status		24	21	17/8	20	14/2	13/2	13/2	18	17/5	18

* Albania and Canada are also JPI participants in JPND.

The aim of the JPIs is to develop common research agendas, with variable geometry and therefore on a voluntary basis. Joint programming is intended to tackle the challenges that cannot be solved solely at national level and allows Member States to participate in those joint initiatives that seem useful for them.

The ERA baseline analysis shows that virtually all EU Member States and a number of associated countries participate in JPI activities. However, large discrepancies exist concerning the participation of Member States. With the exception of Poland and Romania, virtually all the EU Member States in Central and Eastern Europe, as well as the Baltic states and Southern European countries, participate only in a very limited number of JPIs. On the other hand, a number of smaller countries and long-time members of the EU participate in a large number of JPIs and even act as coordinators of some JPIs.

Concerning activities performed within JPIs, most of the JPIs are currently finalising the creation of their strategic research agendas. According to the ERA baseline database, 60 % of countries exhibit a high degree of development of joint research agendas, with involvement in both EU-supported and bilateral/multilateral joint research agendas, and with several calls issued. Almost all countries have been involved in these initiatives, though with significantly differing budgets.

A review of joint actions undertaken by JPIs has shown that apart from setting up the governance structure of JPIs and the strategic research agenda, the launching of joint research activities via joint calls for proposals has been the first choice for joint activities, as these were perceived to be a good starting point for long-term commitment if no prior experience of cooperation exists, as they develop trust among participants on different levels (e.g. funding owners and agencies) and enforce priority setting within JPIs ([27]).

At present, all calls launched by JPIs were implemented by using a virtual common-pot funding basis. In the virtual common-pot model funds are provided by the national/regional agencies to the successful national applicants. Also, the amount of funding provided to potential national applicants depends on certain (technical) funding criteria, and consequently the monitoring of funds was implemented by national authorities.

Apart from implementing joint calls, JPIs are in the process of implementing a number of other activities, comprising other joint research actions (e.g. research alliances and foresight activities), knowledge sharing activities, networking actions, joint research infrastructure actions and actions to further foster the alignment of national policies and programmes. The great diversity in terms of joint actions was by and large driven by the flexibility that JPIs enjoy. However, this causes difficulties for researchers and the policymaking community in clearly identifying the unique character of JPIs, and poses the risk of increasing rather than decreasing the fragmentation of European research activities.

As regards the existence of *ex post* evaluations for JPIs, it is the case that these are planned for all JPIs due to their specific set-up and regulations.

Other national activities

All countries analysed participate in EU-funded initiatives and programmes for joint programming and joint research agendas, including JPIs, ERA-NETs, ERA-NETs Plus and

---

([27]) Meyer, S., Dinges, M., 'Summary paper for the workshop on funding modalities and peer review for joint programming initiatives', 2013 (http://www.jpis2cowork.eu/images/pdf/Deliverables/D4-1-Conclusion-of-WP4-Workshop-Funding-and-Peer-review.pdf).

Article 185 networks. In addition to JPIs, virtually all EU Member States have set up bilateral/multilateral research strategies and agendas, and international cooperation in research is often mentioned as a priority in national research strategies. However, these do not necessarily address specific themes or topics, let alone grand challenges. And for several initiatives it is not (fully) known what the research agenda addresses, as initiatives are sometimes set up on an ad hoc basis.

Bilateral/multilateral programmes cover collaborations with various countries, both within and outside Europe. For example:

- Austria seeks to focus research internationalisation activities on the western Balkan countries, China, India and Russia;
- the Netherlands focuses on bilateral/multilateral programmes with Africa, China, India and Indonesia, and has some programmes with France, Germany, the United Kingdom and the United States;
- the Nordic countries collaborate in NordForsk, which is an organisation under the Nordic Council of Ministers that provides funding for Nordic research cooperation as well as advice and input on Nordic research policy.

The number of calls from bilateral/multilateral initiatives is far from complete, and also the types of joint bilateral/multilateral measures differ greatly between countries. In some cases international collaboration is confined to the support of mobility schemes for human resources, whereas in others coherent strategies and actions are pursued. Overall, coordinated approaches and actions such as the ones performed in the case of NordForsk are missing in a number of EU Member States (see Box 4 below).

Counting the number of joint bilateral/multilateral schemes and the number of joint calls that follow-on from them is cumbersome in several countries. This is mainly due to a high degree of fragmentation in the funding structure (e.g. many different funding actors) and a large number of bilateral/multilateral schemes and agreements for which it is rather difficult to get a complete overview of information. For example, in some countries calls with predefined priorities have been issued in the past, but there are no open calls at the moment. The budget allocated to these calls is not known.

Box 4: Good-practice example for multilateral research programming

NordForsk, established in 2005, is an organisation under the Nordic Council of Ministers that provides funding for Nordic research cooperation as well as advice and input on Nordic research policy. NordForsk aims to bring together research activities in the Nordic countries (Denmark, Finland, Iceland, Norway and Sweden, including the autonomous areas of the Åland Islands, the Faeroe Islands and Greenland) to strengthen the position and impact of Nordic research. NordForsk organises large-scale Nordic programmes in which national research groups collaborate.

NordForsk provides funding for cooperation within all fields of research, building on existing national priorities in the individual Nordic countries. Normally projects involve cooperation between at least three Nordic countries or autonomous areas. Grants are awarded on the basis of open calls for proposals and peer-review procedures. NordForsk allocates supplementary funding to cover expenses associated with implementing collaboration at the Nordic level, while most of the research activity itself is funded by national sources.

NordForsk concentrates efforts on several large-scale initiatives, using various programmes and funding instruments. The main funding instruments are as follows.

- Nordic centres of excellence (NCoE) are the most important funding scheme to stimulate collaboration between excellent researchers, research groups and institutions in the Nordic countries. An NCoE must have a joint research agenda, coordinated researcher training and collaboration on research infrastructures. An example is the 'NCoE programme on food, nutrition and health'.
- Thematic programmes focus on a defined subject area, aiming to create new scientific knowledge and know-how. This instrument integrates and coordinates several projects related to the theme chosen. Examples are the 'Nordic e-science globalisation initiative' and the 'Education for tomorrow' programme.

The largest joint Nordic research and innovation initiative is the 'Top-level research initiative' (TRI) on climate, energy and the environment.

NordForsk has also initiated NORIA-net, an activity to enhance coordination and collaboration between national funding agencies and policymakers. Several NORIA-nets exist; some promote strategic planning and design of joint Nordic programmes and calls, others collaborate to develop best practices in the national research funding agencies, for example with regard to referees/peer review systems, evaluation methods, etc.

Source: http://www.nordforsk.org

Ex post evaluations of these types of multilateral programmes are more or less common practice in some countries (e.g. Denmark, Finland, France, Germany, Iceland, Spain, Sweden), whereas in other countries this is not organised (e.g. Bulgaria, Latvia, Slovakia, Turkey) or it may not be identified (Belgium, the Czech Republic, the Netherlands, Slovenia).

3.2.2. Removing barriers for cross-border research cooperation

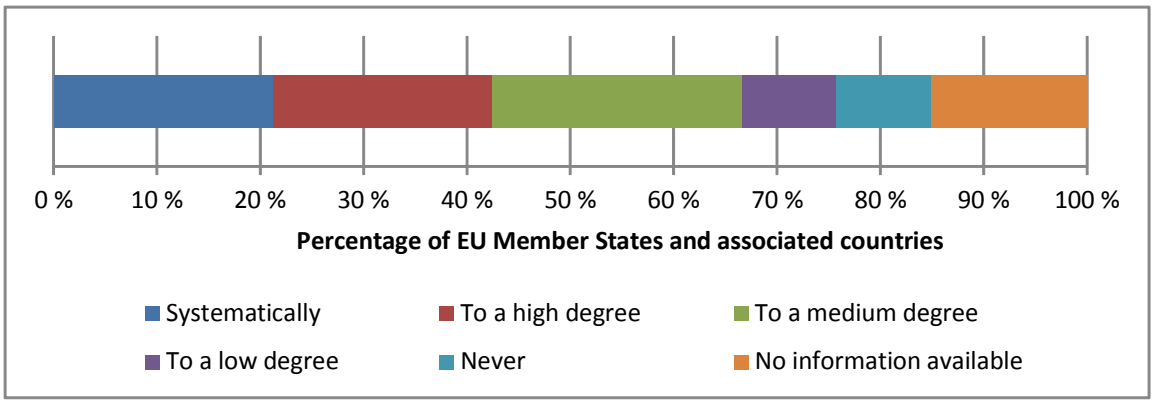
Mutual recognition of peer-review results

Transnational cooperation is also hampered by the low compatibility and interoperability of national research programmes, and differences in proposal and project-evaluation practices play an important role here. The ERA baseline analysis shows that almost two

thirds of the countries have bilateral/multilateral programmes that allow for mutual recognition of (project) evaluations (see Figure 7):

- in four countries (Bulgaria, Italy, Malta and Slovakia), mutual recognition of evaluations is not organised;
- in seven countries (Denmark, Finland, France, Iceland, the Netherlands, Sweden and the United Kingdom), mutual recognition of evaluations is implemented systematically, as these countries all have programmes that allow for this mutual recognition and are participating in the European Science Foundation (ESF) peer-review forum;
- in eight countries, mutual recognition does take place, but not in all bilateral programmes;
- in several countries (e.g. Austria, Germany, Luxembourg and the Netherlands) a lead agency procedure is followed (see Box 5 below for an example of the lead agency procedure).

Figure 7: Degree of development of mutual recognition of evaluations



Source: ERA baseline database.

Box 5: Good-practice example for mutual recognitions of evaluations: the lead agency procedure

Lead agency procedure

Researchers in Austria, Germany, Luxembourg and Switzerland can submit a joint application to one of the four RFOs involved (FWF — Austrian Science Fund; DFG — German Research Foundation; FNR — National Research Fund; or SNSF — Swiss National Science Foundation, respectively) following the routine local procedure. This lead agency notifies the partner organisations of the application so that there is no need for a double submission. The lead agency proposals must have a joint research question and a joint research plan. According to the lead agency agreement, the project parts carried out in the individual countries must be interdependent and complementary. In principle, the lead agency is located in the country in which the requested funding amount is highest. The lead agency evaluates the whole proposal independently. The rules and procedures for the application and evaluation are similar to the rules and procedures of the lead agency. Eligibility and funding rules remain national; the lead agency funds the researchers based in its country, while the other agencies will recognise the outcome of the evaluation and will fund the project partners in their countries.

http://www.snf.ch/E/international/europe/Pages/agreements-for-collaboration.aspx

Policies to facilitate cross-border interoperability

Countries may also take initiatives to remove legal and other obstacles that could hinder the cross-border interoperability of national programmes. The ERA baseline analysis shows that half of the countries reported having policies in place to facilitate the cross-border interoperability of national programmes. These programmes allow researchers from one country to apply for research funding from programmes in another country and allow procedures and criteria in joint calls and programmes to be harmonised.

Two categories can be distinguished among the 17 countries that have implemented such programmes.

1. Countries that implement procedures on an ad hoc basis through bilateral agreements. Examples of countries in the first group include Finland, Iceland, Luxembourg, Portugal, Romania and Slovenia. The bilateral agreements usually have specifically defined priority areas, allowing for the joint definition of calls and priorities between countries.
2. Countries that have launched national policies to improve the cross-border interoperability of programmes. For example, in 2008 the Ministry of Education, Culture and Science in the Netherlands published its internationalisation agenda ('Grenzeloze goed'), which includes policy aims and objectives for the internationalisation of Dutch research, including aims in relation to modifying procedures, guidelines and rules of application for foreign researchers. Germany's Federal Ministry of Education and Research (BMBF) also launched an internationalisation strategy in 2008. Other countries that have launched such a national policy are Denmark and Switzerland. However, in all cases the details of the policy and the implementation of measures are set at the level of the funding agency.

Information about the type of policies and specific measures agreed upon is lacking in several countries. The available evidence suggests that the vast majority of countries that have bilateral agreements also defined common eligibility criteria for proposals, and standards for the evaluation and selection of proposals.

Other criteria facilitating cross-border interoperability have only been implemented by a limited number of countries (fewer than eight), and regulations are sometimes confined to single bilateral agreements. These concern in particular the definition of eligible costs, funding rates and reporting requirements, and intellectual property rights.

