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Investments in JOint and Open REsearch Programmes and analysis of their economic impact

(JOREP)

Final Report

Authors of the study

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- °USI – Università della Svizzera Italiana
- NIFU – Nordic Institute for Studies in Innovation, Research and Education
- °°ARMINES-LATTS, Laboratoire Territoires Techniques et Sociétés
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1. INTRODUCTION

1.1. Strengthening the ERA through open and joint programmes

The idea of coordinating EU member states' national research policies dates back to the '50s when the attainment of a common policy in science and technology started to be considered a strategic factor for the growth and development of the European Union. At first, coordination was mainly carried out in specific fields through the activities of supranational intergovernmental organisations such as ESA, CERN, EURATOM, ESO, and EMBL.

In the '70s several intergovernmental funding schemes were created for cooperative research which fostered the ideas of networking and transnational collaborations among research performers at the European and international level in the field of research and scientific development. Large multilateral programmes such as COST and EUREKA were launched. Besides being important sources of funding, these represented a way for the EU to improve coordination and collaboration in Europe in several fields of science. The idea behind the launch of large EU programmes[1] and EU initiatives was to limit the duplication and waste of resources and efforts on research while improving networking and collaborations. Then, the European Union took on the role of both funder and, to a limited extent, coordinator of national research policies through the launch of large initiatives aimed at promoting networking and joint programmes in R&D. Also national shares of contributions to research channelled through these schemes progressively increased (European Commission, 2008b).

The need to improve collaborations in R&D among EU member states intensified when making Europe the most advanced knowledge society in the world and building ERA (the European Research Area) were announced in 2000 as main strategic objectives of the Lisbon strategy to be reached by 2010. The Open method of coordination was presented as a means for strengthening and speeding up coordination among EU member states in several fields, among which R&D. Until then, enhancing coordination in the field of education and research was considered mostly consistent with the subsidiarity principle governing European policies, but it was difficult to accept by the member states which did not want to lose their decisional power in this field. However, after 2000 the focus of EU policies shifted from the creation of European programmes and EU supranational agencies to the development of cooperation among national agencies in specific fields. The purpose was to mobilise a greater portion of national public research budgets, which had until then remained in the hands of national governments and had not been used within initiatives based on European funding only. ERA-NET initiatives are explicitly conceived as variable geometry tools for coordinating national funding through joint calls among national agencies. 71 ERA-NETs were launched under FP6, which resulted in about 85 joint calls totalling over 800 mio. euro (European Commission 2008a). Article 169 (now Article 185) initiatives and, more recently, Joint Technological Platforms go in the same direction.

The European Commission clearly indicated the main policy rationale for joint programming (European Commission 2008): increasing the efficiency of public spending for research in a context in which little progress had been made towards reaching the 3% of GDP target set for GERD funded by the State.

Joint and open programmes have gained increasing importance in the changing landscape of European research characterised by greater cooperation, the need to improve the attractiveness of Europe for the production of knowledge, and the need for research to be efficient in aiding governments, firms, and institutions. They are also seen as instruments able to enhance the quality, efficiency and structuring of ERA. Both types of programmes involve a European and international dimension in public research policies, the former as research funding programmes jointly managed by different national states (joint research programmes) and the latter allowing access to national R&D programmes by performers located in other countries (open research programmes; European Commission 2008a).

Joint and open programmes are two different instruments, stemming from different initiatives and having different motivations and economic rationales. The opening of national R&D programmes also represents an important trend in national research policies, so that several ERA countries are experiencing different forms and ways of opening, despite generalised barriers and political reluctance to transfer national funds abroad.

[1] The European Union Framework Programmes should also be cited although not addressed by JOREP project

Thus, joint and open research programmes are a key feature of European research, which needs to be studied with appropriate tools and methodological approaches. It is important to take into consideration their multifaceted aspects and variable geometry, which are not fully described by traditional instruments and statistical tools for collecting data on R&D.

1.2. The JOREP project

JOREP (Investments in joint and open R&D programmes and analysis of their economic impact) is a service contract commissioned by the European Commission [Contract. No. RTD/DirC/C3/2010/SI2.561034]under the Seventh Framework Programme of the European Union for research, technological development and demonstration activities (2007 to 2013).

The project is coordinated by CERIS (The Institute for Economic Research on Firms and Growth of the CNR-Italy) and started in June 2010.

The project covers eleven countries displaying various situations within ERA: medium-size countries with a well-developed science basis, large countries, Mediterranean countries, and Central and Eastern European Member States. These countries are (in alphabetical order): the Czech Republic, Denmark, France, Germany, Italy, the Netherlands, Norway, Poland, Switzerland, Spain, and the United Kingdom.

The following are the organisations taking part in the project as JOREP partners and national experts:

CERIS CNR (Institute for Economic Research on Firms and Growth of the Italian National Research Council) – coordinator – Emanuela Reale, Emilia Primeri

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The JOREP study revolves around some key questions: what is the EU member states' engagement in trans-nationally coordinated programmes? What is the openness of their public R&D programmes? What needs do joint and open R&D programmes mainly answer? What are the main motivations driving the joint undertaking of research and the opening of R&D programmes? Are there differences based on broad scientific domains?

In this context, the JOREP project aims at providing a sound quantitative basis for the monitoring of investments in joint and open research programmes in EU countries, as well as empirical evidence of the policy rationales and impacts of these programmes on the European Research Area. Two main activities are involved: a) the collection of data about joint and open programmes according to a set of descriptors, and b) the analysis of motivations and impact. The project has also led to the definition of a set of descriptors concerning joint and open programmes.

Before collecting quantitative and qualitative data on joint and open programmes, a clear definition of both typologies of programmes and methodological choices has been developed in relation to: the context of analysis of joint and open programmes, the perimeter of research, the typologies of indicators to be adopted, and the methodological choices at the basis of the data collection and the analysis of motivations and impact. JOREP has been developed consistently with Eurostat's aims and indications, previous works on public funding and transnational coordinated research, and the OECD NESTI GBAORD project.

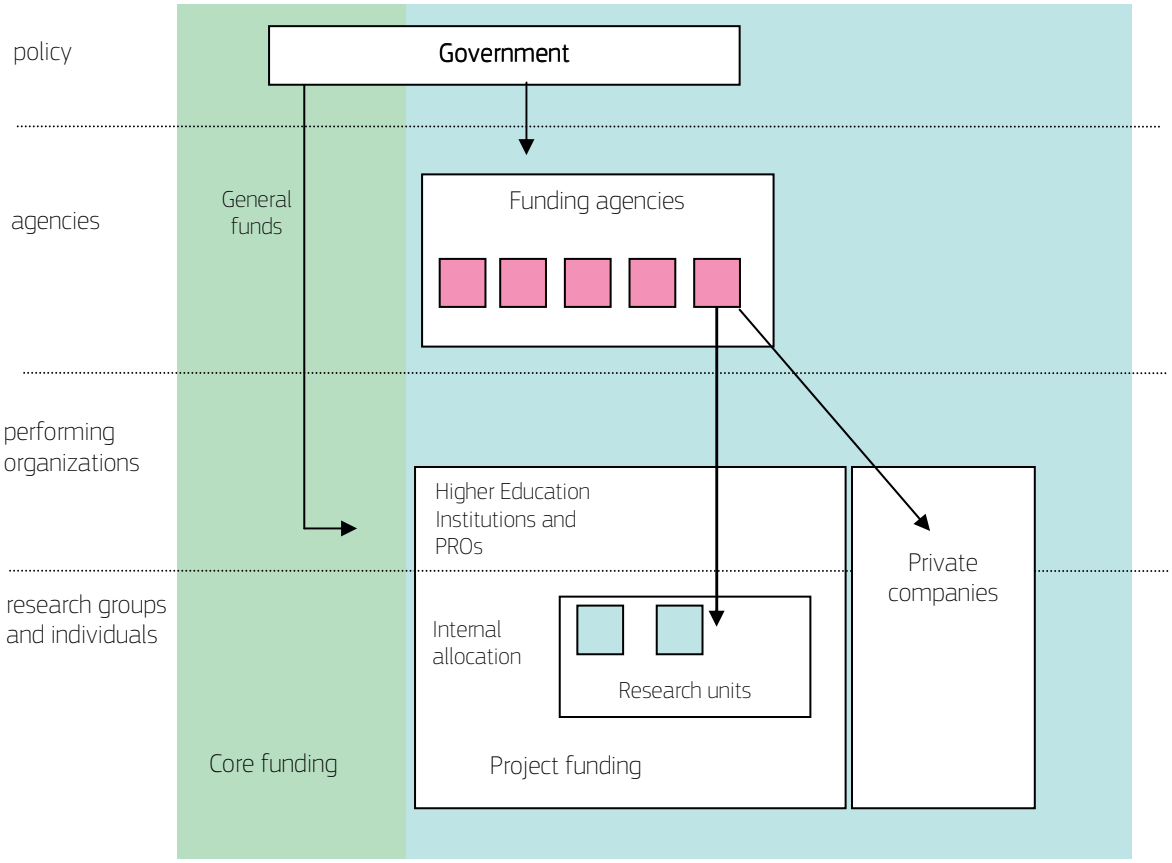
1.3. Conceptual framework

The conceptual framework of JOREP is based on the concept of public funding system, as a basis to describe the nature and role of open and joint programmes and to address the issue of their impact on the European Research Area. Funding systems are to be considered multilayer systems in which the interaction among four layers – namely policy, funding agencies, performing organisations, and research groups – takes place. These four entities represent different functions in research funding and are organisationally separate, with few exceptions such as the case of vertically integrated national organisations acting as both funding agencies and research performers, like the Academies of Sciences in some Central and Eastern European Countries (Lepori et al. 2009) and organisations like the CNRS in France (Thèves et al. 2007). Moreover, two main funding allocation modes can be identified, namely institutional funding and project funding (FIGURE 1).

Project funding can be defined as money allocated to a group or individual – to perform R&D activities which are limited in scope, budget, and time –, in most cases based on the submission of a project proposal describing the research activities to be done (OECD, Directorate for Science, Technology and Industry, 2010).

The main criteria for identifying project funding – distinguished from institutional funding – are: a) the organisational separation between funding agency and beneficiary, b) funding is limited in time and c) resources are allocated directly to research groups instead of universities or research organisations. It should be noted that competitiveness does not represent the main criterion to define project funding versus institutional funding.

Figure 1. A model of public funding systems for research



Hence, a research-funding programme is defined as an organisational setting able to distribute project funding to research groups and involving the following functions:

- An explicit goal and mission statement, including the objectives to be reached.
- A statement of scientific priorities or perimeter concerned and a description of the type and mode of research expected, included in the call for proposals.
- A procedure and set of rules for submitting proposals, as well as for their evaluation and selection.
- A dedicated budget related to the programme.
- The procedures for establishing and managing the contract, including follow-up and reporting.

This conceptual framework, as shown in detail below, allows for a systematic discussion of transnational issues in research funding and provides a suitable framework for dealing with open and joint programmes and for identifying the descriptors and data to be collected in the first phase of the project.

1.3.1. The general framework on joint programmes

Our conceptualisation of joint programmes is based on a representation of public research funding organised in four functional layers - namely policy, funding bodies (agencies, ministries, European Commission), performing organisations (including universities) and research groups – and characterised by two main allocation modes, institutional and project funding (Lepori 2011). Project funding identifies resources directly allocated by a funding agency to a research group or an individual for research activities limited in time and scope (Lepori, Dinges, Reale, Slipersaeter, Theves and Van den Besselaar 2007);

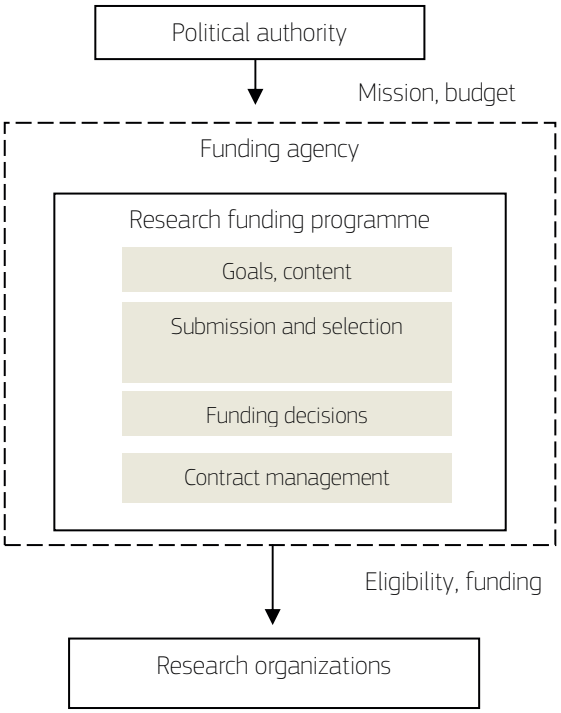
Joint programmes in the definition adopted by JOREP are a subset of project funding. Accordingly, we do not consider other forms of internationalisation of research funding, like joint research infrastructures and cooperation at the level of performers. As we are dealing with public funding, our definition of research matches the one adopted in the analysis of public allocation of research funds in official R&D statistics (the so-called Global Budgetary Allocations and Outlays for Research and Development, GBAORD).

For a general discussion of the conceptual framework, refer to JOREP Deliverable D2 'Literature review and national mapping'.

Project funding is mostly organised in the form of specific research programmes managed by a funding agency. The latter is a generic term to characterise an organisation regularly allocating public funding for research projects. As such, the organisation will have a mission and specific goals, its internal organisational structure and personnel, and will enjoy a (varying) degree of autonomy in taking decisions (Braun 1998, Slipersaeter, Lepori and Dinges 2007). This definition of funding agency is broad and includes not only formally independent agencies, like research councils, but also the organisational subunits of ministries in charge of managing research programmes (e.g. ministerial committees) or organisations like COST, which is legally an intergovernmental conference. Thus, a funding agency does not necessarily have a legal status of its own.

For the purposes of this study, we define a research funding programme as an organisational setting which distributes public project funding for research (Lepori, van den Besselaar, Dinges, et al 2007b) on a regular and organised basis. This definition does not require programmes to be long-term activities with repeated calls, but it excludes research contracts awarded for specific purposes and without a well-defined framework (even though the contract selection process is competitive, like in the case of tenders). Hence, programmes need to manage a number of processes, namely a) the construction of an explicit goal and mission statement, b) the identification of scientific priorities and of the type and mode of research expected, c) procedures and rules for submitting proposals, as well as for their evaluation and selection, and d) procedures for contract management, including follow-up and reporting (FIGURE 2).

Figure 2. Research programmes and funding agencies



By definition, we consider joint programmes all publicly funded research programmes for which at least one of the programme functions is shared among more than a single country (or regions belonging to more than one country). In most cases, this implies that programme resources are provided by more than one country. We notice that this general definition is broader than the EU concept of "Joint Programming", which refers to a limited number of programmes launched by the EU in order to foster ERA integration (European Commission, 2008).

While the JOREP perimeter is discussed in greater detail below, it is important to list some general exclusion, which are implied by this definition:

-Programmes for the exclusive financing of mobility and meetings are not included, as the definition requires research activities to be supported (i.e. through salaries). This excludes the large number of purely networking schemes managed by national agencies.

-Programmes managed only by the European Union (EU Framework programmes), as well as programmes managed by the EU with an individual country (EU structural funds) are not included.

-Programmes supporting joint development and exploitation of infrastructures are not included.

1.3.2. Joint programmes as multi-actor spaces with sharing of functions

While most national programmes are managed by a single agency with a clear status and organisational form, the situation is more complex for what concerns joint programmes, as in very few cases – like the European Space Agency – all programme functions are transferred to the supranational level and the role of National States is limited to providing funding to that agency. In most joint programmes, processes are shared between the supranational and the national level and there are different ways to organise this division. Analysing the organisational setting and sharing of functions in joint programmes is relevant, as we expect these two features to deeply influence their functioning and evolution, as well as their impact on the research system. In this regard, a few questions are central for the JOREP project, leading to the development of specific descriptors to characterise programmes (see below, section 3.3).

a) Which processes are integrated at the supranational level? A central feature of the variable geometry approach introduced by the European Union is that integration does not necessarily take place for all the processes involved in programme funding, but individual countries might manage some of them

independently. Hence, it is relevant to analyse which processes are integrated at the supranational level and which remain in the hands of national agencies, and to relate the observed patterns to programme features and the interests of the actors involved.

b) Which are the organisational forms of integration? Integration requires the establishment of some supranational structures in order to manage decision-making processes. The simplest form is the creation of a supranational funding agency, with an official status and its own organisation. However, joint programmes might also be based on transitory coordinating structures, like joint decision-making committees; delegation to a single national agency is a third option, which has been chosen in a number of cases (the so-called "lead agency" agreements, like D-CH-A) and relies on mutual trust and alignment of goals among the agencies involved.

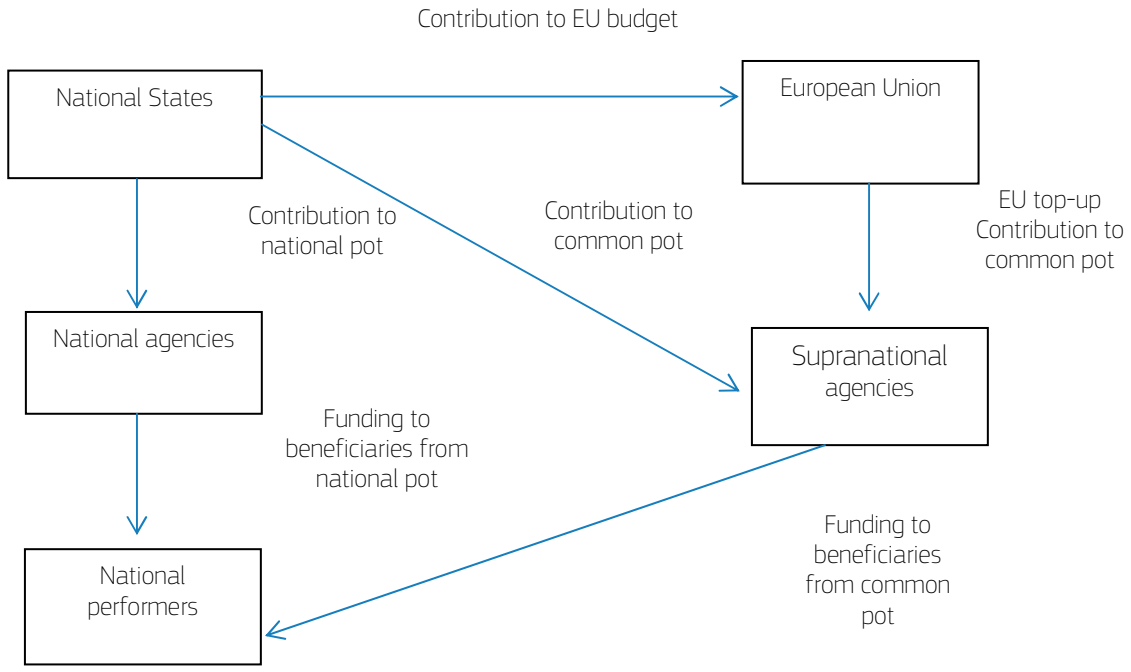
c) How is funding managed? Joint programmes do not necessarily imply cross-border transfer of funds. As a matter of fact, two main funding management models can be identified: a real pot model, in which funds are transferred from national states to a supranational funding agency and then distributed to performers in the participating countries, and a national pot model, in which each country directly funds its performers through a national funding agency. Mixed models are also found, such as the case of a national pot model plus EU top-up funding managed at the supranational level.

d) Actors involved and their role. Constellations of actors in joint programmes are expected to be more complex than in national ones. Most of them will include a number of National States, as well as the European Union for European initiatives. States are likely to delegate some tasks of joint programmes to national funding agencies, but the roles and types of agencies depend on differences in the organisation of national funding systems and their degree of agencification (Slipersaeter et al, 2007). JOREP provides a systematic identification of national agencies participating in joint programmes and of their functions, as well as a description of the types of agencies involved, for example distinguishing among ministries, research councils, and innovation agencies (see chapter 2).

1.3.3. Funding models and flows of funding

This organisational complexity corresponds to a certain degree of complexity in the structure of funding flows, which requires the introduction of a new conceptual framework besides the one currently adopted in R&D statistics (OECD 2002). Namely, in joint programmes public resources from the National States can be transferred either to a supranational agency or to a national one, from which they are then allocated to beneficiaries in different countries (see FIGURE 3).

Figure 3. Structure of funding flows in joint programmes



In terms of the methodology adopted for data collection, this implies that three organisational levels involved in public research funding must be distinguished, namely:

- Public budgets, as initial sources of public R&D funding (covered by GBAORD).

- Funding agencies managing public funding (related to specific programmes) and distributing it to beneficiaries.

- Research organisations as final beneficiaries.

The JOREP methodology involves the collection of two sets of data regarding funding flows from the States to the agencies and from the agencies to the beneficiaries; the former are relevant to the analysis of public investments in joint programmes, whereas the latter are relevant to provide breakdown information by beneficiary sectors.

While in most national programmes the whole budget is managed by only one funding agency, most joint programmes are based on national pots and, accordingly, there might be different national agencies providing resources to national participants – possibly integrated with European-level funding. Hence, the total programme budget needs to be calculated by adding the amounts provided by all the funding agencies involved.

Furthermore, the JOREP framework coherently introduces the international sector (including Europe) as a geographical entity separate from member states and thus introduces the measure of contributions from the EU budget to joint programmes, as well as European and international agencies managing a share of programme funding either from national or European sources.

The above discussion illustrates the complexity of the topic to be investigated in the JOREP project. Not only are the types of programmes and policy intentions behind them very diverse, but there is also a distinctive lack of empirical research which could provide a basis for constructing the categories for data collection and impact analysis.

Considering the complexity of the topic, before dealing with the data collection and analysis of motivations and impact, JOREP has clearly defined the perimeter of programmes and the criteria for their inclusion in the analysis, or exclusion. These can be summarised as follows:

Programmes funding research activities and not only travelling, coordination, or career costs.

The opportunity to use programme funding to pay researchers (including PhD students) is the main criterion for identifying these programmes.

Only programmes in which at least one JOREP country participates are included.

Programmes directly managed by the European Union and funded only through European budget are not considered joint programmes - EUFPs and structural funds are not included.

National research organisations (Academies of Sciences or the CNRS) were included in JOREP as far as they act as funding agencies for the laboratories. Research cooperation agreements among research organisations are excluded.

1.4. Structure of the report

The Final report represents Deliverable D11 of the JOREP project and summarizes the main achievements and results of the data collection and the analysis of motivations and impact. It mainly relies on Deliverable D9, the Analysis Report, which offers a full description of the data collection, methodological choices, problems encountered, and solutions developed to carry out the task, as well as an analysis of motivations and impact with evidence for the documentary analysis, interviews, and a beneficiary survey for ten case studies. Annexed to the Final report, the Handbook of the JOREP project provides details on data collection on joint and open programmes.

The Report has the following structure.

Chapter 2 describes the data collection methodology and presents the methodological choices for the motivations and impact analysis, referring to previous Deliverables of the JOREP Project when appropriate.

Chapter 3 presents the typologies of programmes emerging from the analysis (Integrated, Coordinated, Collaborative, Open), summarising the main features of each typology. The relationship between joint programmes and European integration is also discussed.

Chapter 4 focuses on the institutional logic of national actors in relation to the establishment and development of joint programmes and opening of national programmes.

Chapter 5 illustrates open programmes and the trend of opening of national research programmes, presenting evidence from a pilot test on three JOREP countries (CH, IT, FR) and evidence on open programmes from the data collection and the analysis of motivations and impact.

Chapter 6 introduces the theory behind the analysis of motivations and impact of joint and open programmes developed by JOREP as well as key evidence on their impact.

Finally, Chapter 7 summarises the main observations, methodological remarks, and suggestions of JOREP as well as policy recommendations based on the observed trends and results.

2. COLLECTING AND ANALYZING DATA ON JOINT PROGRAMMES: CONCEPTUAL FRAMEWORK, METHODOLOGY AND RECOMMENDATIONS

While joint programmes are mostly considered research funding programmes shared among European countries (possibly together with the European Union), looking at some examples of programmes which would be labelled as joint programmes shows that there is great diversity in terms of functions, organisational forms, and levels of involvement of national agencies. Two extreme cases at either end of the spectrum are fully integrated programmes, like the European Space Agency, and bilateral programmes in which submission, evaluation and funding are managed in parallel in each of the participating countries.

Describing the different organisational forms of joint programmes and patterns of national involvement is a key aspect of JOREP and will be discussed in detail in chapters 3 and 4 of this report. It requires a well-constructed set of descriptors in order to systematically compare the different programmes. Furthermore, defining which kind of initiatives should be included and working out operational criteria for inclusion and exclusion becomes central for the analysis. As will be clarified later, joint programmes in the meaning adopted by JOREP represent just one of the dimensions of internationalisation of research policies – hence, the importance of a clear definition of the perimeter for our study. Both the definition of the perimeter and the characterisation of the programmes are driven by the study's conceptual framework, rooted in a broader understanding of how research funding systems are organised. Finally, as will be discussed later, funding flows for joint programmes are particularly complex due to the presence of both national and cross-border flows; thus, they require the development of suitable categories beyond those adopted in current R&D statistics (OECD 2002).