Only five countries reported that measures were taken to remove legal barriers regulating the cross-border interoperability of research programmes:

- for the Nordic countries it was reported that, within the NordForsk collaborations, regulatory measures were put in place decades ago;
- Austria has established a national contact point for intellectual property issues, and one of its tasks is to settle legal issues, for example the consolidation of model contracts and the development of guidelines;
- in Ireland, new legislation adopted in 2013 allows Science Foundation Ireland to fund research in other countries, especially in relation to its strategic areas of focus. For many other countries information is lacking.

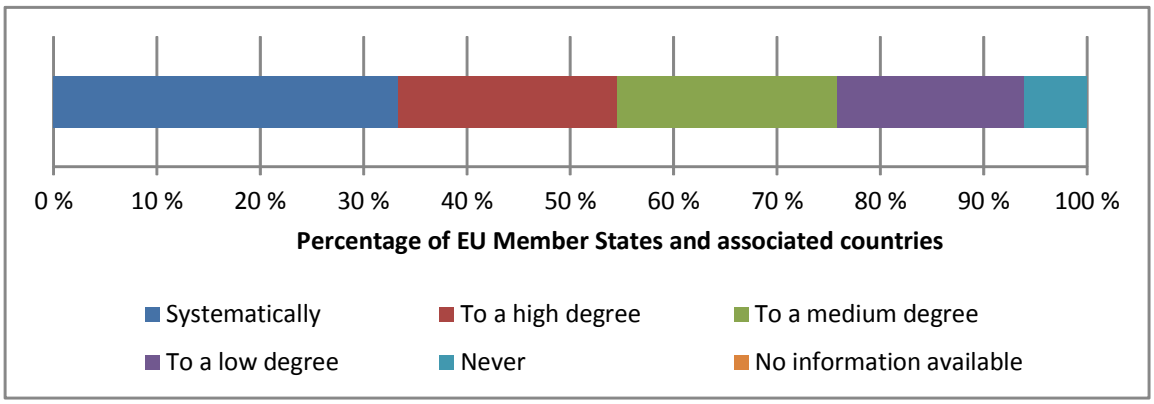
3.2.3. Creation of and access to research infrastructures of pan-European interest

Commitment to the construction and operation of global, national and regional research infrastructures of pan-European interest

As regards commitment to the construction and operation of global, national and regional research infrastructures of pan-European interest, the ERA baseline analysis provides the following results (see Figure 8).

- Twenty-two countries have recently launched a national roadmap on the construction and operation of global, national and regional research infrastructures of pan-European interest. These countries usually published one roadmap incorporating a number of research infrastructures.
- Some countries, such as Estonia and Finland, had already launched their roadmap five years ago, and have even launched updates to the initially published roadmap.
- In some countries, doubts were raised whether the national roadmap could even be considered a roadmap or whether it should rather be defined as a strategic plan (i.e. research infrastructures that will be financially supported are identified, but no specific plans are incorporated on how to achieve the goals).
- A number of Member States have not yet established a roadmap on the construction and operation of research infrastructures, but are planning to launch one in the very near future. In Austria for example, a consultation commissioned by the Austrian Council for Research and Technology Development aims to create pressure in favour of faster resolution of this issue, including the development of a national roadmap. Slovakia submitted a draft of the 'National research infrastructures roadmap' (NRIR) in 2010. The NRIR has not yet been accepted, but the Slovak government had expected that the strategy would be accepted by the parliament in September 2013.

Figure 8: Commitment to the construction and operation of global, national and regional research infrastructures of pan-European interest



Source: ERA baseline database.

The budgets that are allocated to these roadmaps vary to a great extent and also seem to be difficult to estimate. Budgets need to be put in perspective, but a comparison is complicated due to the large differences between the countries in terms of overall government spending, size of knowledge infrastructure, etc. Furthermore, national governments usually provide an overall budget to support research infrastructures but do

not distinguish between national research infrastructures and research infrastructures of pan-European interest. To conclude, it is sometimes unclear whether the budget refers to the overall budget for the research infrastructures or to a budget specifically available to execute the roadmap/strategic plan.

As regards the integration of national roadmaps on national research infrastructures with ESFRI, it can be concluded that all existing national roadmaps cover ESFRI research infrastructures ([28]).

Removing legal and other barriers to cross-border access to research infrastructures

In order to facilitate cross-border access to research infrastructures the ERA baseline analysis shows that about 50 % of Member States have developed at least some policies facilitating cross-border access to research infrastructures. In 16 countries, financial support through explicit programmes is available to facilitate outward cross-border access to research infrastructures. Such programmes offer researchers the possibility to access foreign or pan-European research infrastructures. Among those countries that have developed such measures, two categories can be distinguished:

1. Countries which only participate in large-scale international research infrastructures and facilitate access to these infrastructures through their membership. These countries provide access to research infrastructures such as the European Organisation for Nuclear Research (CERN) (nuclear research), the ESA (space research), the European Southern Observatory (ESO) (astronomical research), etc.,
2. Countries which implement dedicated programmes to support cross-border access to research infrastructures. These countries, in addition to their CERN and ESA membership activities, have various other programmes in place to facilitate access to large research infrastructures in other parts of the world (see Box 6 for examples).

Box 6: Example of measures supporting cross-border access to research infrastructures

- The Netherlands offers support for researchers that want to use the European Synchrotron Radiation Facility (ESRF) in Grenoble through the 'Beamline' programme, and for participation in the 'Integrated ocean drilling programme' (IODP).
- Germany provides access to foreign research infrastructures through the German Academic Exchange Service (DAAD), the Alexander von Humboldt Foundation (AvH) and the Fulbright Commission to facilitate access to the United States.
- Hungary provides financial assistance for outstanding Hungarian graduate researchers (preferably post-doctoral researchers) under the age of 40 to participate in training and education programmes at foreign universities, research institutes and workshops.

([28]) For example, Finland incorporated 13 such research infrastructures into its national roadmap, Italy 10, Greece and Romania both nine, the Netherlands eight and Denmark six. In Belgium a national roadmap for research infrastructures is being prepared, but the Belgian federal and regional governments give priority to Belgium's involvement in ESFRI, with substantial political and financial contributions to a selection of infrastructures from the ESFRI roadmap.

Most of these countries also offer explicit programmes for inward cross-border access to research infrastructures. Such support is provided in one of the following two ways:

1. Bilateral agreements: mainly in Germany, the Netherlands and Slovakia, through the support programmes mentioned above. Other examples of such measures through bilateral agreements include the São Paulo Research Foundation (Fapesp) programme, which facilitates access between Brazil and the Netherlands through the exchange of researchers between the host labs for several months.
2. Dedicated programmes from national funding agencies aimed at talented foreign researchers. For example, Italy has the 'Rita Levi Montalcini' programme, a national fellowship programme promoting the internationalisation of Italian universities by recruiting foreign post-doctoral researchers. Luxembourg has the PEARL and Attract programmes, designed to bring external researchers to Luxembourg and fund projects carried out in conjunction with one of Luxembourg's PROs or the university. Romania supports the creation of research teams within an R & D institution, a university or a host enterprise, involving established international experts, of any nationality, as project managers.

In some countries the focus of the financial support measures seems to be more on providing funding for foreign research visits or stimulating doctoral candidates to pursue studies in other countries rather than providing specific access to certain research infrastructures.

Information services regarding national infrastructures are usually provided through European databases and services, such as MERIL ([29]), Netwatch ([30]) or Euraxess ([31]). Some countries have also launched dedicated portals to provide such information. For example, Narcis provides information about the profiles and addresses of university and non-university research institutes in the Netherlands, as well as research data for all research schools. Slovenia has launched the Sicris information system, providing information about national research organisations and projects.

Although half of the countries have implemented financial support schemes to facilitate cross-border access to research infrastructures, only a small number of countries have implemented common rules for accessing research infrastructures *in situ* and/or remotely in order to acquire confidential data or data on shared intellectual property rights. For many other countries data on this indicator are unavailable. Data concerning the share of non-national researchers (from Member States and non-EU countries) accessing research infrastructures of European interest are available through the MERIL database, but these have to be interpreted with caution, since they are only available for a limited number of research infrastructures in these countries.

3.3. Priority area 3: An open labour market for researchers

Europe needs to improve the situation of its research labour force to maintain its excellence, and needs to overcome the lack of attractiveness of researchers' careers in several EU countries, as well as removing barriers to mobility that still exist between Member States ([32]).

([29]) http://portal.meril.eu
([30]) http://netwatch.jrc.ec.europa.eu
([31]) http://ec.europa.eu/euraxess
([32]) See Commission staff working document 'Impact assessment accompanying the document "A reinforced European Research Area partnership for excellence and growth"', SWD(2012) 212

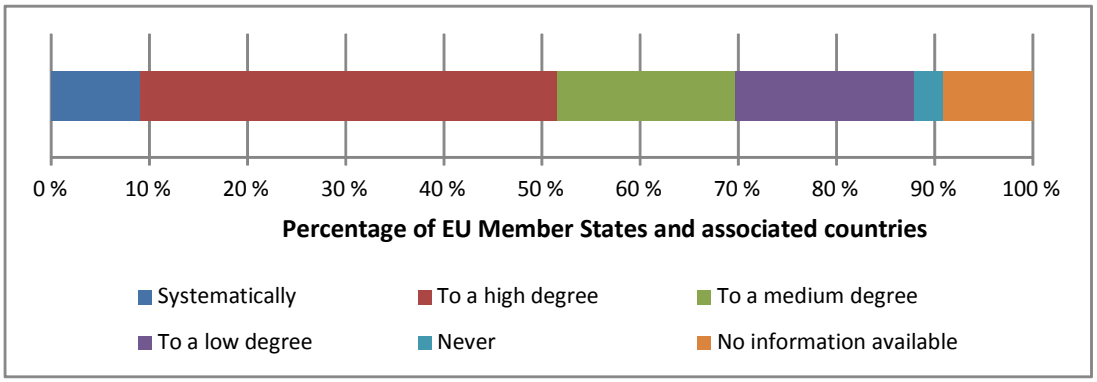
In order to address the remaining fragmentation of the European labour market for researchers and improve the quality of doctoral training and research careers, the European Commission proposed that Member States build upon actions already set up at European level — such as Euraxess, and the 'European charter for researchers' and 'Code of conduct for the recruitment of researchers' ([33]) — and implement better concepts such as principles for innovative doctoral training, and invited Member States to remove barriers relating to transparent recruitment and mobility ([34]).

3.3.1. Openness and transparency of national recruitment systems

Lack of open and transparent national recruitment systems affect the attractiveness of the research system and mobility. The 'Code of conduct for the recruitment of researchers' adopted by the European Commission describes the main features that recruitment and selection systems shall present. The ERA baseline analysis of the development of measures focused on the consideration of distinct procedural aspects in recruitment processes.

The overall assessment shows a diversity of policies and measures among EU Member States and associated countries (Figure 9). The absence of national measures, or the existence of only a limited number of such measures, was identified in several countries. This can be explained by the different roles of public authorities in the recruitment system.

Figure 9: Degree of development of policies and measures on open, transparent and merit-based recruitment of researchers of the higher education sector



Source: ERA baseline database.

In all countries under consideration, both public authorities and research organisations are involved in the recruitment process. The role of public authorities is to fix the rules and coordinate practices that HEIs and PROs have to implement for the selection of researchers. However, the degree of autonomy varies widely between countries. Two main recruitment systems can be distinguished:

1. Recruitment processes that are strictly regulated by legal rules: HEIs and PROs have to follow strict requirements during their selection process. This system applies in countries such as Denmark, Hungary and Spain. In Germany the rules

---

final, p. 12: 'Working conditions of researchers in Member States differ and in some cases they are not sufficiently attractive to draw young people into the research profession, retain leading talent and attract foreign researchers'.

([33]) http://ec.europa.eu/euraxess/pdf/brochure_rights/am509774CEE_EN_E4.pdf

([34]) European Commission communication, 'A reinforced European Research Area partnership for excellence and growth', COM(2012) 392 final.

are adopted at regional level. In countries that have strict frameworks for the implementation of selection processes, two categories were identified:

(a) systems in which research organisations have to respect the general rules of public services (e.g. in Belgium and Slovakia); and
(b) systems in which specific rules are defined for HEIs and PROs (e.g. in Denmark by Ministerial Order No 284 of 25 April 2008 on the appointment of academic staff at universities).