This chapter presents the main elements of the methodological construction developed for the JOREP study. We firstly outline the three main methodological components of the study, namely operationalisation of the perimeter, construction of programme descriptors, and collection of data on funding flows. Section two is devoted to operational issues concerning how data collection and validation have been organised, how data have been integrated into a European-level database and, finally, what methodological problems have emerged and how these have been addressed. Section three is dedicated to the analysis of motivations and impact carried out by JOREP. The conceptual framework and methodological choices driving the analysis are presented.

The focus of the chapter is on conceptual and methodological choices, while the reader should refer to the different JOREP deliverables for more complete and systematic information. We also focus on joint programmes. The methodology for open programmes is presented in chapter 5.

Box. Highlights on methodology and future data collection

Joint programmes are defined as public research funding programmes for which at least one of the key functions (mission, submission and selection, funding decisions, contracts) is shared among more than one country. JOREP has developed three main methodological components for data collection: a) A suitable definition and operationalisation of the joint programmes perimeter; b) A set of descriptors on main organisational characteristics; c) Definitions for systematic collection of data on funding flows.

JOREP has proven the feasibility of these tasks and shown that these data provide original and relevant insights into joint programmes and their development through time. Data on funding flows are not available in public budgets, but need to be collected via dedicated questionnaires presented to European and national funding agencies. A two-tier data collection strategy is suggested, combining a European-level observatory (in charge of the perimeter and descriptors) and data collection on funding by Eurostat and National Statistical Institutes.

2.1. Methodological issues: perimeter and definitions

Operationalisation of the perimeter. Following the general definition, an operationalisation of the perimeter was undertaken at two levels: first, the JOREP core team developed a list of European initiatives and, then, national experts in bilateral programmes integrated it.

Obviously, the perimeter includes only joint programmes involving the participation of at least one JOREP country – the Czech Republic, Denmark, France, Germany, Italy, the Netherlands, Norway, Poland, Switzerland, Spain and the United Kingdom. Joint programmes between one JOREP country and non-ERA countries – for example, a programme between the Netherlands and China – are included as well. To check whether programmes are supporting research, the criterion adopted concerns the launch of at least one call for proposals in 2008 or 2009. Accordingly, some ERA-NETs are excluded because either they have never launched a specific call or this did not happen in the reference years. For similar reasons, all Joint Programming Initiatives are not considered (first calls in 2010), as well as most JTIs (with the exception of ARTEMIS and ENIAC). Programmes between regions in different countries are also included in principle, but have not been systematically covered by JOREP.

Furthermore, all programmes supporting research infrastructure and careers are excluded. At the European level, this concerns especially the European Fusion Development Agreement (EFDA) and initiatives mostly providing research grants, like the European Molecular Biology Organization (EMBO). INTERREG is also excluded as it primarily funds infrastructures and regional development. Finally, at the national level, research cooperation agreements among public research organisations (e.g. CNRS-MPG) are excluded from the perimeter, even though they involve allocation of funding to the partner laboratories.

A specific issue concerns disaggregation when individual programmes belong to a common setting, like the ERA-NETs, Eureka clusters, or COST actions. The general rule is that programmes should be considered separate if, at the programme level, they have a separate budget with dedicated calls. Thus, ERA-NET, ERA-NET+, and Art. 185 initiatives should be disaggregated at the level of each individual initiative, since each of them has a dedicated structure for calls and proposal selection and a dedicated budget, while EUREKA and COST activities are not disaggregated at the level of individual actions, since it is assumed that only a single budget for all COST activities exists at both the European and the national level.

The final dataset includes 99 programmes, 44 of which are European initiatives and 45 bilateral programmes. We consider the resulting coverage quite good, even though a number of small-scale national schemes might have been disregarded. Concerning European initiatives, while coverage for 2009 is quite accurate, the perimeter is changing rapidly as several initiatives were started after 2009 (or some existing initiatives have launched calls only after 2009).

For a general discussion of the methodology, refer to JOREP deliverable D3 'Study methodology'.

Programme descriptors. A central component of the JOREP methodology has been the definition of a set of descriptors systematically characterising the programmes and the organisation of different processes. Most of the descriptors are either numeric or in the form of a closed list with predefined categories; this choice allows for a more systematic comparison among programmes, but requires a careful conceptually driven construction of categories, as well as systematic checks on uniform application by national experts. Free text remarks have been used extensively to highlight exceptions and cases, which do not easily fit into the categories. TABLE 1 provides a complete list of descriptors; for full definitions and specifications, the reader should refer to deliverable D3. The descriptors provided can be divided into four broad categories:

A set of general features of the programme as a whole. These include the official start year of the programme, its establishing authority, its duration, the typical duration of projects supported by the programme, a classification by research topics using the Nomenclature for the Analysis and Comparison of Scientific Programmes and Budgets from the Frascati Manual (NABS; OECD 2002), and the importance of scientific quality vs. relevance criteria in the selection of projects.

A set of descriptors for the main organisational characteristics of the programme, including whether its submissions are made to a single agency or in parallel, its mode of integration, and the funding model adopted. A list of JOREP participating countries and funding agencies, including the function to which each agency contributes as well as when national participation started. Moreover, a complete list of countries participating in the programme is also included.

Finally, a set of programme categories. This includes the distinction between European initiatives and bilateral programmes, a classification by typology, which will be discussed in Chapter 3, and the distinction between ERA and non-ERA programmes (the former also comprising non-ERA countries).

It is important to notice that while programme-level descriptors are distinctive for each programme – like the programme topics –, national or agency-level descriptors are specific for each country and agency participating – a typical case being the year of participation by a specific country. As we shall discuss later, this leads to a complex relational data structure, which requires the setting up of a relational database (section 2.2).

Table 1. List of descriptors for joint programmes

Descriptor	Type	Category	Content of the descriptor and categories
Programme identifier	Numeric code	Programme-level	An individual numeric code identifying the programme.
Name of the programme	Free text	Programme–level	Official name of the programme or its English translation.
Programme start year	Closed list	Programme–level	Year of the official act creating the programme.
National participation	Closed list	National-level	Yes/no for each country included in the data collection.
Year of participation	Closed list	National-level	Year when the country signed the official participation act (even when funding started later).
Main programme changes	Free text	National-level	Free text to specify changes in national status, rules, etc.
National role	Closed list	National-level	Closed list (full participation, limited participation).
Establishing authority	Free text	Programme–level	The authorities which established the programme (EU/national states/funding agencies).
Participating agencies	Closed list	Agency-level	List of all international and European funding agencies that fulfil a programme function.
Agency function	Closed list	Agency-level	Identification of the functions of each agency (yes or no variable for each function).
Programme duration	Binary	Programme–level	Limited/periodic/regular.
Project duration	Closed list	Programme–level	Less than 2 years /2-4 years/more than 4 years (referred to a typical project).
Research topics	Closed list	Programme–level	After testing both NABS, FP7 sectors and OST DISC, the use of the NABS classification is recommended as it is more suitable for this type of programmes.
Beneficiary sectors	Closed list	National-level	Frascati sectors (yes/no variable for each sector); refers to formal right to participation.
Selection criteria	Scale	Programme–level	Scientific quality and relevance (1-4 scale, total sum of points = 5).
Submission procedure	Binary	Programme–level	Single entry point/multiple submission.
Mode of integration	Closed list	Programme–level	Agency/Coordination/Delegation/Independent Selection.
Funding model	Closed list	Programme–level	National pot / Common pot / National pot with additional EU funding.
ERA Partner countries	List	Programme–level	List of countries; this refers only to the countries not included in the data collection.
Non-ERA Partner countries	List	Programme–level	List of countries.
ERA Category	Closed list	Programme–level	ERA programme / non-ERA programme.

*Agency descriptors***.** A second set of descriptors characterises the funding agencies participating in the programmes. We can expect the type of agency participating to be related to the topic and characteristics of

each programme and the size and position of each participating agency to influence the development of joint programmes.

These descriptors include the total budget of each agency, a categorisation by geographical level (supranational/national/regional), and a classification by type, distinguishing among:

- Government**,** meaning funding agencies directly belonging to the public administration, such as ministries and sector offices. Typical examples are the DG research at the European level (which manages the European FPs), and research ministries at the national level. These are further divided into national research/science ministries, sector ministries, and regional governments.
- Intermediaries, meaning agencies mostly independent from the public administration and having the function of either funding research or regulating specific sectors. These include research councils, innovation agencies, sector agencies and, at the supranational level, inter-governmental agencies, EU implementation agencies, and international non-governmental associations (like the European Science Foundation).
- Performers are organisations having the main mission of performing R&D activities but they sometimes also deal with funding activities. These include public research organisations (PROs) and private companies.

Data on funding flows. As explained in section 2, the structure of funding flows for joint programmes is particularly complex, as funding might be provided by different national agencies, as well as by the European Union, and in some cases distributed across countries. Moreover, a careful distinction must be made between transfer from public budgets to funding agencies and from agencies to performers.

Hence, for each joint programme JOREP has collected two distinct sets of data:

- Transfers from public budgets to the funding agencies for the purposes of that programme in the reference year. The following information is provided: source of funds (national states or the EU), receiving funding agency, and amount transferred. A further descriptor indicates if there is a specific budgetary line in the State budget for the programme, or if the amount is earmarked for the programme (as part of global allocation to the agency), or, finally, if the amount for the specific programme has been decided by the agency itself (the so-called delegated budget). This descriptor is relevant to investigate to which extent decisions to invest in joint programmes are taken by National States or by the agencies.
- Transfers from each funding agency participating in the programme to the beneficiaries. The following information is included: amount of money transferred, breakdown between public and private beneficiaries, and country of the beneficiaries. While for national agencies beneficiaries will be in the same country, supranational agencies will usually distribute funds to beneficiaries across different participating countries.

All financial data are in the national currency of the reference year; a separate table is provided with the average exchange rate for each year. These two sets of data do not match exactly, for example because of different accounting conventions, and will have, in any case, a different structure.

2.2. Data collection and management

JOREP national experts collected data for each country, while NIFU STEP collected European-level data centrally. The data were validated by the JOREP core team, checked for inconsistencies together with national experts and, then, integrated into a relational MS Access database, which allows linking information on each programme across countries and participating agencies by taking into account the relational structure of joint programmes.

2.2.1. Data availability and methodological problems

Overall, the availability and completeness of the data are rather good, but there are a few descriptors which are slightly more problematic in terms of comparability and availability; while much effort has been made by the JOREP core team to ensure a comparable use of definitions by national experts, in some cases it cannot be excluded that their application has been slightly different from country to country.

More specifically, in terms of availability, according to Deliverable D6, only 1.3% of the descriptors for joint programmes were missing from the data collection; thus, coverage in this respect is quite good. The share of non-available data is higher concerning programme budget (18% of missing data, but only 12% for 2009) and funding to beneficiaries (22% of missing data, 18% for 2009).

The descriptors display relatively few comparability problems, but it soon became clear that much effort must be devoted to producing clear guidelines on the application of descriptor categories; otherwise, different experts might apply them in very different ways. Especially the thematic classification appears to be rather problematic, as it is not always easy to fit the different programmes into the classification categories, and experts were not well acquainted with the adopted classifications. Given the fact that programmes are policy instruments, the NABS classification has proven to be more suitable than other possible approaches and its use is thus recommended in the final methodology guidelines. Other descriptors which seem to be rather problematic are those regarding the involvement of funding agencies in programme processes, where a much more fine-grained classification would be required and the amount of data is rather large.

Despite their high level of availability, budgetary data raise some more complex questions and need to be analysed with great care. First, programme budgets are highly skewed; therefore, some missing data might have a greater impact on the analysis than expected. This applies especially to some large European initiatives about which, due to the complexity of their funding models, it is not always easy to gather precise information on national budgets. Furthermore, a major issue concerns volatility, as well as how budgets are calculated and recorded. Since most budgetary decisions have been delegated to the funding agencies, most data come from the agencies' records, which usually provide information on project volume by year of decision. For programmes with irregular calls, this is likely to lead to large yearly variations. Moreover, since practices and time to contract might differ from country to country, contributions regarding the same programme call might be recorded under different years.

A final issue concerns the fact that the data for the 2000-2009 period have been retrieved only for programmes belonging to the perimeter in 2009, meaning that programmes ended before that year have not been included. While this is unlikely to significantly affect the aggregate figures, it might have an impact on the analysis of individual programmes, especially in cases such as the European initiatives, in which programmes have changed status and name through the years. This is complemented by the fact that the descriptors have been collected only for 2009 (for practical reasons). These issues concerning programme demography will have to be carefully dealt with in future data collection.