In all these cases, HEIs and PROs have to follow general rules corresponding to standards for open and transparent recruitment processes.

2. Recruitment systems that are mainly decentralised: the legal requirements that HEIs and PROs have to follow are very limited. This system is used in countries such as Austria, Bulgaria, Finland, Ireland and Switzerland.

The qualitative information provided by the investigation shows that a majority of European countries opted for wider autonomy for their research organisations in their recruitment processes. This is in line with the trend towards granting more autonomy on the one hand while increasing accountability mechanisms on the other ([35]). Public authorities define either very limited rules on recruitment aspects or none at all.

While this explains the lack of measures identified at public authority level during the ERA baseline investigation, the actual situation among Member States is very diverse. Indeed, the existence of very limited rules to provide wide autonomy to universities and research organisations can be complemented by efficient soft rules implemented at research-organisation level. For example, in Iceland virtually all universities have signed the European charter and code and follow these orientations. In the United Kingdom, the 'Concordat to support the career development of researchers' is an agreement signed by funders and employers of researchers to highlight the main principles. However, it seems that such soft rules are still lacking in several countries opting for this autonomous approach. Their development could ensure that standards for open and transparent recruitment are respected.

Regardless of the level of autonomy of HEIs and PROs during the recruitment process, common trends were identified, as follows:

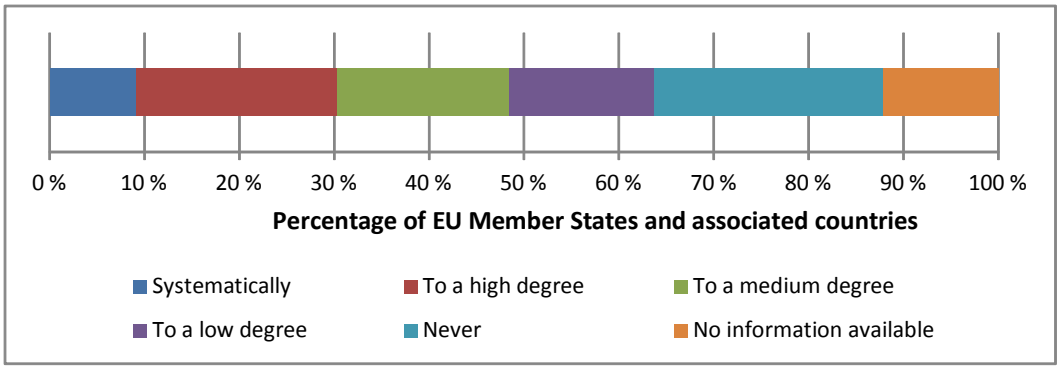
- Minimum requirements relating to the publication of job vacancies are defined by legal rules in a majority of Member States and associated countries.
- The international dimension increased thanks to the more systematic publication of job vacancies in the Euraxess website. Moreover, a few countries have also developed specific measures to expand this dimension, such as Austria, where an amendment to the University Act stipulates that Austrian universities must advertise research job vacancies internationally, or at least EU wide (but university institutions decide autonomously on the instrument for advertising vacancies internationally). A few countries mention explicitly in their rules the possibility of using international expertise in panels, as is the case in Italy (it is permitted under the new Law No 240/2010).

3.3.2. Cross-border access and portability of grants

There are few reported practices of grant portability and these tend to be more limited, in particular in the southern and eastern EU Member States, as well as in associated countries (see Figure 10).

([35]) See chapter on more effective national research systems in this report.

Figure 10: **Degree of development of policies and measures to ensure grant portability**



Source: ERA baseline database.

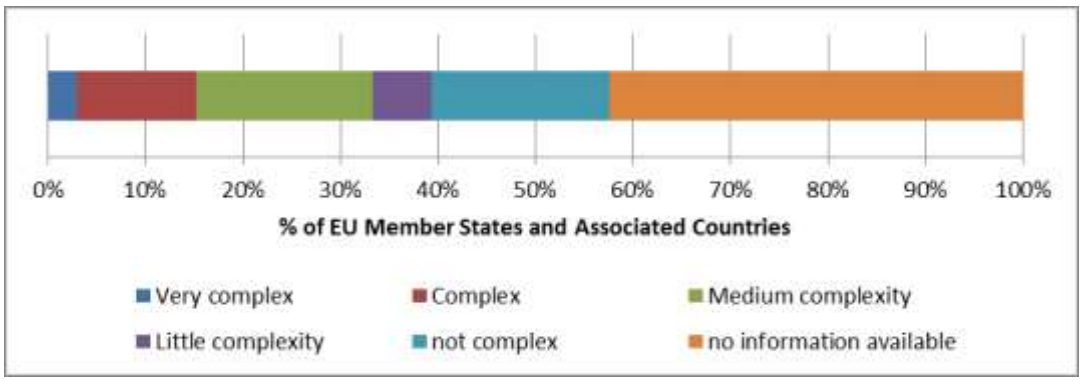
The full development of the principles defined in the 'European Heads of Research Councils' (Eurohorcs) letter of intention on 'money follows researchers' is still limited to the pioneers of the DACH umbrella agreement between the FWF, the DFG and the SNSF, which was a source of inspiration for 'money follows researchers'. Notably, the DACH agreement has not been initiated by national ministries but by the three science councils, which share a high degree of autonomy as regards their operations.

This is a simplified method of applying for and carrying out joint research projects with partners abroad. As part of the DACH agreement there is a limited option for financing the participation in international projects through national funding ('money follows cooperation line'). This initiative is an element of the European Grants Union, which is part of Eurohorcs 'Vision for a globally competitive ERA and roadmap for actions'.

Eurohorcs' 'money follows researchers' is also implemented in Denmark, Estonia, Luxembourg, the Netherlands (for personal grants), Romania (by the education law that entered into force in March 2011), some Swedish funding organisations, Slovenia and the United Kingdom.

In some countries, grant portability is not possible as such, but some measures provide a certain degree of flexibility to allow the continuation of research activities abroad. For example, in Spain, grants cannot be separated from the legal beneficiaries, which are necessarily Spanish institutions, but it remains possible to carry out the research abroad depending on the terms of the relevant call. In France grants are in principle not portable, but specific grants allow research abroad — the 'Lavoisier' programme (not relating to any specific country) provides grants under bilateral agreements with China, Germany and Japan.

Figure 11: Assessment of the degree of development of policies and measures to ensure grant portability



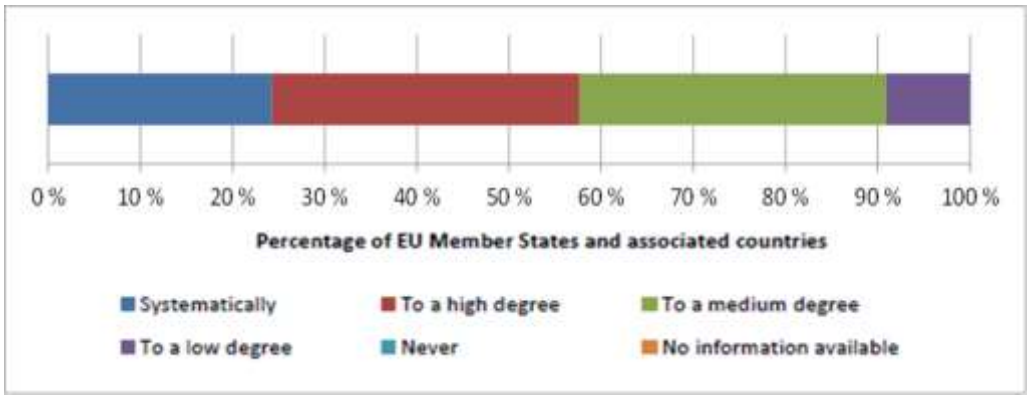
Source: ERA baseline database.

3.3.3. National development of the Euraxess network

The pan-European Euraxess network was set up to provide coordinated and personalised information and services to researchers in Europe, aiming at facilitating the mobility of researchers. The ERA baseline assessment focused on the question of to what extent EU Member States and associated countries facilitated the development of Euraxess services (see Figure 12).

The investigation points out that all countries have set up websites providing information on the research landscape and proposing job vacancies. Service centres also cover most areas in all European Member States, being mainly located in the major national universities.

Figure 12: Degree of development of Euraxess coordinated information and services for mobile researchers (information on vacancies, social rights, tailored information, etc.) in line with the declaration of commitment



Source: ERA baseline database.

In this context, the recently published 'Researchers' report 2013 — Scorecards' ([36]) shows that use of Euraxess for the publication of job vacancies varies among Member States and associated countries and has increased substantially (see report). However, there is still room for improvement in several countries (see also Figure 13).

Figure 13: Researchers' posts advertised through the Euraxess jobs portal per thousand researchers in the public sector

Country	2012	Country	2012	Country	2012
Poland	158.5	*France*	37.5	*Finland*	10.1
Luxembourg	158.2	*Romania*	37.4	*Spain*	8.1
Greece	116.5	*Czech Republic*	32.9	*Germany*	5.1
Sweden	112.4	*Italy*	23.2	*Portugal*	3.5
Ireland	100.1	*Croatia*	20.6	*Lithuania*	2.3
The Netherlands	83.7	*Estonia*	19.1	*Hungary*	2.0
Cyprus	82.7	*Slovenia*	18.8	*Former Yugoslav Republic of Macedonia*	1.3
Austria	58.1	*Denmark*	18.1	*Latvia*	0.9
Norway	58.1	*Switzerland*	17.8	*Bulgaria*	0.7
United Kingdom	55.5	*Iceland*	17.3	*Turkey*	0.4
Belgium	53.3	*Malta*	15.5	*Slovakia*	0.3

Source: 'Researchers' report 2013 — Scorecards'.

([36]) 'Researchers' report 2013 — Scorecards'.
(http://ec.europa.eu/euraxess/pdf/research_policies/Scorecards.pdf).

In a few Member States it seems that a large number of research posts advertised through Euraxess relate to measures incentivising the European dimension of job advertising, such as illustrated below for Poland.

Poland, a strategy for the dissemination of job vacancies at European level

As a result of the amendment in 2011 of the law on higher education, vacancies published by public HEIs are simultaneously uploaded to the Euraxess Poland portal through the RSS feed under the section 'Jobs in Poland'.

However, the main reason for a large number of job vacancies being published through Euraxess seems to be linked to actions implemented at stakeholder level, such as in the Netherlands thanks to the link between the Euraxess jobs portal and the academic transfer initiative. Academic transfer was launched by the VSNU (Association of Universities in the Netherlands), the NFU (Dutch Federation of University Medical Centres) and the WVOI (Employers Association of Research Institutions), and offers a multilingual portal that makes it possible for research organisations to register, to fill in job vacancies and to search for researchers in the Netherlands and other countries.

More recently, legal measures integrating an international dimension for the publication of job vacancies were adopted in Denmark and Italy. In Denmark, the ministerial order on the appointment of academic staff at universities stipulates that positions at professor and associate professor levels have to be posted internationally. However, this is not mandatory for assistant professor, post-doctoral or PhD-level positions. In Italy, the law of 2010 on the general reform of university education stipulates that all fixed-term positions must be published on national and EU websites.

3.3.4. Development of doctoral training programmes integrating the principles for innovative doctoral training

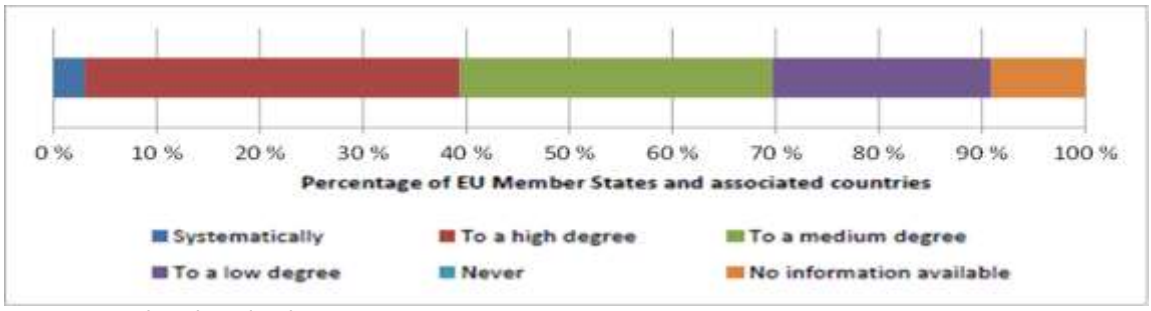
Doctoral training can play a major role in ensuring that the research labour force has integrated new professional skills such as entrepreneurialism, which are indispensable in improving the efficiency of research activities ([37]). With the help of experts from university, associations, industry and funding organisations, the European Commission identified principles for innovative doctoral training ([38]): research excellence, attractive institutional environment, interdisciplinary research options, exposure to industry and other relevant employment sectors, international networking, transferable skills training and quality assurance.

The assessment of the existence of policies relating to these principles underlines the development of measures, even if holistic approaches seem limited to a minority of countries (see Figure 14).

Figure 14: Degree of development (including financial commitment) of policies and measures supporting structured innovative doctoral training programmes applying the principles for innovative doctoral training

---

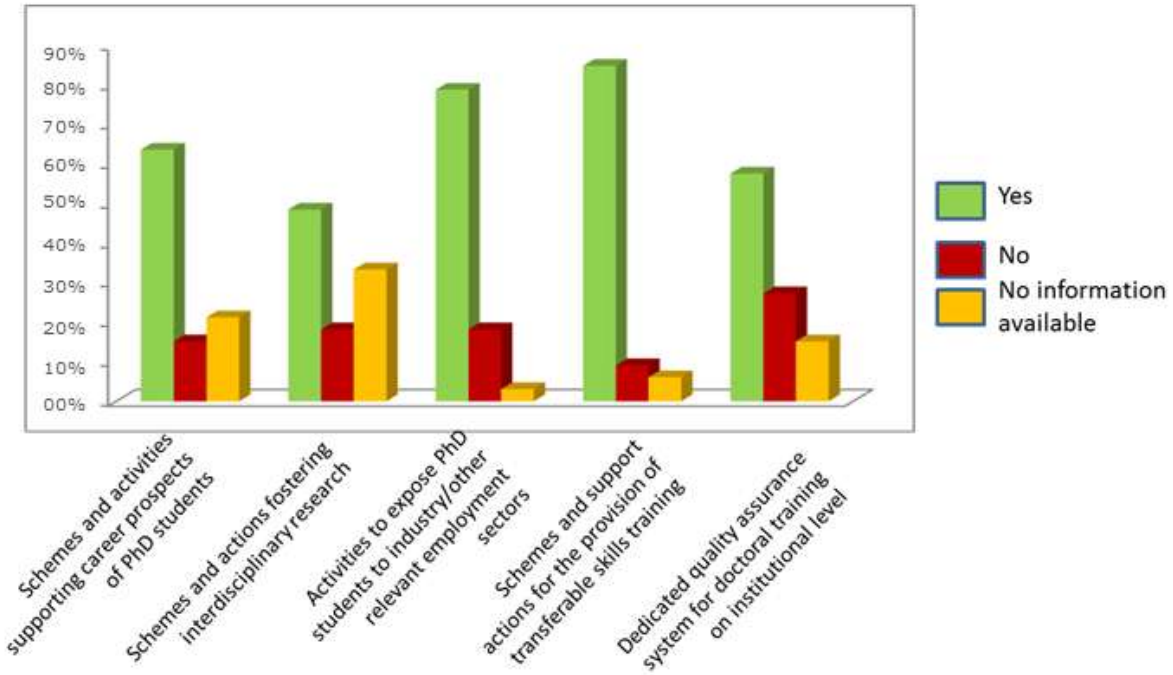
([37]) http://ec.europa.eu/euraxess/pdf/research_policies/ExpertGrouponResearchProfession.pdf
([38]) http://ec.europa.eu/euraxess/pdf/research_policies/Principles_for_Innovative_Doctoral_Training.pdf



Source: ERA baseline database.

However, the analysis of the development of measures per item revealed a correct degree of measures and activities implemented (see Figure 15).

Figure 15: Degree of development of policies and measures supporting structured innovative doctoral training programmes applying the principles for innovative doctoral training, per item



Source: ERA baseline database.

This mismatch between a dominant medium degree of development and a majority of principles covered by measures in the Member States and associated countries is explained by the gap between a limited number of Member States developing a strategic approach covering the principles for innovative doctoral training and a majority implementing measures on a case-by-case basis without a well-defined global approach.

Box 7: Examples of strategies set up to implement the principles for innovative doctoral training

Legislative rules

In Italy the decree about the accreditation of doctoral courses and criteria for the establishment of doctoral programmes of 2013 includes several requirements relating to the principles for the accreditation of PhD courses.

Well-defined and implemented strategies

The Estonian policy aims at increasing the volume and quality of PhD students and researchers. Since the creation of doctoral schools in 2005 several measures have been adopted to cover all the principles for innovative doctoral training programmes ([39]).

Guidelines from public authorities and implementation in the hands of stakeholders

In Finland the 'National guidelines for the development of doctoral training' (2011) of the Ministry of Education and Science encourage universities to provide guidance and promote personal study plans; enhance interdisciplinarity, internalisation and intersectoral mobility; and incorporate systematic PhD training into all doctoral programmes, including transferable skills training.

Countries exhibiting a medium degree of development of policies and measures supporting structured innovative training have had at least a few dedicated programmes for innovative doctoral training. However, there are no explicit measures designed to implement innovative doctoral training principles and the main actions relate to financial instruments on a specific aspect. For example, Poland proposes grants to foster interdisciplinary research (Maestro grants), mobility ('Mobility plus' programme) and relations with industry (several schemes such as the 'Innotech' programme and the 'Innovation creator' programme).

In many countries, no or a limited number of initiatives from public authorities exist because HEIs and PROs have a great deal of autonomy in organising their doctoral training programmes. Nevertheless, the main aspects of the principles for innovative doctoral training are implemented by HEIs and PROs. In some cases these institutions have to follow limited requirements from the authorities, as in the Swiss case presented below. However, in several countries, universities offer research communication skills, awareness of intellectual property rights, career management and entrepreneurship training in their own effort to improve researchers' employment skills and competencies.

Box 8: Principles for innovative doctoral training implemented by stakeholders

In 2012 the SNSF closed its ProDoc programme for enforcing high-level doctoral programmes. The universities are now responsible for all forms of doctoral studies. They are asked to develop structured doctoral programmes in which at least two universities are involved. These programmes in general cover a majority of the principles for innovative doctoral training.

3.4. Priority area 4: Gender equality and gender mainstreaming in research

Gender equality in Europe has come to the fore since the 1998 Treaty of Amsterdam, which promoted gender mainstreaming as a strategy to be integrated in all fields of politics. The promotion of gender equality as a political target of innovation policy is based on extensive research on women in science that helped to better understand the so far marginalised position of women in science and technology.

Research about women in science focused on: (1) women's careers, with their (under-)representation at different career levels showing that the higher the career stage the fewer women are present; (2) rules, practices and procedures that produce gender inequality; and (3) the gender bias in knowledge production (the integration of gender

([39]) 'Researchers report 2012 — Country profile Estonia', p. 9: http://ec.europa.eu/euraxess/pdf/research_policies/country_files/Estonia_CountryFile_2012_FINALdoc.pdf

issues into research as a resource to create new knowledge and stimulate innovation is a current field of intervention) ([40]).

In line with the main findings of studies concerning women in science, actions to be pursued by EU Member States in priority area 4 aim at increasing the share of women in science, changing institutional structures still producing inequalities and better integrating the gender dimension into research content.

The ERA baseline analysis of Member States and associated countries focuses on the main policy achievements and developments in priority area 4 and comprises aspects concerning the following.

- Creation of a legal and policy environment and provision of incentives in order to:
  - remove legal and other barriers to the recruitment, retention and career progression of female researchers while fully complying with EU legislation on gender equality;
  - address gender imbalances in decision-making processes;
  - strengthen the gender dimension in research programmes.
- Engagement in partnerships with funding agencies, research organisations and universities to foster cultural and institutional change on gender — charters, performance agreements, awards.
- Measures to ensure that at least 40 % of the members of committees involved in recruitment/career progression and in establishing and evaluating research programmes are from the under-represented sex.

3.4.1. Adoption of measures in order to remove barriers relating to recruitment and career progression and strengthening the gender dimension in research programmes

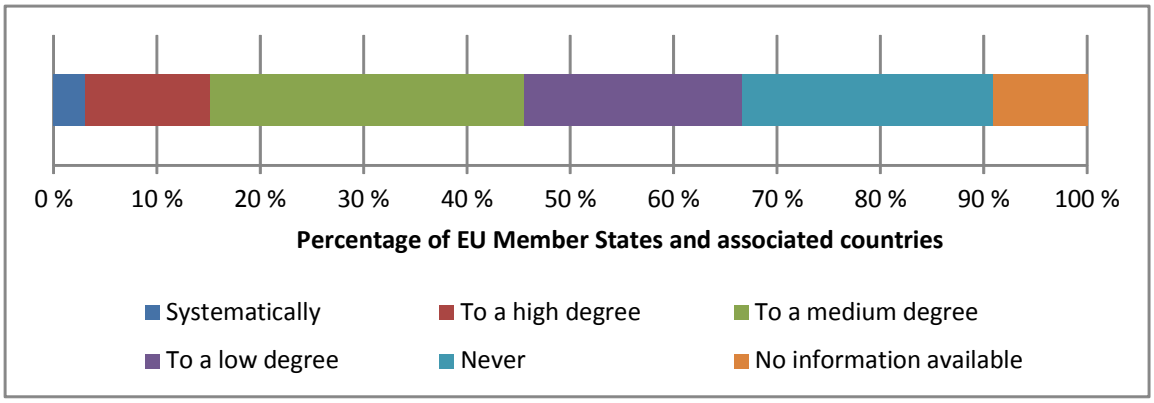
Adoption of measures relating to gender imbalances in decision-making processes

The analysis of the development of measures for more gender balance in decision-making processes in the ERA includes measures for more balance between females and males on the boards/committees of HEIs and RFOs. A second type of measures that has been analysed relates to existing and potential gender biases (*ex ante* and *ex post*) in procedures of recruitment, promotion and funding.

Data from the ERA baseline database show that in most countries the degree of development of measures for more women in decision-making processes is 'medium' (30 % of countries), while only 15 % have implemented systematically or to a low degree (see Figure 16). In one third of countries no measures or no information can be found.

([40]) Sources: Schiebinger, L., *Gendered innovations in science and engineering*, Stanford University Press, Chicago, 2008.
Schraudner, M., *Diversity im Innovationssystem*, Fraunhofer Verlag, Karlsruhe, 2010.

Figure 16: **Degree of development and adoption of measures relating to gender imbalances in decision-making processes**



Source: ERA baseline database.

Among the countries under consideration, Switzerland is the only country that has systematically implemented measures to overcome gender imbalances in decision-making processes, while in France, Germany, Norway and the United Kingdom the degree of development has been considered high. Most often a medium level of development can be found.

The ERA baseline analysis focused in particular on issues such as more balance between females and males on the boards/committees of HEIs and RFOs; the existence of gender biases in audits and in recruitment, promotion and funding procedures; and gender bias in *ex ante* assessments of planned procedures.

Concerning the development of these types of measures among the EU Member States and associated countries, the following characteristics have been identified:

- Measures addressing the gender balance of committees/boards in HEIs and in RFOs are quite common, while audits and *ex ante* assessments of gender biases in recruitment, promotion and funding procedures are rare.
- Most countries that have implemented measures for the gender-balanced composition of committees/boards in HEIs have also implemented these measures in RFOs. At the same time, half of all countries have 'no measures' and 'no data available' for the balanced composition of committees/boards of either HEIs or RFOs.
- Comparing measures for gender balance on boards and the representation of women in leading positions, a low level of development can be found in countries with low representation of women in leading positions, but also in countries with a high share.

To increase the number of women in leading positions some countries have implemented general rules/quotas that are also relevant for researchers (e.g. Belgium). But for HEIs, specific measures exist to ensure a balance between females and males on committees/boards. Quotas are of specific relevance in this field and have been implemented in several countries (Austria, Belgium, Bulgaria, Denmark, France, Germany, Greece, Luxembourg, Poland, Slovenia and Spain) on a national level. A few countries regulate quotas at university level (Israel, the Netherlands). Examples showing the diversity of development of quota systems are presented in Box 9.