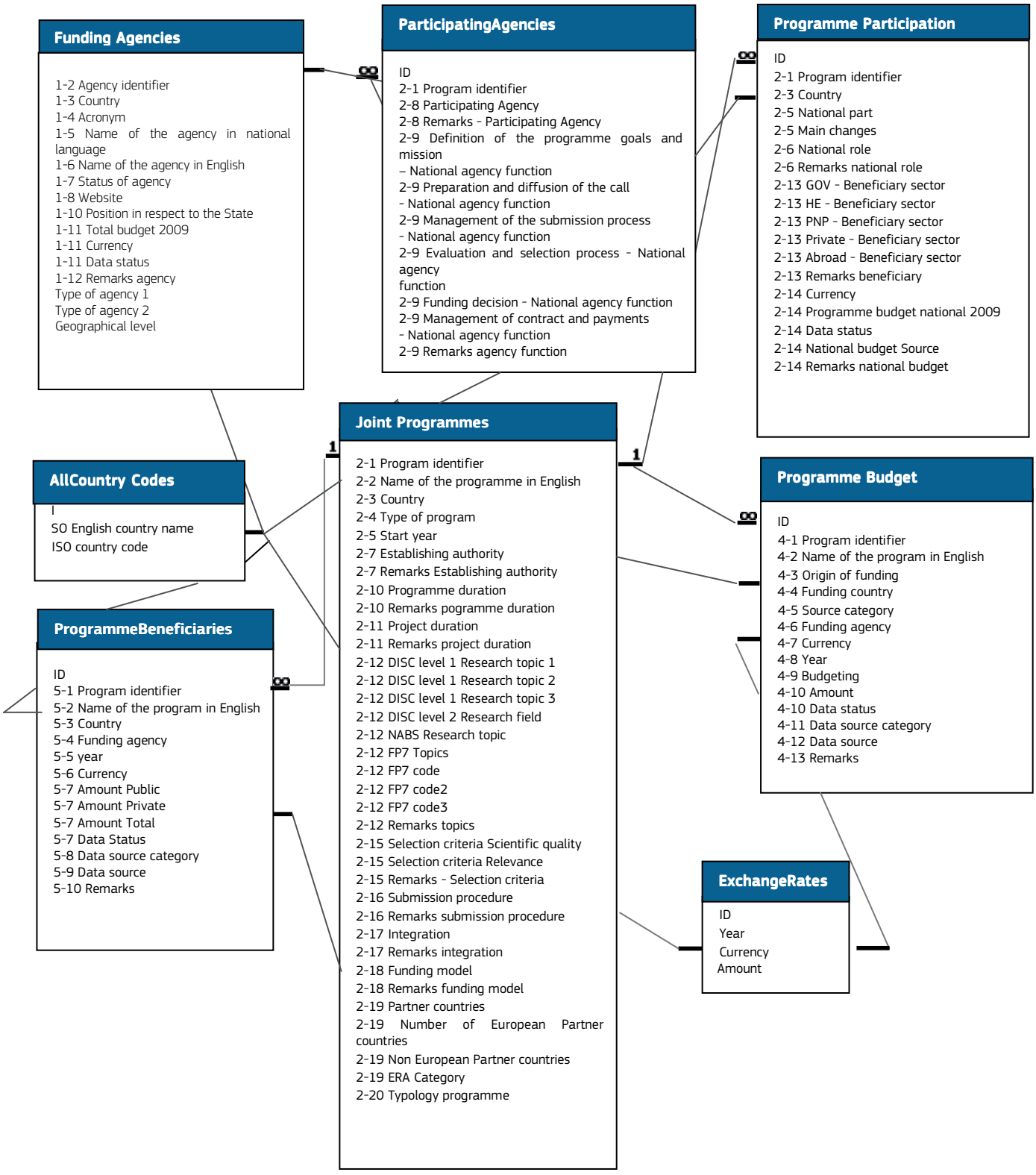
For a general discussion of the data collection, refer to JOREP deliverable D6 ' Methodological report on data quality'.

2.2.2. Data integration and management

As already mentioned, data management is made more complicated by the organisational structure of joint programmes. Indeed, the basic unit for the analysis is the joint programme, which is characterised by a specific set of descriptors referring to the programme itself (such as research topics, selection criteria, start year). Countries might participate in a programme, possibly with different start years, and then delegate participation to a specific national funding agency. Thus, each programme comes with a list of participating countries and funding agencies, to which specific descriptors are appended. Moreover, the programme budget is attributed through a specific funding agency, while beneficiaries receive funds for a programme possibly from different agencies.
In terms of data management, this structure implies that data have had to be integrated into a relational database structure implemented using MS Access (FIGURE 4); specific queries have then been written to extract specific aggregated measures (for example, programme budgets by aggregating the budgets of the different agencies).

The final dataset thus includes 99 joint programmes, 11 countries, and 185 funding agencies participating in them. Overall, there are 397 national participations and 1,513 budgetary contributions to programme budgets; this large number is due to the fact that budgetary data cover the 2000-2009 period.

Figure 4. Structure of the JOREP database



2.3. Motivations and impact analysis

We now turn to the motivations and policy rationales of joint and open programmes and provide an assessment of their impact. This part of the study assumes that there are links among motivations, rationales, policy problems behind setting up and managing specific research programmes and other funding instruments, and the range of impacts these produce. Thus, one of our initial assumptions is that the ways in which different motivations are negotiated through the representation of problems and the convergence around specific policy rationales both justifying and shaping the policy are mirrored in the research programme (or generally the research instrument). In other words, to describe and understand a policy instrument and its effects (or impact), it is necessary to understand its motivations and rationales and any discrepancies between them.

2.3.1. The conceptual framework

The study of impact of joint and open programmes builds on a number of overarching and more specific assumptions based on the literature. Before setting out the methodology for the study and its empirical strategy, it might be useful to list these key assumptions:

- Policy instruments are shaped through a complex process during which the motivations, interests, and expectations of different stakeholders are negotiated.
- This is a political process involving power and influence.
- Dominant and expedient motivations are reflected in policy rationales, which are explicitly or implicitly reflected in policy documents.
- Understanding the practices of a policy instrument is problematic without understanding the compromises that had to be made during negotiation and the interests that had to be accommodated.
- Without understanding the core practices of policy tools, capturing their impact is problematic.
- In its strictest sense, impact is the difference made by a specific policy instrument that is clearly and causally attributable to said instrument (at least in part).

For a general overview of the literature, refer to JOREP deliverable D2 'Literature review and national mapping'.

The literature also considers that many participants are involved in the process of policy formulation and implementation. They affect the outcome of this process by bringing in their motivations (a complex system of interests, values, and perceptions of reality). This is a process involving power relationships enforced through different mechanisms. Negotiations and re-negotiations of power result in the emergence of dominant motivations. Dominant motivations become institutionalised as policy rationales, and policy rationales are accessible through the analysis of the policy instruments in which they are embodied. There can be discrepancies between the motivations and policy rationales for setting up and maintaining specific research programmes and the motivations for their use.

Other key issues regarding the study of the impact of joint and open programmes are described below.

Impact, or measurable difference, is achieved through complex social processes involving different actors. As far as impact of research funding programmes is concerned, the main groups of actors are the funders and the funding beneficiaries.

Besides the great efforts it requires, attribution of impact in research funding is logically and practically impossible because of the great variety of funders and multiplicity of influences; thus, shifting attention to co-attribution is potentially more fruitful in analytical and empirical terms. As for the actors' expectations about the intended and/or expected impact, it should be underlined that they can – and indeed often do – diverge; moreover, whether the intended impact of a research funding programme is realised or not depends on whether the intentions of the funders and of the beneficiaries coincide.

The impact of a research funding programme is realised through the impact of the projects that it supports. Nevertheless empirical investigations show that a relatively small portion of projects achieves most of the impact of a programme. Thus, two different approaches can be outlined. Empirically, the study of impact can focus on measuring and attributing differences, or on un-packing the social process through which this change is achieved. In the latter case, impact is seen as the opportunities that were intended, the opportunities that were created, and the opportunities that were interpreted and mobilised. While this study will look at all the aspects above, its emphasis will be on the latter.

This study also explores the extent to which several hypothetical benefits – highlighted in the literature and summarised in Prospect 1 as main expected outcomes of joint programming and of the opening of national programmes – have been achieved.

Prospect 1 below summarises the categories of expected benefits; they largely correspond to the questions in the Tender Specifications: Do the openness and the joint undertaking of R&D programmes imply greater involvement of private participants? Are they more attractive to private actors? Do they allow for economies of scales? Do they allow for broader diffusion and exploitation of research results? Do they stimulate excellence and produce research of better quality with greater impact? Do they allow addressing questions and challenges that could not be addressed otherwise?

PROSPECT 1. Categories of expected benefits

Cost reduction	Overcoming high fixed start-up and operating costs of large research infrastructures
	Reducing programme management cost
	Facilitating access of industry to public research support
Improve coverage	Enabling pan-European public research programme optimisation
	Facilitating the coordination of different research programmes as well as horizontal policy coordination
	Facilitating joint public-private strategic research agendas
Innovation rent	Promoting scientific excellence by enlarging the competition space
	Promoting cross-border project collaboration (which promotes scientific excellence)
New fields	Addressing challenges jointly

Based on the intentions concerning impact stated in the objectives of policy and funding schemes and on whether this impact can be reasonably expected, four types of impact can be distinguished (Nedeva et. al.). These are illustrated in Prospect 2.

PROSPECT 2. Types of impact

	Intended	Unintended
Expected	Straight runs	Collateral
Unexpected	Long shots	Accidentals

Expectations regarding intended and expected impact (“straight runs”) and intended and unexpected impact (“long shots”) can be identified through the stated objectives of policy and research funding schemes. Whether or not these intentions are realised depends, on the one hand, on whether they are supported by the core practices and communicated clearly and, on the other hand, on how they are interpreted and used by the potential beneficiaries. Whilst “straight runs” are intended and expected, “long shots” are effects that are intended but cannot be expected to occur with any level of certainty within a set timeframe.

Unintended and expected impact (“collateral”) is the “collateral damage” that actors expect but cannot avoid because there are many social influences at play which the policy or funding scheme cannot control. Finally, unintended and unexpected impact (“accidentals”) is very interesting as a possibility but difficult to measure. It can, however, be captured if an empirical object is studied exhaustively.

We believe that it is possible to capture all the different types of impact by linking together: the opportunities that open and joint programmes intend to provide (as stated in their objectives), the opportunities they actually provide (i.e. the signals they send through their selection practices and accountability processes), the

opportunities they are perceived by (potential) beneficiaries to provide, and the opportunities that are actually mobilised by the beneficiaries.

2.3.2. Methodological choices

Most studies concerning impact start from the assumption that impact is a clearly attributable change or difference. Consequently, they focus on measuring change/difference and on attributing this to specific policy influences or social actions.

Another possible approach to the study of impact is to work under the assumption of potential rather than actual change. In this case, the research focus is not on measuring difference directly and on attributing it, but on describing and understanding the mechanisms that generate said difference - in the potentially affected object(s) - and linking it to a specific policy. In this case, specific policies, policy actions, and social actions are seen as sets of opportunities, as these are perceived and enacted by a variety of participants in the social process. In principle, these opportunities can generate different outcomes - what these outcomes are depends on the way in which opportunities are enacted and perceived.

The proposed approach is based on the two major rationales that, in our view, can explain the internationalisation of research funding. One is 'normative' (achieving a political aim), the other is 'problem solving' (i.e. addressing issues faced by knowledge dynamics).

We can outline at least two consequences for the overall analysis deriving from these remarks:

1. In the policy-oriented framework, what is at stake is a measure of dynamics at work. Is internationalisation growing? At which speed? Does it extend research fields? In which fields is this more intense? Which are the most productive instruments? What explains their uptake?

2. In the knowledge dynamics framework, the focus is on: What triggers the need to move to the EU level (science dynamics per se, technology and industry arrangements, societal issues)? Is this a shared feature, or does it relate to different national situations (mostly in terms of critical size, but not only)? What are the processes through which these objectives are framed and implementation structures created (in particular what explains the selection of particular instruments)? What are the institutional constraints / levers for such evolution? (Is it easier in "euro-compatible" institutional arrangements, in which the intermediate layer is made of strong and independent (quasi) funding agencies?)

Based on the aforementioned considerations, we can now describe the proposed integrated framework for motivations and impact analysis (Prospect 3).