Box 9: Diversity of measures concerning existence of quotas in research funding organisation boards

In Belgium, for example, a quota exists allowing a maximum of two thirds of one sex on the boards of RFOs. This is monitored by the government, but there are no sanctions if an organisation does not meet the quota.

In Switzerland, the SNSF promotes a representative gender balance in the election of researchers on its evaluation committees. A decision by the SNSF's bodies not to include female researchers must be explicitly justified.

In Austria, the FWF and other RFOs set a target that the share of women among reviewers should on average be at least 30% per year. Quotas and targets are seen as important guidelines, but are not perfectly efficient as long as no sanctions are imposed.

However, a considerable number of countries still have an absolute lack of political awareness of gender balance in decision-making processes and do not yet have any measures implemented. This is also the case in countries with a high share of female professors (Latvia, Lithuania, Romania and Turkey) as in countries with very few women in HEIs' leading positions (Croatia, Cyprus, the Czech Republic, Hungary and Malta).

In many countries a lack of data in this respect also illustrates the lack of awareness. An example measure for raising awareness can be found in Austria: the programme 'Excellentia' was implemented to double the share of female professors by giving extra payment for open use to each university appointing a new female professor ([41]). The evaluation of the programme showed that the targets were not reached, but the programme contributed very well to setting up the agenda for the selection of female professors and changing gender-biased processes and structures in appointment procedures ([42]).

Gender discrimination is often not done on purpose but because of a lack of gender awareness. To raise awareness and identify existing gender biases in recruitment, promotion and funding procedures a special focus is needed, like implementing audits or *ex ante* assessments for potential gender biases. So far, only a very limited number of countries have implemented such policies, and not all of them are real audits: in some countries, equality progress (such as in Bulgaria or Portugal) or female occupation (like the Joint Science Conference (GWK) in Germany) are monitored.

Hence, while quotas or targets for equal gender representation on boards are already common in almost half of EU Member States and associated countries, measures to identify gender biases in career progression procedures are almost entirely not implemented and definitely need to be more addressed at national level in the future.

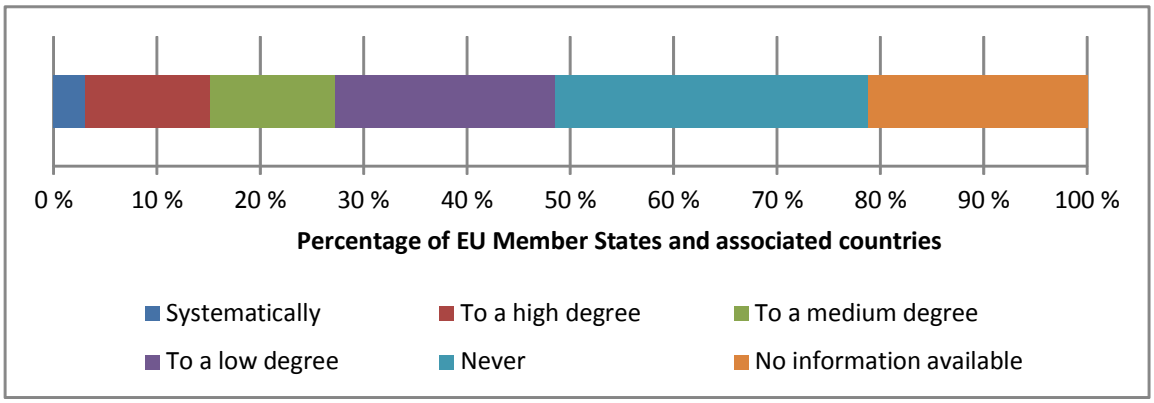
Adoption of measures relating to the gender dimension in research programmes

Measures to integrate the gender dimension into various research programmes are not widespread in ERA Member States and associated countries. More than 70 % of countries have implemented them to a low degree only or have no measures at all or no data available (see Figure 17).

([41]) http://www.femtech.at/fileadmin/downloads/Wissen/Themen/1_Frauen_in_Forschung_und_Technologie/Excellentia.pdf

([42]) Wroblewski, A., Leitner, A., 'Excellentia: Evaluationsbericht', Institute for Advanced Studies, Vienna, 2011.

Figure 17: Degree of development and adoption of measures relating to the gender dimension in research programmes



Source: ERA baseline database.

National policies and programmes fostering gender issues in curricula, implementation of gender studies diplomas, training for research staff on gender issues and gender-analysis methods, gender as criteria in the evaluation of research content, dedicated budgets/programmes for gender-related research projects and national guidelines on integrating gender issues in research content are only implemented in a very limited number of countries.

Only Iceland, Norway, Portugal, Spain and Switzerland have implemented measures systematically or to a high degree. Some countries only have a dedicated budget for gender-related projects. A large group of countries have not implemented any measures. This group of countries comprises both newer and older EU Member States, as well as countries with high and low inequalities concerning female participation in science. Interestingly the degree of development is also low for Nordic countries, which in general have a high level of gender-equality measures.

As the number of measures being implemented among EU Member States is low, the following table provides some examples by means of which specific actions have been taken with respect to the indicator dimensions.

Table 3: Examples of measures relating to the development of the gender dimension in research programmes

Type of measure	Good-practice examples
Integrating the gender dimension in research programmes: dedicated budget for gender-related projects and/or studies (e.g. programmes, calls, bonuses, etc.)	The existence of measures is identified in at least 11 countries. Good examples that can be highlighted in this respect are Austria and France. • In Austria, 'FEMtech R & D' grants fund gender-sensitive innovation and product development. • In France, the Ministry of Higher Education and Research has included a measure to disseminate research on gender in the current equality plan.
Promotion of gender issues in doctoral, bachelor's and master's curricula, and implementing gender studies	• Spain: the law for equality (2007) states that 'in the field of higher education, public authorities in the exercise of their powers promote teaching and

diplomas	research on the meaning and scope of equality between women and men'. • Portugal: scientific knowledge from gender studies and women's studies is incorporated into the curricula of undergraduate and postgraduate courses. • In some countries gender training courses on equal treatment and opportunities for women and men have also been implemented for all university staff (management, HR, teaching staff).
Integration of the gender dimension in research programmes	Introducing gender as a criterion for evaluating research proposals and by the provision of national guidelines for the integration of gender aspects in research projects (Austria, Latvia, Norway, and Spain). • The German DFG examines applicants' equality concepts in selection processes within coordinated programmes. • In Switzerland, the SNSF aims at raising the awareness of jury members concerning gender equality issues. • In Austria, the Austrian Research Promotion Agency (FFG) has implemented gender criteria in the application and evaluation procedure of research projects, and guidelines have been provided by the main research funding agencies (FFG and FWF) to support researchers willing to focus on relevant gender aspects in their research.

Source: Compilation from ERA baseline database.

3.4.2. Assessment of the degree of development and adoption of measures relating to the recruitment, retention and career progression of female researchers

To use the full potential of female researchers, Member States were asked to implement national policies for their recruitment, retention and career progression in HEIs and PROs. These policies are related to flexible career trajectories, work–life balance and the personal empowerment of female researchers, as well as to policy design. Although a wide range of measures is covered by 'recruitment, retention and career progression of female researchers', in half of all countries, measures are only implemented to a low degree. Some 30 % of EU Member States and associated countries have implemented such measures systematically or to a high degree, while less than 10 % of countries have not implemented any measures at all.

- A considerable group of countries (numbering 12) have a systematic or high level of development. These countries have implemented 'a majority of measures' that promote female researchers recruitment, retention and career progression. By and large, these countries are older EU Member States.
- The largest group of countries (numbering 15) has only a low development level. They have implemented a limited set of measures to promote the recruitment, retention and career progression of female researchers.

- In a considerable group of countries (Croatia, the Czech Republic, Estonia, Greece, Hungary, Latvia, Luxembourg, Malta, Slovenia and Turkey) almost no measures have been implemented or no information is available.

Policies for the recruitment, retention and career progression of female researchers can be split into different types by their characteristics.

- Individual empowerment: has the longest tradition in equality policy in science. Only a few countries have established such measures. Mentoring initiatives have been implemented in eight countries (Austria, Bulgaria, Denmark, Germany, Israel, the Netherlands, Norway and the United Kingdom) and networking structures in eight countries (Austria, France, Germany, Hungary, Israel, Romania, Switzerland and the United Kingdom).
- Policies to change organisational cultures: cultural change policies are considered to be more sustainable than measures focusing on individual empowerment ([43]). Policies aiming at structural change are related to flexible career trajectories (like parental leave, return schemes, gender-sensitive mobility conditions) and flexible working arrangements. Such measures benefit all researchers with care responsibilities regardless of their gender/sex. But as long as women are the main carers of children, female researchers' careers are most affected by these policies. In most countries, general maternity leave regulations can be found on a legal level, but a number of countries also have special regulations for (female) researchers to facilitate work–life balance, such as the possibility to interrupt grants for parenting and the right to return to their former position (Austria, Portugal). In former communist countries less awareness of the work–life balance leads to a lack of such measures. In some countries, regulations on the career progression of female researchers are more often found at university level. Absolute age as a limitation for application was mentioned in Austria and Germany and replaced by an academic age. In many countries, general legal regulations are relevant to flexible working-time arrangements; research-specific working-time arrangements are only reported from France, Lithuania, Spain and Switzerland, where job-splitting enables part-time work.

- Policies aiming at an increase of female engagement in science.

  - National targets for achieving gender equality at the legal level are implemented in a number of countries (Austria, Bulgaria, Croatia, Cyprus, Denmark, Germany, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, the Netherlands, Norway, Portugal, Spain and Switzerland). Other countries have implemented targets, but not at the legal level (like Belgium or Sweden). In most of these countries political targets are monitored.
  - Performance agreements between research-performing organisations and research funders to foster gender equality are quite rare. They are implemented in Austria, Germany and Spain at the legal level, and at other levels they can also be found in Luxembourg, Norway and the United Kingdom. France is planning to introduce them.
  - Charters or codes of conduct have only been implemented at the legal level in Germany and Spain, but there are quite a lot of other countries which have

([43]) European Commission, 'Benchmarking policy measures for gender equality in science', Luxembourg, 2008.

similar activities (Austria, Belgium, Croatia, Cyprus, Denmark, Finland, France, Israel, the Netherlands, Norway, Romania, Switzerland and the United Kingdom).

- Awards/prizes rewarding gender activities have been implemented in almost half of the countries.

3.4.3. Assessment of the participation of women in PhD graduate, researcher, senior level and top leadership positions in academia

The participation of women at different stages of a research career is a central benchmark for gender equality in science and technology, and directly or indirectly all policies discussed in PA4 are intended to increase the number of women in science and technology. By publishing the 'She figures' (2003, 2006, 2009, 2012) the European Commission has provided a harmonised data source for comparison between countries and over time.

Considering all career stages, a high share of women in science and technology can only be found in a few countries. These are the Nordic countries, France and Latvia. In the majority of countries the participation of women reaches a medium level. Nearly two thirds of the countries have a low level of participation of women in science and technology.

Only a limited number of countries (Finland, Latvia and Sweden) have a very high level of participation of women over all levels (40–49 %). Differentiated by career stage, the following picture emerges:

- PhD students: Croatia, Finland, Italy, Latvia, Lithuania and Portugal (highest with 62 %) have a share of women above 50 %;
- post-doctoral researchers: Finland, Latvia (highest with 63 %) and Lithuania, and in grade B positions Finland and Romania, exceed the 50 % mark;
- only Latvia and Romania exceed the 30 % threshold of female professors.

Most of the countries show a similar pattern of female participation at different stages of career progression. The share of women at PhD level is quite high in nearly all countries (the mean for all countries is 46 %). This indicates that the participation of women equals the participation of men. But there are some countries that have a considerably lower rate of participation of women at PhD level (Cyprus, the Czech Republic, Luxembourg and Malta). On the other hand, it is very well documented that the participation of women varies significantly by scientific field ('She figures 2012'). Data differentiated by scientific field were not collected in this exercise (but this is recommended for future exercises).

At the other end of the career scale, at grade A level, the share of women is considerably lower than at PhD level (the mean for all countries is 20 %). The values for Belgium, Cyprus, the Czech Republic, Denmark, Germany, Greece, Israel, Lithuania, Luxembourg and the Netherlands are at least 5 % lower than the mean for all countries.

The participation of women at grade A level in Bulgaria, Croatia, Latvia, Romania, Switzerland and Turkey is considerably higher than the average. In the Nordic countries the share of women in grade A positions is average, although one would expect it to be higher.

The average difference in percentage points between the share of women at PHD level and grade A level is 26. This indicates that quite a lot of women are dropping out of the scientific career or never reach the highest position in a scientific career. Countries with a significantly lower difference between these career stages are Iceland, Malta, Romania,

Switzerland and Turkey. On the other hand the gap is widest in Belgium, Greece, Israel, Italy, Lithuania, Luxembourg, the Netherlands and Portugal.

3.4.4. Measures fostering institutional change on gender

Involving funding agencies, research organisations and universities in gender-equality policies is an important prerequisite for changing structures that for so long have produced gender inequality in science. 'Fixing the structures' is seen as an important second step to gender equality in science, between 'fixing the (number of) women' and 'fixing the knowledge' ([44]). By including the relevant stakeholders in processes to revise formal structures, as well as informal practices, institutional change on gender becomes possible.

The majority of EU Member States and associated countries have implemented measures fostering partnerships with funding agencies, PROs and HEIs for institutional change systematically or to a high degree. A comparatively small group (about 20 %) is 'on the way' (medium or low degree of development), while for more countries than in all other fields of analysis within PA4, no information is available. This points to a lack of data collection/monitoring in this field.

The majority of countries have implemented measures fostering partnerships between different stakeholders for institutional change.

- A few countries have implemented measures for cultural change systematically, having implemented initiatives on cultural and institutional change as well as providing public funding for organisations implementing such measures (Austria, Iceland, Norway).
- The majority of countries have partnerships with stakeholder organisations to foster cultural change by initiatives, but without providing public funding.
- Quite a big group of countries have no measures or no information on measures to foster cultural change (Belgium, Estonia, Greece, Latvia, Lithuania, Portugal, Slovakia and Turkey).

Only in a few countries have measures for cultural change been implemented at a legal level (Israel, Luxembourg and the United Kingdom). The institutions involved are on the one hand those providing and receiving research funding, and on the other hand general actors for more gender awareness in science and technology.

The partnerships do not follow one common pattern but are very heterogeneous, ranging from a programme to fund institutional change in non-university research organisations (FEMtech career funds in Austria), to establishing standards for funding ('Research-oriented standards on gender equality', from the DFG in Germany), to a think tank to support policymakers (the Centre of Excellence Women and Science (CEWS) in Germany). Generally, it has to be noticed that diverse measures and organisations have been listed here that do not specifically address the topic of institutional change, but more generally contribute to gender equality by sensitisation or awareness raising.

Almost no information is available on the money spent on funding cultural change. Many countries do not have any specific measures; a few countries have funding, but no data is provided by ministries or funding agencies.

([44]) Schiebinger, L., 'Has feminism changed science?', Harvard University Press, 1999.

3.4.5. Representation of the under-represented sex on committees involved in recruitment/career progression and in establishing and evaluating research programmes

The European Commission has generally introduced a quota of 40 % for the representation of the under-represented sex, which is almost always women, in science and technology (for exceptions see 3.4.3). The target of 40 % females on boards designing/defining national research priorities and policies is one that is close to being reached at EU level, as in the EU-27 the share of women involved in top decision-making committees with a 'crucial impact on the orientation of research' was 36 % ('She figures 2012', p. 116) in 2010.

The mean participation of women on boards designing/defining national research priorities and policies is 27 %. Regulations concerning the equal representation of women and men on boards and bodies appointed by the government exist in France, Germany, Ireland and Spain, but these regulations are not specifically designed for the science and technology sector. The share of women on boards is under 20 % in a few countries (Cyprus, the Czech Republic, Hungary, Italy, Lithuania, Luxembourg) while in some Scandinavian countries the 40 % quota has already been reached (Finland: 45 %, Iceland: 40 %, Sweden: 49 %).

Data on the participation of women in jury panels in funding agencies is only available in a limited number of countries (seven). The share varies between 46 % in Portugal and 15 % in Germany. As, for example, data for Germany measure the share of women reviewing research proposals for the DFG, it becomes evident that data for this sub-indicator need to be collected systematically and harmonised for each country.

Information about the share of HEIs and PROs with rules and practices with regard to the representation of females in recruitment and career progression is not available or valid. The same has to be stated for the number of HEIs and PROs with rules and practices to enhance the participation of female applicants and candidates in recruitment and promotion procedures and for the share of the under-represented sex in recruitment and promotion committees in HEIs and PROs. For these data, a special survey and data monitoring activity would be necessary.

3.5. Priority area 5: Optimal circulation, access to and transfer of scientific knowledge

Scientific knowledge feeds research and innovation processes if it is optimally circulated among the appropriate communities. Today, new technologies and models play a very important role in improving this circulation. Indeed it is fostered by the development of open access to publication and data, as well as new digital tools such as e-platforms and digital signatures. One of the goals of the ERA communication is to optimise the circulation of, access to and transfer of scientific knowledge.

In order to assess the development of measures on the circulation of knowledge and knowledge transfer, the ERA baseline analysis investigated (a) the development of policies on open access, (b) the development of national policies and strategies to foster knowledge transfer between the public and private sectors, (c) the development of policies for research- and education-related public e-infrastructures and associated digital research services and (d) the adoption and development of national strategies for electronic identity for researchers through transnational access to digital research services.

3.5.1. Development of policies on open access

In the 'European Research Area progress report 2013' ([45]), open access is defined as 'the practice of granting free access to research outputs over the Internet, most notably peer-reviewed publications and research data'. In order to reduce the cost of knowledge circulation, the ERA communication indicates that the European Commission will develop its open access policy for EU-funded research and innovation projects, and invites Member States to implement policy fostering open access.

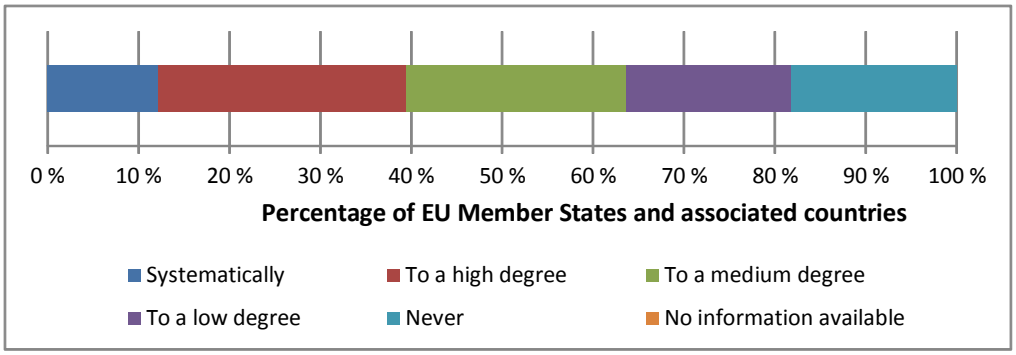
In August 2013 the Commission published the report 'Open access strategies in the European Research Area' ([46]). It identified that the level of open access publications is higher than estimated previously, with around 50 % of scientific papers published in 2011 available for free ([47]). It also pointed out the general trend towards using green ([48]) and hybrid ([49]) open access, more than gold ([50]) open access.

The ERA baseline analysis shows that policies concerning open access are relatively new to EU Member States and associated countries due to the recent developments of open access (see Figure 18). Several actions were launched recently, by different types of actors and using different means.

In several countries, initiatives at stakeholder level play a key role, even more than initiatives from public authorities. Whilst in various cases these actions at stakeholder level are limited to isolated actions, there are also some centralised initiatives, for example by actors such as the conferences of rectors of national HEIs, or the Association of University Libraries. For example, in Portugal the Conference of Rectors of the Portuguese Universities' (CRUP) Open Access Working Group is a structure grouping together most of the Portuguese universities that have taken actions on this matter. Funding agencies have also been identified as initiators and implementers of open access initiatives, thanks to mandatory measures applying to the funded bodies and researchers. For example, in Belgium the two main funding agencies (Fonds Wetenschappelijk Onderzoek — FWO, and Fonds de la Recherche Scientifique — FNRS) oblige researchers to self-archive all articles arising from research funded by them.

([45]) http://ec.europa.eu/research/era/pdf/era_progress_report2013/era_progress_report2013.pdf
([46]) 'Open access strategies in the European Research Area', Science-Metrix, 2013 (http://www.science-metrix.com/pdf/SM_EC_OA_Policies.pdf).
([47]) See Annex — Proportion of open access paper per country (2008–11).
([48]) 'Green open access refers to authors' self-archiving [of papers accepted in academic journals following a successful peer-review process]', in 'Proportion of open access peer-reviewed papers at the European and world levels — 2004–11', Science-Metrix, 2013.
([49]) Hybrid open access: 'authors pay for their papers to be available in OA in an otherwise not OA journal — Hybrid open access journals provide gold OA only for those individual articles for which their authors (or their author's institution or funder) pay an OA publishing fee. There are other cases such as the release of subscription-based journal articles after an embargo period, this type of OA articles could also be called delayed OA', in 'Proportion of open access peer-reviewed papers at the European and world levels — 2004–11', Science-Metrix, 2013.
([50]) 'Gold open access refers to journals that use a funding model that does not charge readers or their institutions for access, and makes all contents available without embargo period', in 'Proportion of open access peer-reviewed papers at the European and world levels — 2004–11', Science-Metrix, 2013.

Figure 18: **Degree of development of open access and preservation policies relating to scientific publications**



Source: ERA baseline database.

Laws are used in a few cases by public authorities to provide a mandatory framework. For example, in Austria the government put into law an obligation to set up a national institutional repository for the theses and dissertations produced at Austrian universities. In Spain the Ministry of Education has established a mandate to deposit and to make publications publicly available in the institutional repositories. At a national level, the 2011 national law on science includes an open access mandate for publicly funded research.

Public authorities can also orient the use of open access through soft measures. For example, in Belgium the ministers of science and research at federal and regional levels signed in October 2012 a declaration on open access in which they agreed to make open access the default for all Belgian research output.

The development of policies relating to open access to data was much more difficult to identify than it was for open access to scientific publications, despite the Berlin declaration on open access to scientific knowledge of 22 October 2003, which was signed by several European organisations, mainly at stakeholder level. For more than 40 % of countries no information was available in the database and only 20 % of countries show a high/systematic degree of open access to data.

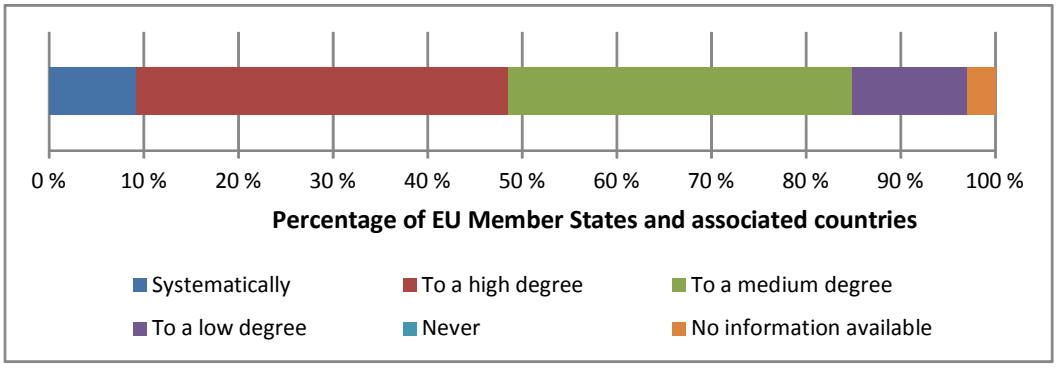
In those countries where some information was available, data have shown that the reinforcement of open access repositories mainly takes the form of the development of centralised infrastructures. It may be supported by public authorities or entirely launched by stakeholders. In France, the Bibliothèque Scientifique Numérique (BSN), ISTEX and HAL data collections were launched to provide rather systematic open access infrastructures. In several countries, EU projects such as Driver and Driver II play an important role.

These few examples of open access policies show that such initiatives can have a positive impact on the development of open access. However, they remain limited to a very few countries. Information about these actions could be disseminated in order to promote similar initiatives in other Member States.