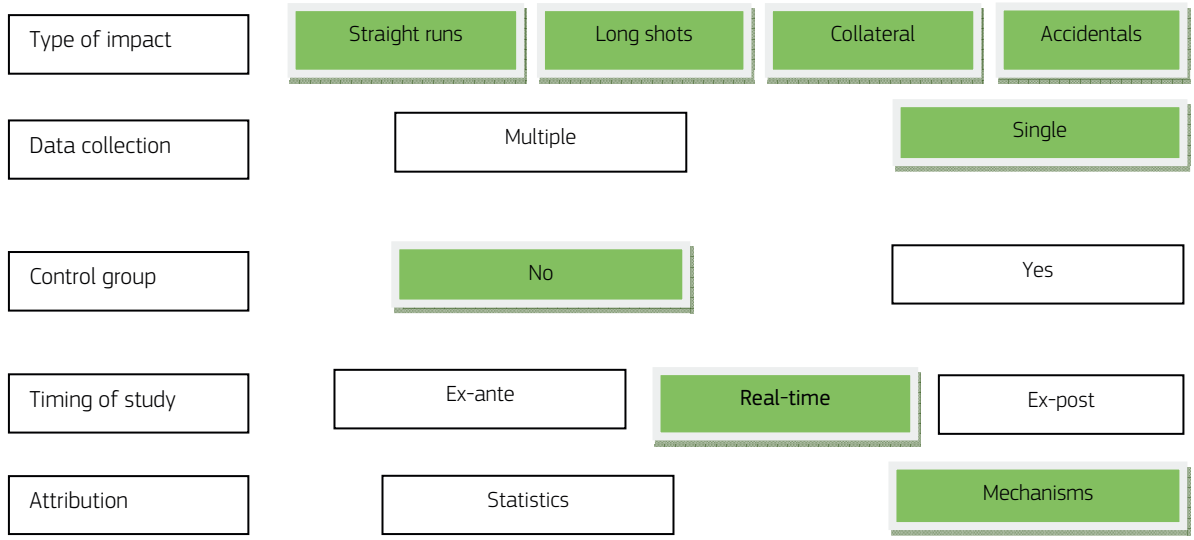
Research programmes (open and joint) are seen as funding mechanisms characterised by the following:

- These mechanisms aim to affect developments (strategy);
- These mechanisms involve three sets of actors which may, and indeed often do, have different intentions: political actors, implementation actors, and beneficiaries;

Social practices play an essential role – for what concerns action as well as interpretation of meaning. The core practices of any funding mechanism revolve around selection, funding rules, and accountability.

Correspondingly, research programmes provide a platform for complex social interactions creating the potential for a variety of outcomes. These potential outcomes (effects, impact) can be explicated. Specific outcomes (impact) are largely unpredictable and can be only loosely attributed to specific (however complex) social influences.

PROSPECT 3. JOREP integrated framework (Choices in green)



Each research funding programme can be seen as a funding mechanism embodying four kinds of opportunities, namely 'intended opportunities', 'provided opportunities', 'perceived opportunities' and 'mobilised opportunities'. The sections below define each of these terms, focusing on the actors involved and on how opportunities can be accessed.

Research programmes as 'intended opportunities'

Each policy action has intentionality. Policies are usually specifically designed and implemented to generate specific effects (intentional, policy-initiated change), and are often promoted as responses to specific problems. Naturally, policies are presented as the solutions to these problems, able to produce a set of desired changes. This intentionality (but stripped of advocacy) is the raw material for the construction of funding mechanisms as 'intended opportunities'. Intended opportunities are the motivations that generate the policy action, and are contained in the mission statements and the official objectives of policies.

Furthermore, 'intended opportunities' can be analysed by looking at the 'stories on their origin' which the policy actors can tell. Interestingly, there is another social group whose stories can help re-construct a funding mechanism as 'intended opportunities' – that of the 'implementing professionals'.

The 'intended opportunities' are linked to policy rationales, which can also be re-constructed either by reading the missions and objectives of funding mechanisms or through a historical reconstruction of the 'conditions of origin' of the mechanisms.

Research programmes as 'provided opportunities'

Whether or not the intended opportunities have been/are being provided by a programme depends on the way in which they are implemented through three different practices: selection practices, funding practices, and accountability practices.

Selection practices include how selection is organised (peer reviewing, other forms of evaluation, individual vs. group evaluation, who the evaluators are, etc.), what is being assessed (people, organisations or research, for instance), criteria for assessment, decision making (who takes the funding decisions, etc.).

Funding practices mainly concern the different rules and regulations developed by the funding mechanism (programme): how much funding is available, under what conditions it is given, how funding is allocated, how it is transferred etc.

Accountability practices include all reporting procedures and requirements developed and implemented at different levels.

It is important to mention that the funding mechanism (programme) can be expected to achieve its 'intended' impact (effects) if there is a high level of congruence between 'intended' and 'provided' opportunities. For instance, a programme aiming to offer opportunities for technology transfer and using selection, funding, and accountability practices that do not match this intention is likely to have effects that are different from the intended ones. A particularly tricky point is accountability since 'what is counted is usually delivered'.

In other words, the implementation of the instruments (the provided opportunities) can be different from the intended opportunities because of the presence of technical limits in the ability to translate a policy project into practice (technical gap). Secondly, policy actors may want use the programme to achieve objectives that could not be expressed in the intended opportunities for political reasons (political gap).

Research programmes as 'perceived opportunities'

The beneficiary groups perceive each research programme (or funding opportunity) as a particular kind of opportunity. Exactly what kind of opportunity it may be perceived as depends on two things: a) the way in which the programme is presented; and b) the opportunities that potential beneficiaries consider important for them.

Potentially, the biggest mismatch can be expected between the opportunities that are intended and provided, on the one hand, and the opportunities as they are perceived, on the other hand. The bigger this mismatch, the higher the probability that the programme is not going to achieve its 'intended' effects. Detecting and explaining said mismatch allows researchers to explore and map different 'unintended' and 'unexpected' effects that a funding mechanism may have.

Understanding possible mismatches is also important in terms of policy reflexivity – in fact this is probably much more fruitful for policy than measuring and attributing impact. Mismatch between intended and perceived opportunities is likely to result in at least partially failing to achieve a programme's intended effects (impact). This can be remedied in a number of ways – e.g. by examining and changing the intended opportunities; by fine tuning the practices so that the 'signals' are changed; or even by putting more effort into making the intentions clearer. Here, the motivations of the individual beneficiaries, expressed through the decision to participate or not, can provide interesting insights into the robustness of the policy process. For instance, one can argue that the implementation of the provided opportunities is more likely to produce a coherent and accepted policy when it involves all the relevant policy actors, because this involvement generates better knowledge of the context.

Research programmes as 'mobilised opportunities'

Opportunities can be analysed not through the intentions and interpretations of the beneficiaries but through their actions. In other words, this approach looks at what has been/is being achieved for what concerns participation in the programme and what the beneficiaries see as their main achievements. Mismatch might occur in this case too –beneficiaries may perceive the opportunities that a funding mechanism provides but decide that these are not the opportunities they need, so they 'bend' them to suit their needs. An example regards some of the funding from the ERC: a grantee said that he recognised that the funding was important for basic science and path-breaking research, but for him the way to mobilise this opportunity was to use it to buy equipment, because it was what he needed and other sources were much more restrictive. Mobilised opportunities refer first and foremost to the expected benefits that programmes are supposed to produce, as outlined in Prospect 1.

Links with intended and provided efforts can be detected in the motivations for further action, which might produce a feedback effect.

2.3.3. Motivations and impact analysis: organization of activities

The motivation and impact analysis was developed in two stages: firstly a documentary analysis, secondly an empirical analysis supported by semi-structured interviews and a survey.

The documentary analysis provided the background for the definition of matters to be addressed in the interviews and for the definition of research questions. Information on the cases was collected before the empirical investigation from different sources: websites, documents, call texts, reports, presentations, and other material often available to the public.

The semi-structured interviews addressed two main groups of respondents:

- Programme principals (policymaking level)
- Programme officers (operational level)

Moreover, a survey was addressed to programmes' beneficiaries (see Chapter 6).

Templates of interviews and of the beneficiary survey are available in JOREP deliverable D9 'Analysis Report'.

The interviews and the survey explore the perceptions of intended, provided, and mobilised opportunities of the different actors involved in setting up and running joint and open programmes (including the beneficiaries of the programmes). The aim of the interviews and the survey was to understand complex relationships linking motivations, rationales, and impact.

For a general overview of the methodology for the motivations and impact analysis, refer to JOREP deliverable D9 'Analysis Report'.

The programmes considered in the motivations and impact analysis, representing different typologies of programmes as presented in section 3.3, are:

NORDIC TOP LEVEL RESEARCH INITIATIVE TRI

ART. 185 EUROSTARS EUREKA

ART. 185 AAL- AMBIENT ASSISTED LIVING

JTI ARTEMIS

ERANET EMIDA

ERANET + (ERASYS BIO AND ERASYS BIO+)

BILATERAL PROGRAMME GERMANY-USA FOR REGENERATIVE MEDICINE

LAA - LEAD AGENCY AGREEMENT

DFG/ANR

DFG/ESRC

SINERGIA

In the analysis of motivations and impact, we use the typologies developed after the data collection (see section 3.3) but also information retrieved from the data collected is considered. For instance, we know that integrated programmes are managed by an independent agency, have a single entry-point submission procedure, but can be differentiated depending on the degree of integration of their funding source (real common pot, or national common pot). Coordinated programmes mostly seem to adopt a national common pot funding scheme (virtual or, in some cases, mixed common pot), with different modes of coordination, i.e. through supranational bodies or national agreements regulating collaborations among organisations from different countries; they also display different levels of integration of activities (for what concerns drafting and issuing of calls, submission and selection, funding decisions). Similarly, in collaborative programmes, delegation is the main issue: this could encompass both submission and selection activities, thus implying funding decisions too, or could concern the application phase only.

Moreover, it could be based on formal agreements within the framework of larger cooperation schemes or, differently, be ad hoc and for specific themes. We assume that the mentioned characteristics can influence the opportunities practically provided by the decision makers, and mobilised by the beneficiaries.

3. THE EUROPEAN LANDSCAPE OF JOINT PROGRAMMES

The launch of the European Research Area (ERA) in 2000 implied a deep change in European research policy, since the goal was no longer just to provide direct funding for European-level cooperation (for example, through the European Framework Programmes), but to transform the whole European research landscape into a more integrated, open and competitive system. Since most public research funding in Europe is managed through National States, strengthening and coordinating national research policies has been considered a central dimension of this process (European Commission 2008).

In this context, European joint programmes have been seen as an instrument to coordinate the funding policies of European countries and to mobilise national funding around joint funding instruments; the idea of the variable geometry approach introduced by initiatives like the ERA-NETs was to combine top-up coordination by the European Union with bottom-up interests and commitment by ERA states specifically interested in the research domain.

Moreover, it was expected that additional EU funding for these programmes would create incentives for national states to commit their own resources to joint programmes, thus substantially increasing the resources available for the so-called transnationally coordinated research.

However, despite anecdotal evidence that this approach was successful – such as the large number of European initiatives (ERA-NETs) – and cases of programmes successfully institutionalised, such as Art. 185 and Joint Technology Initiatives, a systematic analysis of joint programmes has not been available until now. Besides providing aggregated figures on the total financial volume of these programmes – complementary to those provided by Eurostat with its pilot project on transnationally-coordinated research – JOREP has aimed more specifically at analysing the characteristics of these programmes – in relation to, for instance, their organisational setting, type of research funding, and subject domain –, and to determine whether some types of programmes are more successful than others. This is obviously relevant for future national and European policies dealing with internationalisation.

In this chapter, we build on the methodological approach presented in Chapter 2 to provide quantitative answers to these questions. In the first section, we present descriptive indicators concerning the volume and characteristics of joint programmes in the considered countries, by combining descriptors of programme characteristics with data on funding flows. In the second section, we reinterpret these patterns through the identification of a small number of types of joint programmes, related to underlying notions of how European integration should take place.

This approach helps us to make sense of the diversity of the programmes observed, but also to better understand the constellations of actors involved in the establishment of (different types of) programmes. Accordingly, in the third section of the chapter, we make use of data on foundation years and funding volume for the 2000-2009 period to highlight temporal dynamics and identify those organisational settings which have been most successful; we complement these data with information from interviews with policymakers and funding agencies in order to grasp the motivations and policy goals behind the observed strategies. The chapter is concluded with some general remarks on the future of joint programmes in the European Research Area. The analysis is based on a set of 95 programmes for which complete information is available.

All data refer to the baseline year 2009 and to the countries covered by JOREP (the Czech Republic, Denmark, France, Germany, Italy, the Netherlands, Norway, Poland, Switzerland, Spain, and the United Kingdom); as these make up 85% of the total ERA public funding to research, the results can be considered fairly representative of the whole European landscape. Coverage is fairly good, since all major programmes have been included (with specific focus on European initiatives). However, counts of programmes are less reliable; this is because some very small bilateral initiatives might not be covered and the number of bilateral initiatives also depends on the national organisation of funding, since some countries have an individual programme for each partner country, while others have only one scheme which is larger and more generic.