3.5.2. Strategies to foster knowledge transfer between the public and private sectors

The circulation of knowledge between research and industry is indispensable for an optimal link between research, innovation and competitiveness. The ERA baseline analysis dealt with the existence of national knowledge-transfer strategies and the development of national programmes and measures concerning the entrepreneurial skills of researchers, training activities between public and private research, incentives and structured support for researchers to address knowledge-transfer issues (e.g. technology transfer offices).

Figure 19: **Degree of adoption/development of national knowledge-transfer strategies focusing on knowledge transfer between the public and private sectors**



Source: ERA baseline database.

The ERA baseline analysis shows that collaboration between academia and industry is addressed by a large number of countries, and a range of activities covering all the aspects relating to transfer of knowledge as requested in the indicator search were identified (see Figure 19). These comprised:

- networking and communication activities with the private sector;
- hiring people for PROs and HEIs with their primary occupation in the private sector;
- research and training activities with the private sector;
- structured programmes for the placement of researchers in the private sector;
- bilateral agreements with non-public players;
- IPR policies;
- academic entrepreneurship programmes and spin-off programmes.

Often, a single country implements a series of initiatives, even on a single aspect of knowledge transfer. Moreover, the investigation shows that this is an increasing trend. New strategic plans in several countries include this aspect as one of the key priorities of their research policy.

An exception in terms of policy measures addressed was measures to facilitate the hiring of professors or staff whose primary occupation was in the private sector. This type of measure was only found in Germany, where professors at universities of applied sciences are usually hired after at least 3 years of work experience outside the higher education sector. This is also encouraged in Poland and Sweden.

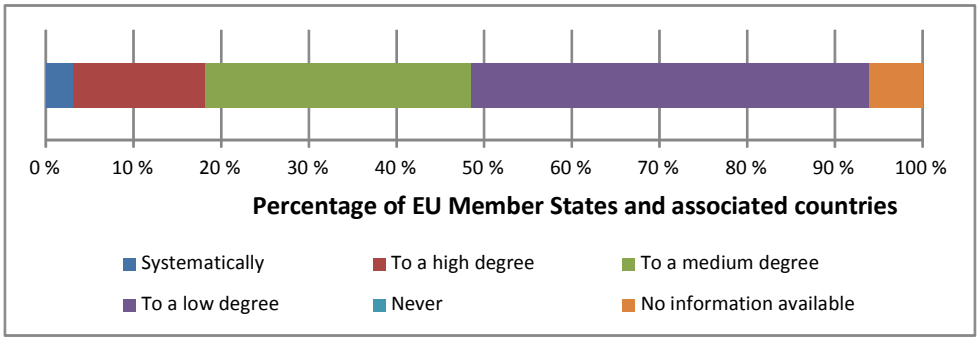
Overall, the ERA baseline analysis shows that, in virtually every Member State, the knowledge-transfer measures are implemented by means of a huge number of actions at policy level and stakeholder level. However, the relevance, appropriateness and impacts of these measures can only be assessed by means of thorough evaluations, considering the context of the national innovation systems.

3.5.3. Existence of e-infrastructures and associated digital research services policies

Digital means can facilitate the circulation of knowledge. That is why it is important that European countries develop efficient e-infrastructures. The ERA communication invites Member States to 'harmonise access and usage policies for research- and education-related public e-infrastructures and for associated digital research services enabling consortia of different types of public and private partners'.

The ERA baseline analysis shows that the existence of such policies in Member States indicates a relatively low level of development of initiatives at the level of Member States and associated countries. Indeed, more than 50 % were assessed as a low degree of development, no development or no identified information.

Figure 20: Degree of development of Member States' harmonised access and usage policies for research- and education-related public e-infrastructures and associated digital research services (networking and computing, distributed resources accessible via networks, data repositories)



Source: ERA baseline database.

This can be explained by a lack of sources identified on this aspect due to the absence of corresponding secondary sources and difficulties in retrieving relevant information at the national level. This of course reflects a low prioritisation among EU Member States and calls for these issues to be addressed by an in-depth investigation on this evolving aspect and the development of relevant action plans.

It was only possible to detect a few initiatives on policies and activities relating to public e-infrastructures and other digital research services, such as the following.

- The setting-up of central portals for access to published research — The Danish National Research Database is a central portal for published Danish research. The database currently covers published literature, such as scientific articles, PhD theses, conference presentations and lecture notes. The Italian platform Pleiadi provides access to documents deposited in Italian academic and research institutional repositories and open access journals. The Polish Virtual Library of Science (VLS) provides over 10 000 full-text articles. The Digital Repository Ireland (DRI), funded under the Higher Education Authority, is one of the main research data repositories in Ireland. Similar services are provided in France by the Centre pour la Communication Scientifique Directe (CCSD), Hyper Article en Ligne (HAL) and the Bibliothèque Scientifique Numérique (BSN).
- Infrastructures delivering e-infrastructure services — The Belgian federal network Belnet provides services on request such as a platform for e-collaboration or video conferencing. The Danish e-Infrastructure Cooperation (DeIC) supports Denmark as an e-science nation through the delivery of e-infrastructures (computing, storage and network) to research organisations. In Hungary, the National Information Infrastructure Development (NIIF) programme funded by the state provides a wide range of communication, information and cooperation services. In Ireland, the e-INIS e-infrastructure is a federation of core electronic infrastructure providers dedicated to the provision of a sustainable national infrastructure for the support of advanced research activities in Ireland. The Dutch SURF organisation is a platform providing facilities to partners to collaborate together and combine their efforts, bringing together ICT professionals within networks and collaboration projects for knowledge sharing regarding ICT-driven innovation.

- Virtual labs — Flanders (Belgium) has developed virtual labs in the areas of medicine and new materials. Luxembourg has established by law the Digital Humanities Lab of the Virtual Centre for Knowledge on Europe.

As regards the adoption and development of national strategies for electronic identity for researchers through transnational access to digital research services, similar results have to be reported. In the course of the data-gathering actions of the study it was intended that strategies and practices relating to electronic identity would be identified. However, no information could be found for nearly 40 % of the countries analysed. Moreover, the information detected for several other cases seems to be very partial, which makes the reliability of this assessment relatively low.

However, in this area, European initiatives play a key role in the development of transnational access to digital research services. The European project GÉANT provides support for the development of a trans-European network implemented by Terena, which groups together national research and education networks (NRENs). At national level NRENs manage Eduroam (educational roaming), which allows roaming educational users to gain Internet access at other member sites by authenticating against a server hosted by their own institution.

In several countries, such as the Czech Republic, Germany and the United Kingdom, issues relating to identity security, scope of personal data use, identity validation and identity tracking are currently discussed, but no large-scale initiatives exist so far.

4. CONCLUSIONS

4.1. The state of play of the European Research Area in the Member States

General overview

The report provides a picture of the degree of development of policies by Member States and selected associated countries one year after the adoption of the ERA communication. The analysis highlights that only half of the indicators are implemented to a medium degree (at least) by a clear majority of countries ([51]). Priority area 4 'Gender equality and gender mainstreaming in research' presents the specificity that no one of its indicators is implemented to a medium degree by a clear majority of countries.

Indicators with a particularly low degree of development ([52]) are concentrated in priority area 4, 'Gender equality and gender mainstreaming in research'. In other priority areas this level was identified for the following indicators: joint research agenda initiatives subject to common *ex post* evaluation; policies and measures to ensure grant portability; harmonised access to public e-infrastructures and associated digital research services; and electronic identity for researchers.

Certain fields well covered by measures and activities implemented by public authorities were identified, such as the application of peer-review standards, joint research agendas addressing grand challenges, development of Euraxess and knowledge-transfer strategies.

It seems that the degree of development of policies is higher in Nordic and western European countries than in Central and Eastern European countries. The situation of southern countries varies from country to country. A distinction between Member States and associated countries did not appear to be relevant. Indeed, Norway and Switzerland show a high degree of development of policies compared to a majority of Member States.

More effective national research systems

European researchers and RFOs still face very different conditions as regards the available volume of public research funding and terms and modalities for receiving research funds (between 20 % and 80 % of GBAORD). The observed heterogeneity among EU Member States is mainly due to differences in the share of institutional funding for HEIs. In particular, many Central and Eastern European countries have low shares of GUFs, and among the older EU Member States, Belgium, Ireland and the United Kingdom show clearly below-average shares of institutional funding for HEIs. On average, GUFs accounted for 45 % of total HERD in EU Member States in 2011.

In order to be able to thoroughly study the degree of competitiveness of national funding systems and their evolution, statistical procedures need to be harmonised. Competitive project funding at national level needs either to be considered in national accounts statistics or in R & D surveys at the level of research-performing institutions.

([51]) A 'clear majority of countries' being defined as at least two thirds of the selected countries, based on figures available in Annex 2: Descriptive statistics per MS action.
([52]) Less than 50% of countries implemented it at least to a medium degree.

The trend towards further redefining and fine-tuning institutional funding systems persists. Incremental funding (i.e. funding based upon historic patterns) systems are increasingly being replaced by formula-based approaches and contract approaches. Various Member States have launched actions for establishing performance-based research-funding systems in order to provide incentives for institutions to spur excellence in research.

The actual status of development of institutional funding on a competitive basis is very heterogeneous among EU Member States. It was not possible to highlight what shares of institutional funding have been allocated by means of competitive measures, i.e. through evaluations and performance indicators. Output indicators used in institutional funding systems predominantly relate to PhD output, third-party funding and research output (journal publications). However, in many institutional funding systems, input indicators (number of researchers, number of enrolled students) still play a dominant role in indicator-based funding systems. Recent reforms of institutional funding systems seek to reduce the complexity of allocation mechanisms.

The development of international peer-review standards has reached a high level among the countries under consideration. Funding institutions apply principles of international peer review, especially for academic-oriented R & D programmes, whereas funding for more applied R & D programmes geared predominantly towards industrial actors focuses more on market aspects, potential for realisation and economic impacts. Peer-review regulations are in most cases provided via soft rules. Only in about 30 % of countries are policies developed by legislative actions. In the majority of Member States research project funding is delegated to intermediary organisations (research councils, science funds, etc.). These organisations sometimes exhibit a high level of autonomy and are held accountable for installing proper funding procedures by means of evaluations, etc. Hence, the development of good principles of international peer review should not be monitored at national level, but the appropriateness of review procedures should be reviewed at the stakeholder level.

Optimal transnational cooperation and competition

International cooperation in research is often mentioned as a priority in national research strategies. However, the level and type of cooperation varies greatly among EU countries, and approaches are often dispersed among various actors in the research system.

- Only a limited number of countries have a long-standing tradition of research collaborations with a distinct focus and joint agreements on procedures. Examples are the Nordic countries in NordForsk, or the DACH-agreement between three research funding agencies of the same type in Austria, Germany and Switzerland.
- In other countries (e.g. the Netherlands), bilateral/multilateral research collaborations are predominantly oriented at countries outside Europe, and in several countries many collaborations, agreements and memoranda of understanding exist, but not all seem to be very active and some could even be considered dormant.

Multilateral programmes addressing grand societal challenges are by large restricted to JPIs. With the exception of Poland and Romania, virtually all of the EU Member States in Central and Eastern Europe, as well as the Baltic states and Southern European

countries, participate in only a very limited number of JPIs, whereas other European Member States participate in more than 50 % of JPIs.

All calls launched by JPIs were implemented by using a virtual common-pot funding basis, in which funds are provided by the national/regional agencies to the successful national applicants. Activities for coordinating national research policies have been initiated by means of experimental measures, but the overall degree of development of JPIs is still low.

The importance of excellent research infrastructures for achieving excellent research is widely acknowledged by countries: 22 countries have a national roadmap on research infrastructures in place, while others are working on it. For some countries doubts were raised regarding whether the national roadmap can be really considered a roadmap. These are more like strategic plans, because there are no specific plans incorporated into these roadmaps on how to achieve the goals. Good information on the specific financial commitments to research infrastructures is lacking.

About 50 % of the countries have implemented measures to support cross-border access to research infrastructures, either financially or by providing information or establishing common rules for access and use. Although several countries have specific programmes supporting inward and outward access to research infrastructures, a number of countries have more general programmes supporting international research collaborations. However, the focus of the financial support measures then seems to be more on providing funding for foreign research visits or stimulating doctoral candidates to pursue studies in other countries, rather than providing specific access to certain research infrastructures.