Box. Highlights concerning the European landscape of joint programmes

In 2009, joint programmes accounted for 3.4% of public research funding in the considered countries, but only 0.9% excluding the European Space Agency. The total budget of joint programmes strongly increased in the 2000-2009 period. About a dozen programmes account for most of the budget, most of them being European initiatives supported by the European Union and driven by economic relevance and common technological challenges.

Most programmes are characterised by a national pot (plus EU additional funding for the largest programmes), as in most cases national states are not willing to integrate resources. Three types of programmes can be identified: integrated (with a supranational agency, national pot and EU additional funding), coordinated (with light coordination structures) and collaborative. While the European Union is focusing on the establishment of integrated European initiatives, national research councils are developing their own strategy based on lead agency agreements for science-oriented programmes.

Finally, National States mostly focus on establishing collaborative programmes with third countries (North America, Emerging countries).

3.1. An overview of joint programmes

As shown in TABLE 2, in 2009 the 95 programmes in the dataset had a total funding volume of slightly less than 3.5 billion euro. About 80% of these resources came from the participating countries, while about 20% were provided by the European Union. From this perspective, the strategy of joint programmes has been quite successful in mobilising national resources with relatively limited overall EU contribution (differences among the JOREP countries for what concerns participation in joint programmes are analysed in chapter 4 of this report). These aggregated figures show that joint programmes made up almost 3.5% of total public research funding in the considered countries; hence, they represent an extremely significant phenomenon – especially when compared to the overall budget for EU Framework Programmes, which was around 6.6 billion euro in 2009.

For a more detailed presentation of the JOREP results, refer to JOREP deliverable D9 'Analysis Report'.

44 of these programmes fall into the category of European initiatives, which are open in principle to all ERA countries, including initiatives promoted by the European Union (ERA-NETs, initiatives under Art. 185, etc.) as well as intergovernmental initiatives like the European Space Agency, Eureka, COST and the programmes of the European Science Foundation (based on agreements among national funding agencies). 51 programmes can be defined as bilateral, i.e. established through agreements among two or more countries – for example at the regional level, like the Nordic Initiatives or the Visegrad Fund. Only 17 bilateral programmes are developed exclusively inside ERA, while most bilateral programmes (34) are between ome ERA country and a country outside ERA. Expectedly, international cooperation occurs more frequently with: the United States (10 programmes), Canada (6 programmes) and Japan, as well as China (10 programmes) and India (5 programmes). Hence, joint programmes are a broader phenomenon than European Initiatives and national states take action on their own within this domain.

Table 2. Key indicators on joint programmes in JOREP (2009)

Number of joint programmes (ESA included)	95
Total funding volume (mio. €, 2009)	
ESA included with EU funding	3 484 785
ESA included without EU funding	2 799 928
ESA excluded with EU funding	862 627
ESA excluded without EU funding	707 771
Total GBAORD of the JOREP countries (mio. €, 2009)	81 901 230
% of GBAORD of JOREP countries (only national funding)	
ESA included	3,42%
ESA excluded	0,86%
Additional EU funding as % of total budget	19,5%

Financial data show that the European Space Agency alone accounts for about 80% of the total budget of joint programmes in the dataset; while ESA does represent a prime example of European collaboration in a domain in which national states would not have a sufficient critical mass of resources, it is not related to the new integration policies launched with ERA. Moreover, this model – based on very homogeneous and well-connected international research communities able to steer national policies towards strong forms of integration – is applicable to big science, like space, astronomy, physics, fusion research, but not to other domains of science and technology characterised by higher fragmentation. As we show later in this chapter, after ESA there have not been other examples of fully-integrated programmes promoted by the National States.

Excluding ESA, the total funding volume of joint programmes is set to 0.86% of research funding in the concerned countries and to about 15% of the resources devoted to European Framework Programmes; while this is indeed a sizeable amount, it remains rather limited if compared to national budgets – later in this chapter we will discuss to which extent joint programmes can be expected to reach a much larger funding volume.

The level of concentration remains very high, with a Gini coefficient for programme budgets of 0.93 and 0.80 excluding ESA. The other 13 programmes exceeding 10 mio. euro cover about ¾ of the remaining budgetary volume. Among them are: EUREKA (the largest joint programme after ESA), COST, 2 Joint Technology Initiatives (Artemis and ENIAC), 2 Art. 185 Initiatives (Ambient Assisted living, EUROSTARS), 4 ERA-NETs (NORFACE Plus, EUROTRANSBIO (ETB-PRO), ERASysBio+, MANUNET), 3 bilateral and multilateral programmes (International Programmes for Regenerative Medicine, Programme Blanc International, Plant-KBBE).

Among the 95 programmes in the dataset, 15 had no budget at all in 2009, thus being essentially symbolic in nature. On average, European initiatives are much larger than bilateral programmes – excluding ESA, they account for 86% of the budget. Finally, if we consider EU funding, its relatively small share actually corresponds to large concentration in few programmes. Namely, excluding ESA, there are only 14 programmes receiving EU additional funding, which account for 40% of the total budget of joint programmes; eight of the top nine programmes by budget are supported by the European Union, the main exception being Eureka. For these 14 programmes, the share of EU contribution was 48%, following the rule of equal contributions by the EU and by national states for joint initiatives. This leads to the conclusion that, excluding the two very large programmes established in the past by national states (ESA and Eureka), a substantial share of European funding is required to develop large European-level initiatives.

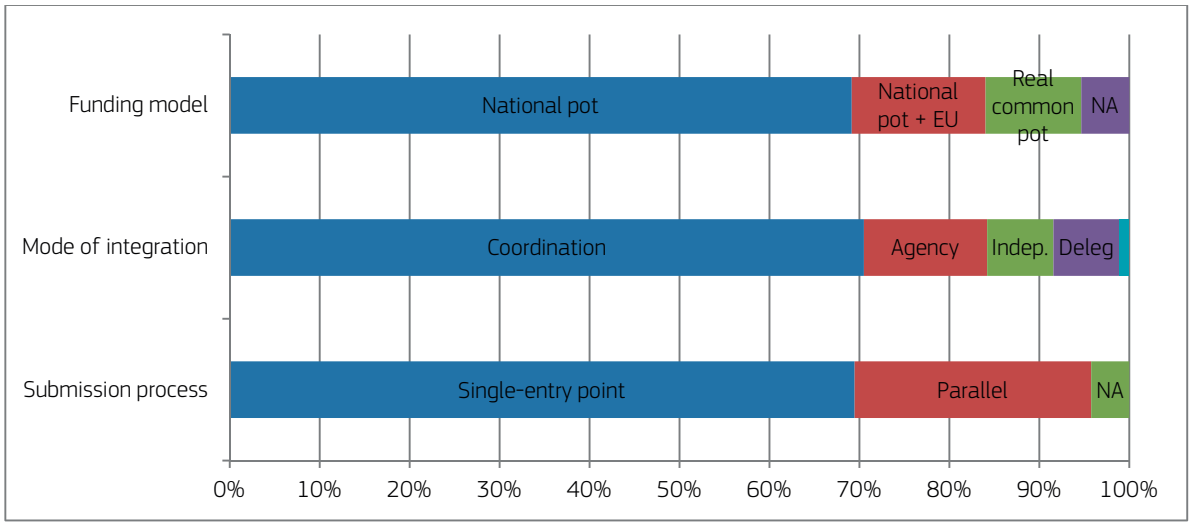
3.2. Organizational characteristics

The descriptors developed by JOREP make it possible to systematically characterise the organisational forms of joint programmes in relation to how integration is managed, their funding model, the type of agencies managing them, their scientific fields and, finally, the performers participating. This characterisation is of the utmost importance given the high level of diversity of joint programmes in terms of functions integrated; it helps in identifying the most widespread organisational models for joint programmes and thus constitutes the basis for the development of a typology in the next section of this report. Given the high level of skewedness of programme budget, we provide in most cases figures for both the number of programmes and the aggregate budget by category, obviously excluding ESA. The comparison also provides indications of the categories to which the largest programmes belong.

3.2.1. Main organizational characteristics

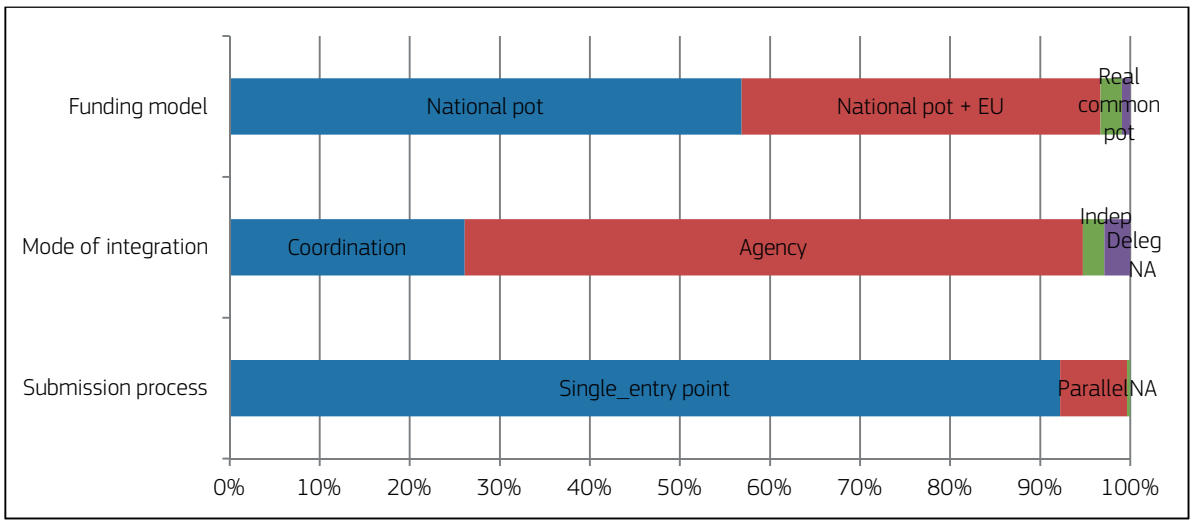
The three descriptors highlight a number of patterns in the organisational form of joint programmes, concerning how European integration is managed, and consider the association between characteristics and size of the programmes.

Figure 5. Main characteristics of joint programmes (share of total number of programmes, in 2009)



(ESA included, N=95)

Figure 6. Main characteristics of joint programmes, (share of total funding volume to JP, 2009)



(ESA excluded, N=94, EUR)

First, looking at the mode of integration, most programmes are characterised by coordination through some kind of temporary committee managing the project evaluation and selection specifically for that programme; a stronger form of integration through the establishment of a supranational agency with a permanent status is found only in a minority of programmes, but these are by far the largest – including ESA, Eureka, COST, Art. 185 Initiatives (AAL, EMRP), and Joint Technology Initiatives (ARTEMIS, ENIAC). Thus, there is a strong connection between modes of institutionalisation on the one hand and size of the programme on the other hand. The other two modes of integration, namely independent selection by national agencies and delegation of all functions to a national agency (lead agency agreements) characterise a relatively small number of programmes.

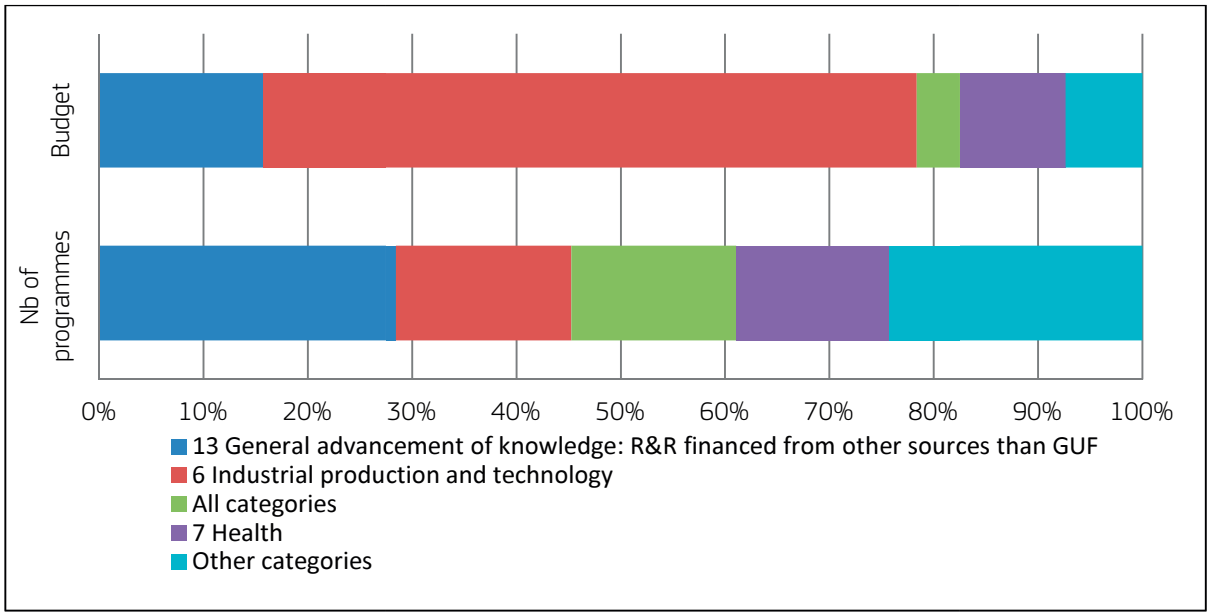
The funding model shows that National States are not willing to delegate decisions concerning budget to supranational agencies, as the low number and limited budget share of real common pot programmes confirms – ESA with its very large integrated budget remains an exception. In fact, two main models emerge, namely national pot for most programmes and national pot plus EU contribution for the largest programmes with a supranational agency; this model characterises all large European initiatives, with the exception of Eureka and of the European Science Foundation.

Finally, the prevalence of the single entry-point method indicates that, even when the budget is not integrated, calls for proposals, submission and, most likely, evaluation are managed centrally at the programme level rather than at the national level. Integration of these programme functions characterises the vast majority of programmes.

3.2.2. What type of research is supported?

To analyse the type of research supported by joint programmes, we contrast three indicators: 1. the programme classification by socio-economic objective using the standard Nomenclature for the Analysis and Comparison of the Scientific Programmes and Budgets (NABS) of the Frascati Manual (OECD 2002); 2. an expert-based characterisation of the importance of scientific excellence vs. relevance in the proposal selection on a 4 point-scale (4= most important criterion; 1 = not important; the sum of scores for excellence and quality is set to 5); 3. the distribution of programme funding between public and private beneficiaries.

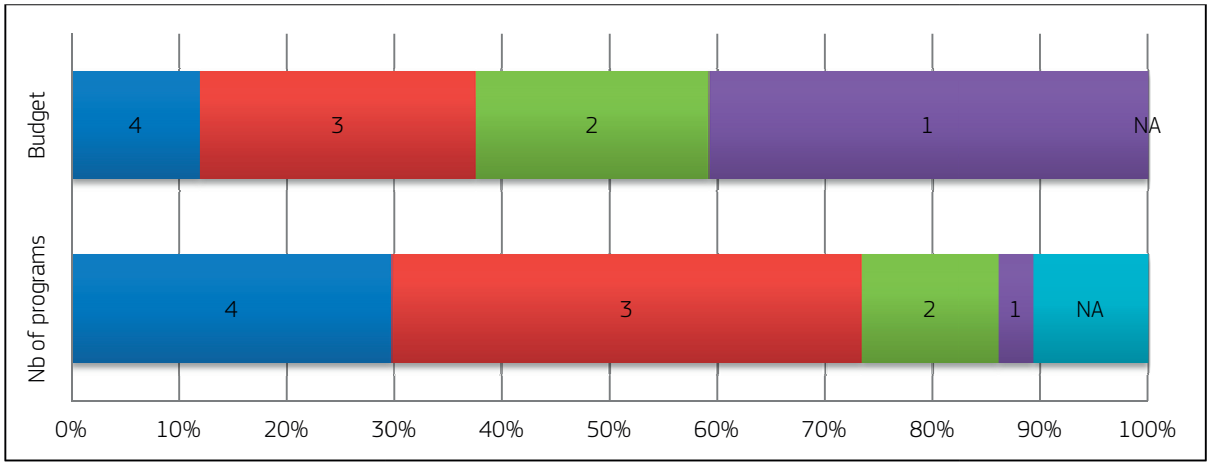
Figure 7. Joint programmes by topic (NABS)



(ESA included, N=95, ESA excluded for the budget, N=94)

In terms of scientific domain (or, more precisely, policy goals), our data indicate that a large number of joint programmes are either oriented towards basic knowledge (the so-called investigator driven programmes) or generic, in principle open to all scientific and technological domains (FIGURE 7); however, when considering their budgets, it becomes clear that almost all large programmes (also excluding ESA) focus on technology and innovation, like in the case of Eureka and of the Joint Technology Initiatives.

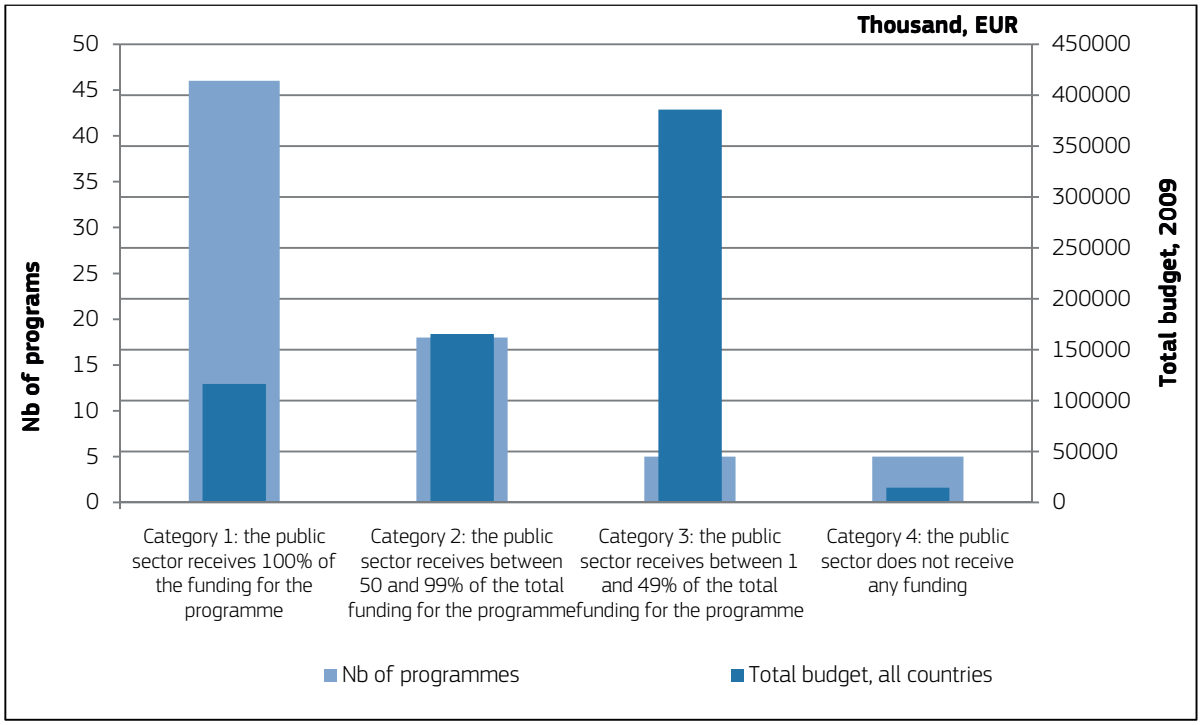
Figure 8. Scientific quality selection criteria: number of programmes and total budget in 2009



(ESA included, N=95, ESA excluded for the budget, N=94)

The same picture emerges when considering the relative importance of scientific excellence vs. relevance in project selection: about 1/3 of the programmes are solely oriented towards excellence and for 3/4 of them excellence is more important than relevance, but 2/3 of the total budget of joint programmes is allocated to programmes in which relevance is more important than excellence (the large share of programmes for which excellence is not important is largely due to the presence of Eureka).

Figure 9. Repartition of programmes by beneficiaries (nb and volume)



(ESA included, N=95, ESA excluded for the budget, N=94)

A third indicator supporting this analysis concerns the distribution of programme budget among beneficiaries, broadly distinguishing between the public sector (Government, Public Research Organisations, Higher Education Institutions) on the one hand and the private sector on the other hand (FIGURE 9). Again, programmes seem to fall into either of two categories: a large group by number of programmes in which funding is mostly directed towards the public sector, and a smaller number of larger programmes in which a substantial share of funding is allocated to the private sector (the most important case obviously being Eureka). By combining these descriptors, the analysis leads to the identification of three groups of programmes with different characteristics, as well as related to different actors. This distinction is thus indicative of the actors' underlying interests and dynamics behind the establishment of joint programmes (see section 3.2.3 below).

The first group comprises European initiatives focusing on technological domains. Policy and economic relevance are of great importance and the aim is to support both the public and the private sector. These initiatives include all the biggest joint programmes, thus making up the largest share of total budget (all programmes in the domain of industrial production and technology).

Programmes in policy domains, like health and environment, fall into the second group. They are found among both European initiatives and bilateral programmes and are characterised by the fact that they almost exclusively fund public-sector beneficiaries. Finally, the third group includes a large number of (mostly small) programmes focusing on science or more general purposes; they are all aimed at the public sector, but, if compared to the second group, they place greater emphasis on scientific excellence in the selection of projects; this group mostly comprises bilateral programmes promoted by National States or by national funding agencies.

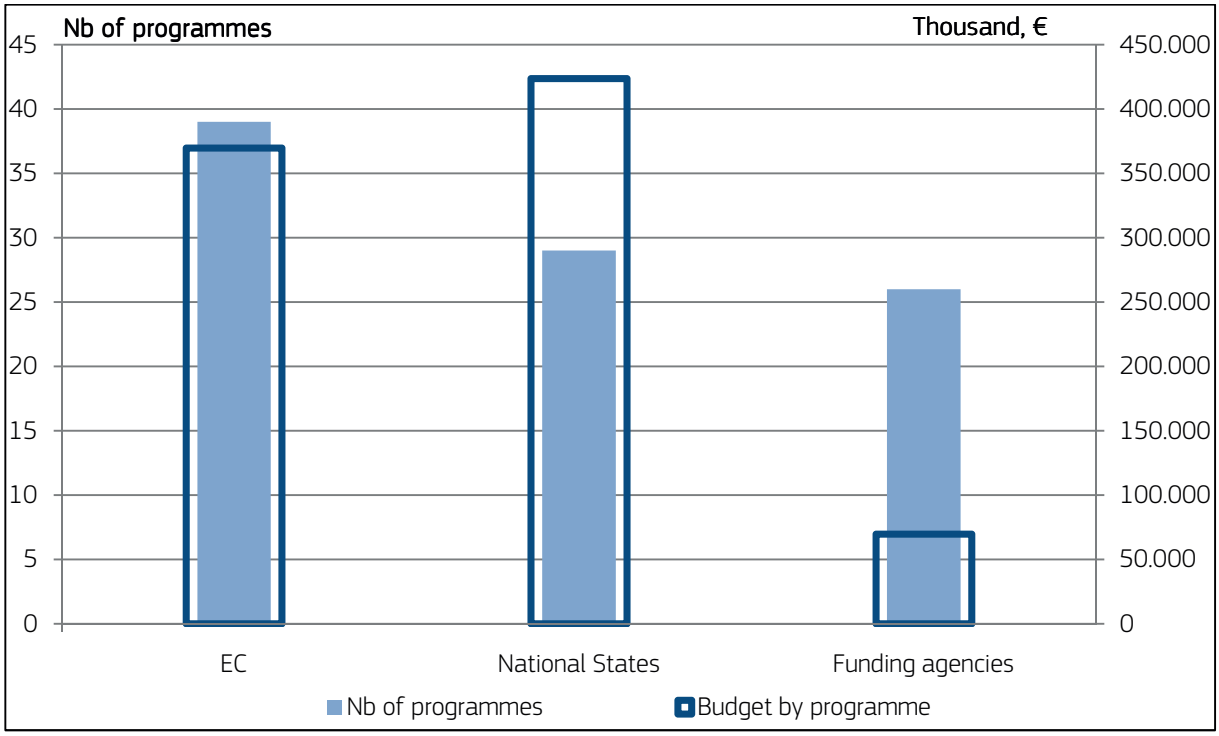
3.2.3. Who participates to joint programmes? Examining the constellations of actors

Joint programmes display complex constellations of actors. Different countries, as well as the European Union, play a role in their establishment and funding, but programme functions are also usually delegated to (different types of) funding agencies and shared among supranational and European agencies. To provide

insights into this aspect, we analyse three dimensions of joint programmes, namely which authority established the programme, their patterns of national participation and, finally, the types of agencies participating.

Establishing authorities. As shown in FIGURE 10 joint programmes have been created by the European Union –initiatives within the framework of European Programmes –, by National States, and directly by national funding agencies through mutual agreements (without the intervention of the States). However, in terms of size, all large programmes have been established within the European framework, with the exception of ESA and Eureka.