An open labour market for researchers

The results highlight that legal rules establishing open and transparent recruitment procedures in HEIs and PROs were implemented only in a minority of countries due to a decentralised approach in several Member States and associated countries. However, there are examples of soft, coordination and contractual measures to ensure certain standards of openness and transparency and maintain the autonomy of HEIs and PROs in their recruitment process.

The analysis revealed that the international dimension in selection panels is very limited. As is underlined for gender issues with the presence of females on the panels, the presence of international panellists could limit possible discrimination in the recruitment of non-national residents.

While the investigation in this exercise focused on the existence of appropriate procedures, it did not measure the outcomes of the process. However, a mismatch is possible between the existence of appropriate rules and an effective, open and transparent system. For future exercises, it would be relevant to compare these results with the perception of the recruitment system by the researchers, using information provided by MORE2 and the researchers' reports.

Gender equality and gender mainstreaming in research

Measures to remove barriers relating to the recruitment and career progression of female researchers are implemented differently at each career level: measures to raise the share of women in decision-making processes have been implemented to a medium degree

over all countries. However, a lack of political awareness becomes visible in quite a number of countries which do not provide any measures or data. While measures for placing more women on committees/boards in HEIs and RFOs are quite common, measures identifying gender biases in career progression procedures (audits and *ex ante* assessments on gender-biased procedures in recruitment, promotion and research funding) are rarely implemented and need to be addressed more strongly in the future.

Measures to promote the integration of the gender dimension in research programmes are only implemented in a small number of countries and also need more attention.

The development and adoption of measures relating to the recruitment, retention and career progression of female researchers is only realised 'to a low degree' in every second country. At the same time, national targets/quotas and awards/prizes can be found in about half of the countries, while performance agreements considering the gender dimension are rare.

Although there have for many years been various policies at European and national level addressing the under-representation of women in science and research, the representation of women at different stages of the scientific career ladder still represents a 'leaky pipeline': at PhD level women are already in the majority in some countries, and ERA-wide their participation tends to equal that of men, but in grade A positions only 20 % are women. Hence professorship is still a very male-dominated position and far from being gender balanced.

The majority of EU Member States and associated countries have implemented measures fostering institutional change on gender (intending to eliminate structures and processes that produce gender imbalance), but rarely at a legal level, and public funding is provided only in some of these countries. To raise awareness on dimensions of cultural change, more efforts are needed to implement measures relating to gender bias in recruitment, promotion and funding procedures.

The representation of women in committees that shape the research system is still limited, as measures to ensure that at least 40 % of the members of jury panels (decision-making bodies) in funding agencies are women (the under-represented sex) are only implemented in a small minority of countries, and no valid data on women on committees involved in recruitment/career progression are available. This underlines that, in order to achieve further progress, such measures need to be pushed and promoted, and indicators need to be improved.

Two further remarks generally relating to policies on gender equality and gender mainstreaming in research need to be added.

- The concept of excellence and the way it is operationalised in research funding needs to be linked to the implementation of gender issues. Excellence so far is used as a meritocratic, gender-neutral concept for measuring scientific quality. But as recent research has showed, the understanding of excellence is based on social assumptions and (gender) stereotypes ([53]). These may have a gender bias and may vary between

([53]) Cf. Husu, L., 'On metaphors on the position of women in academia and science', *NORA — Nordic Journal of Women's Studies*, Vol. 9, No 3, 2001,, pp. 172–181; Brouns, M., 'Gender and assessment of scientific quality', *Gender and excellence in the making*, European Commission, DG Research, 2004, pp. 151–157; Rees, T., 'The gendered construction of scientific excellence,

disciplines, countries and cultures. In the context of institutional change, procedures in funding agencies relating to the definition of excellence in peer-review processes (see priority area 1) need to be analysed for gender biases.

- Equal pay is a relevant factor in gender equality ([54]), therefore raising awareness of this issue in research organisations which use public funds could be a pilot action: HEIs and PROs should make income data for researchers available by sex (within the limitations of data protection — see for example the Austrian law on general transparency of income).

Optimal circulation, access to and transfer of scientific knowledge

Open access to publications is becoming a common approach in Europe. In certain countries public authorities are playing an important role, using incentives or mandatory requirements. However, in a huge majority of countries key players are stakeholders acting as precursors, sometimes supported by their public authorities for the dissemination of the practices.

Whilst open access to publications is becoming well established and well known, this is not the case for open access to data and for the deployment of e-infrastructures. Understanding remains limited due to the lack of robust sources. For example, there are several European and international repositories identified as being data repositories, with important variations from one to another. Moreover, these areas are still evolving quickly, depending on technological evolutions and the development of new models. This makes it difficult to measure the exact situation. The investigation highlighted that the first activities in these fields come from stakeholders acting as precursors. However, public authorities often play a key role in the development due to the need for centralised infrastructures and management, and due to the higher costs. This involvement can be as a main player or as support for (a group of) stakeholders. Important differences in activities and means were identified between countries. Some are developing ambitious infrastructures and instruments (acting as precursor states/regions), whereas no or nearly no actions were identified in several countries.

Knowledge transfer between the public and private sectors was identified as a shared priority in all countries. Moreover, the high level of measures and activities shows that public authorities around Europe are actively engaged in increasing the contribution of public research to their competitiveness. A huge diversity of measures was detected, even on the same issue in a single country. All kinds of instruments are used, from legal measures to financial support and coordination activities. In this context a key issue is the measure of the efficiency of these activities, in order to identify the most appropriate ones and analyse their replicability from one country to another. However, there are currently no robust instruments, other than competitiveness indicators, to measure the efficiency of these actions. Such measurements could be undertaken through a case-by-case analysis taking into account the socioeconomic specificities of the countries.

Interdisciplinary Science Reviews, Vol. 36, No 2, June 2011, pp. 133–145; Van den Brink, M., Benschop, Y. and Jansen, W., 'Transparency in academic recruitment: a problematic tool for gender equality?', *Organisation Studies*, Vol. 31, No 11, 2010, pp. 1459–1483.

([54]) European Commission communication, 'Strategy for equality between women and men 2010–15', COM(2010) 491.

4.2. Future options for monitoring of the European Research Area

One aim of this study was to assist the European Commission in identifying measures and retrieving data on the implementation of the ERA communication in Member States and associated countries. However, another important aspect was its experimental dimension: to provide the European Commission with inputs for developing and designing more robust ERA monitoring mechanisms. In this context, the recommendations indicated below propose a shift from a descriptive to a monitoring approach.

From a policy to a monitoring approach

The indicators and sub-indicators used for this investigation mainly correspond to the indicators identified in the impact assessment accompanying the ERA communication ([55]). Its main foundations were designed by the European Commission on the basis of policy orientations provided in the five priority areas. The study should test to what extent it is possible to monitor the ERA's progress in the Member States using this indicator approach, and provide recommendations for refined indicators in order to shift from policy-related items to monitoring topics. The methodological note and the revised template were designed to provide first inputs in this regard.

Before launching a new investigation on ERA actions in the Member States, it would be necessary to:

- verify that all the SMART criteria are reached for each of the indicators and sub-indicator;
- set up a dialogue with the main interested parties in advance, in order to have the agreement of the concerned parties (in this case, EU countries shall be associated);
- once agreed, keep the same framework during the whole monitoring period in order to be able to measure progress.

Development of appropriate monitoring-oriented sources

The quality of the results of this investigation was hampered with regard to several sub-indicators by a lack of corresponding sources. Robust monitoring of the ERA will only be possible if appropriate sources are available. Several issues have been detected in the data collection approach, as shown below.

- Sources missing, such as on the share of institutional funding allocated on a competitive basis. Such sources shall be set up by the Commission (DG Research and Innovation or Eurostat).
- Sources providing data at aggregated level only, with no detail on each country. Hence these sources are not suitable for collecting country-level information. This situation was found for example with the ESF peer-review guide or the ESF publication on cross-border research collaboration in Europe.
- Secondary sources exist, but are designed as descriptive sources and not as monitoring sources. This is the case, for example, for the country profiles of the researchers' reports and the Erawatch report, which provide information that is supportive, but not always sufficiently standardised (and therefore robust enough) to be used for a monitoring exercise.

([55]) Annex 7: Possible indicators to be used for monitoring ERA progress, pp. 119–124.

- Secondary sources exist but are not reliable enough, such as the MERIL database and the information on national and non-national researchers working in research infrastructures. Information for an important number of research infrastructures is missing, which greatly decreases the quality of the information. These sources shall be improved in order to allow their use for future monitoring exercises.
- Secondary sources do exist, but are not updated on a regular basis.

Tackle the obstacle of the diversity of systems in Europe and the measures implemented

The results of the investigation highlight that policies and measures differ greatly between countries, complicating the comparison of several aspects. Two issues shall be emphasised, as follows.

- Differences between research systems, with three main elements differentiating them: (a) the degree of centralisation by public authorities or the autonomy of stakeholders (HEIs and PROs); (b) the degree of externalisation of research policies and funding to dedicated agencies; and (c) the distribution of competences between national and local authorities. This makes nearly every European country a system on its own. However, a monitoring instrument needs to be able to capture the policies, measures and results of all these systems. That is why the following recommendations propose a multidimensional approach.
- Differences between measures in terms of means and intensity. Public authorities can use different means to implement public policies, such as laws and other regulatory instruments, coordination activities, the dissemination of knowledge to increase awareness and financial incentives. During this investigation, the qualitative analysis showed that the scope of comparison of such different means was limited. This is why it is recommended, where relevant, that a second level of analysis of binary indicators is added to identify if a measure is a mandatory requirement, a soft measure or a financial measure, in order to allow better clustering of countries.

Deployment of a four-dimensional analysis: public authority level, stakeholder level, researchers and performance indicators

The results of the investigation show that the focus on measures set up by public authorities limits the scope for assessing the effectiveness of measures. Indeed, this analysis measured the existence of policies for each identified indicator. However, it does not integrate, or it does so only partially, the intensity of the actions, the actions implemented by stakeholders (e.g. HEIs and PROs) and the initial performance level of each country.

This is why we recommend the development of a multidimensional approach, including the following.

- Public authorities (including national and local authorities, as well as public funders): identification and characterisation of measures implementing the ERA communication.
- Stakeholders/implementers (including HEIs and PROs): assessment of the effectiveness of public measures relating to the ERA communication. A survey such as the one launched in 2012 by the Commission could be the means used to collect the information.

- Researchers: they are, for certain aspects, the users or beneficiaries of the items of the ERA communication. A survey of this community could provide a less institutional assessment of the real situation in each country and on the state of the mobility of researchers in Europe.
- Performance indicators: it is necessary to identify the needs and challenges of different countries and the gaps between the policies implemented and the results. Indicators based on results are more easily identifiable for certain aspects, such as on the proportion of females in research, but more difficult to define for other issues.

Measurement of progression on a 2-year basis

More than the current state of play, the main interest of a monitoring exercise is the measurement of progress and evolution of the ERA. This is why it is necessary to plan stable and regular exercises, to allow the provision of comparable data over time.

HOW TO OBTAIN EU PUBLICATIONS

Free publications:

- one copy:
  via EU Bookshop (http://bookshop.europa.eu);

- more than one copy or posters/maps:
  from the European Union's representations (http://ec.europa.eu/represent_en.htm);
  from the delegations in non-EU countries
  (http://eeas.europa.eu/delegations/index_en.htm);
  by contacting the Europe Direct service (http://europa.eu/europedirect/index_en.htm)
  or calling 00 800 6 7 8 9 10 11 (freephone number from anywhere in the EU) (*).

  (*) The information given is free, as are most calls (though some operators, phone boxes or hotels may charge you).

Priced publications:

- via EU Bookshop (http://bookshop.europa.eu).

Priced subscriptions:

- via one of the sales agents of the Publications Office of the European Union
  (http://publications.europa.eu/others/agents/index_en.htm).

KI-NA-26-550-EN-N

The study 'Analysis of the ERA state of play in Member States and associated countries: focus on priority areas' was prepared by a consortium led by Innova Europe.

It provides an overview of the degree of adoption of ERA-related policies by Member States and selected associated countries 1 year after the endorsement of the ERA communication. Specifically, it identifies and analyses the baseline situation in each Member State, and when relevant in associated countries, for each action within the priority areas defined in the ERA communication.

Studies and reports

Publications Office

doi:10.2777/6362