Figure 10. Establishing authorities of joint programmes



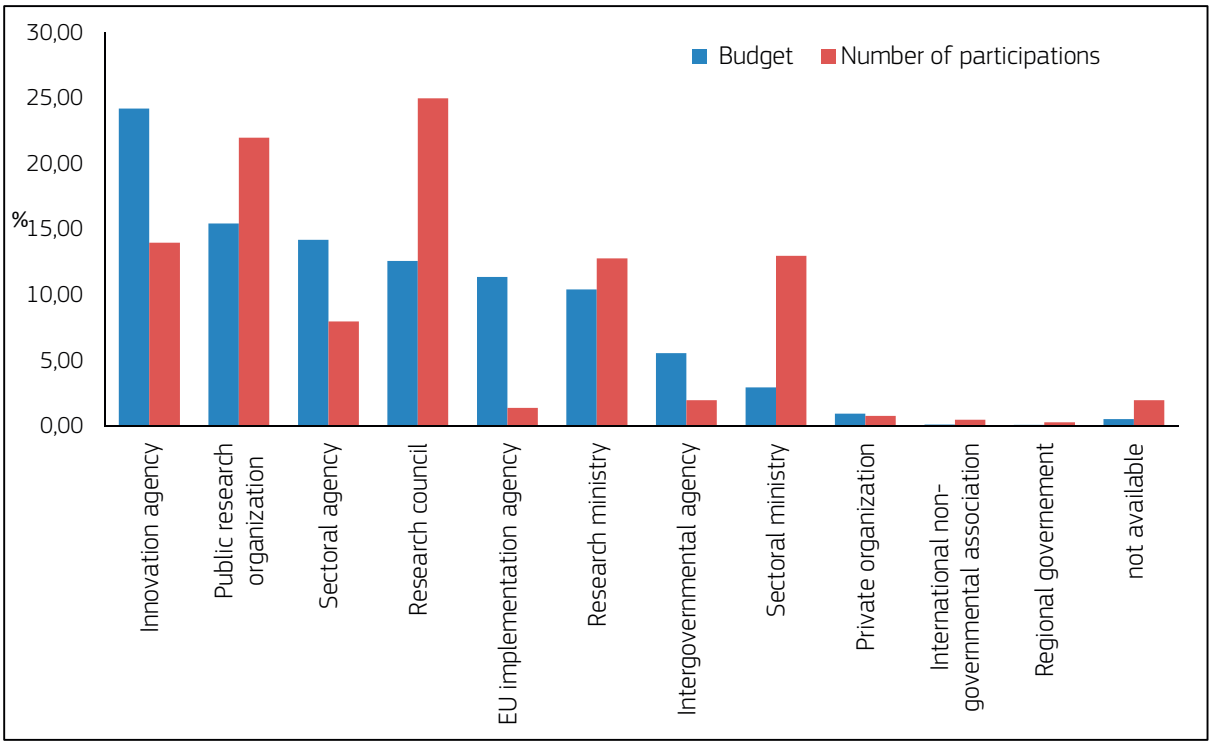
(ESA excluded, N=94)

There are also some differences concerning the type of research supported by these groups of programmes. The vast majority of programmes supporting industrial production and technology have been established within the European framework, whereas most programmes established by national funding agencies are science-oriented.

National participations. There are major differences among programmes for what concerns the number of (JOREP) countries participating. Only 10 out of 51 bilateral programmes include more than one JOREP country, almost all of them are bilateral programmes with third countries. On the contrary, participation in European initiatives is strongly related to their mode of integration: almost all JOREP countries (and, in fact, most ERA countries) participate in programmes with a supranational agency, like ESA, Eureka or Joint Technological Initiatives; these programmes are so well-established that all European countries take part – possibly by adjusting their level of participation depending on the different calls. Conversely, as for European initiatives like the ERA-NETs, frequency of national participation varies greatly – some ERA-NETs involve participation by all JOREP countries, while in other cases just a few countries are involved.

Type of agency participating. Given their type of organisation, most joint programmes involve the participation of different funding agencies sharing functions –the total participation count for the 95 programmes in the dataset is 335.

Figure 11. Participation to joint programmes by types of the agencies, number and volume



(ESA excluded, N=94, EUR)

As FIGURE 11 indicates, there are some quite distinctive patterns of agency participation. First, national funding agencies are much more important than European ones –in terms of both frequency of participation and volume of funding managed –, whereas regional agencies play only a marginal role. This largely matches the current structure of joint programmes, since a rather large number of national agencies are involved in each of them. Second, at the national level, agencification – i.e. the management of research programmes through agencies at arm's length from the State – is largely prevalent, while direct management of programmes by the State's ministries is much less widespread.

The performers manage some programmes as well, especially in the case of the ERA-NETs. The data also confirm the variety of agencies involved, which is closely related to the different characteristics of the programmes. The agencies are innovation agencies, whose large funding volume is related to the fact that technological programmes make up most of the budget of joint programmes, as well as research councils (investigator-driven programmes) and sector agencies in political domains.

At the government level, the role of research ministries is still significant in comparison to other ministries, especially in relation to managing bilateral programmes with third countries. Regarding the performers, it is clear that public research organisations like the CNR in Italy still played an important role in the funding of joint programmes in 2009.

3.3. A typology of joint programmes

The analysis above confirms that the characteristics of joint programmes are not independent, but specific associations can be identified, for example in relation to their forms of integration, the constellations of actors involved, and the type of research supported. This remark supports the notion that there are a few normative models of how joint programmes can be managed, which are in turn associated with underlying conceptions of how European integration should take place. On this basis, we have develop a typology of joint programmes which will also help understand the role played by actors in establishing and managing joint programmes, including the European Union, National States and funding agencies (Lepori, Reale, Chassagneaux, et al 2011).

3.3.1. Models of European integration and joint programmes

Our classification of joint programmes builds on three general ways of dealing with internationalisation and Europeanisation of research policies, which have been developed in the literature (Edler and Flanagan 2011; Barré, Henriques, Pontikakis and Weber 2012).

Integration refers to the transfer of competencies to a higher institutional level. This is related to the notion of the European integration as transferring competences from the national to the European level by creating a common governance structure (Werner and Dietz 2004; the State/federation model; Schmitter 1996). In research and innovation policy, it corresponds to a centralised scenario, in which decision-making arenas are created at the European level and the role of national policies is strongly reduced (Kuhlmann 2001).

In terms of programme organisation, this model leads to the creation of a supranational agency, managing all processes independently without the involvement of national States and adopting a common pot funding model. Its origins can be traced back to the early stages of European integration and it has been applied especially to research organisations (CERN: 1954). In programme funding, its forerunners were EURATOM (1957) and the European Space Agency (1975).

At the other end of the scale, collaboration implies that different partners – national States or funding agencies – work together on a specific funding scheme, without delegating decisions concerning policies to a supranational body. This model is related to a decentralised scenario of European integration ("condominio model"; Schmitter 1996) and research policy (Kuhlmann 2001). For what concerns programme funding, it translates into collaboration among national funding agencies on specific activities. Each of them has control over evaluation, selection and funding decisions, but collaboration in some of these processes does take place (for instance, by funding projects selected by all the parties involved). The first example of application of this model to funding programmes is the French-German cooperation in transport research DEUFRAKO (1978). Coordination means bringing different elements to a more harmonious relationship (Edler and Flanagan 2011).

This goes farther than collaboration towards a mutual alignment of funding policies with a lasting structural effect; some forms of integration might take place – like the creation of joint bodies or consortia -, but without implying that these take over national competences. This logic is related to scenarios of European integration emphasising the diversity of national and regional spaces and considering the European level as a place where coordination and competition occur in a subsidiary manner. It is closely related to joint programming initiatives by the European Union, like the ERA-NETs, adopting a variable geometry approach in which national states can determine their own level of commitment (European Commission 2008).

We apply these models to the JOREP dataset of joint programmes as follows (see TABLE 3). Integrated programmes are those characterised by the existence of a supranational agency, as this is both a precondition and a clear sign of durable transfer of competences to the supranational level; we divide this group further depending on the funding model.

Coordinated programmes are those characterised by decision-making through a joint committee but also by a single entry-point submission system. When parallel submissions occur, we must assume that the joint committee has the function of matching national decisions rather than managing the selection process. Finally, in our classification collaborative programmes include those characterised by parallel submission, as well as delegated programmes (lead agency agreements). This group might also be classified among the coordinated programmes.

Table 3. Classification of joint programmes by type

Integration of the programme functions		Integration of the funding resources	Type of programme	
Integration	Submission	Funding		
Agency	Single-entry point	Real common pot	Integrated programme with integration of funding	Integrated programmes
Agency	Single-entry point	National pot	Integrated programme without integration of funding	
Coordination	Single-entry point	Real common pot	Coordinated programme with integration of funding	Coordinated programmes
Coordination	Single-entry point	National pot	Coordinated programme without integration of funding	
Delegation	Single-entry point	National pot	Collaborative programme with delegation	Collaborative programmes
Coordination	Parallel	National pot	Collaborative programme – parallel programme	
Independent	Parallel	National pot	Collaborative programme – independent programme	

3.3.2. Classification of the programmes

We have classified the programmes within the JOREP perimeter according to the above typology and criteria (see TABLE 4); 7 programmes could not be classified because of missing data.

Table 4. Number and funding volume of joint programmes by type

		Number of programmes	Total funding volume (2009, EUR)
Integrated programmes	Integrated programmes with integration of funding	3	2 626 429 409
	Integrated programmes without integration of funding	10	587 673 528
Coordinated programmes	Coordinated programmes with integration of funding	6	16 335 963
	Coordinated programmes without integration of funding	36	162 225 243
Collaborative programmes	Collaborative programmes with delegation of responsibilities	7	25 035 911
	Collaborative programmes - parallel programmes	19	43 538 490
	Collaborative programmes - independent programmes	7	20 385 987
	Not available	7	3 160 646

(ESA included, N=95, EUR, 2009)

Integrated programmes

13 out of 95 programmes are classified in this category because their functions (call preparation, evaluation, submission, selection) are managed by a supranational agency, created for this purpose and operating on a long-term basis. Three integrated programmes are characterised by a real common pot. These can be seen as the most integrated programmes within our JOREP perimeter. They are: the ESA programmes, the Nordic Top-level research initiative, and the International Visegrad Fund.

However, the budget of most of the integrated programmes identified (10 out of 13) is managed at the country level. A more accurate observation reveals that, among the 10 integrated programmes for which the funding resources are not integrated, 7 receive additional contributions from the European Union. These programmes are the initiatives under Article 185 of the Lisbon Treaty, the ARTEMIS and ENIAC JTIs, and the COST actions. The funding resources of EUREKA, ESF-Eurocores, and ESF-European Collaborative Research Projects in the social sciences (ECRP) are managed at the level of the participating countries. It should also be noted that EUREKA is an umbrella structure managing different types of programmes, including some which are co-funded by the European Union, whereas the European Science Foundation funding scheme was closed in 2011. European funding seems thus to be central to the stability of this model.

Coordinated programmes

This category includes the largest number of programmes. 42 out of 95 programmes are classified as coordinated programmes because submission and evaluation are managed through non-permanent structures, such as joint committees, whose existence is specifically related to the programmes. However, this group represents a small percentage of the total funding volume allocated to joint programmes in 2009 (7.4%). The funding resources for most of these programmes (36 out of 42, i.e. 86%) are not integrated (25 ERA-NETs and 11 bilateral programmes).

Funding of the 6 remaining programmes is managed through a real common pot. These include 2 ERA-NETs (namely, HERA-JRP and SEE-ERA-NET Plus) and 4 bilateral programmes (Egyptian-German Research Fund, DIP German-Israeli project collaboration, South African-Norwegian program for Research Co-operation, and Iberoamerican Program on Science and Technology for Development).

Collaborative programmes

The 33 collaborative programmes identified here received the smallest share of funding allocated to joint programmes in 2009 (2,6%).

Most programmes in this category (19) have the following features: their main programme functions are managed through a non-permanent joint committee, proposals are submitted to two or more agencies simultaneously, and their funding resources are not integrated. 4 ERA-NETs (CORNET II, ERA-SPOT, MARTEC, MNT ERA-NET II) and 15 bilateral programmes are included in this group. Most bilateral programmes in this category (14) consist in collaborations with countries outside ERA.

Within this category, collaborative programmes with delegation of responsibilities display the highest level of integration. The management of joint activities is delegated to a national agency in one of the participating countries (lead agency). The 7 programmes in this subcategory might also be classified as coordinated programmes.

Conversely, the least integrated programmes within this group and within the overall database are the 7 “Collaborative – independent” programmes, for which the evaluation and selection of proposals are carried out independently, there is parallel submission to each of the funding agencies, and the available funding resources are managed by the funding agencies. All these programmes are bilateral programmes.

3.3.3. Characterizing the groups of programmes

As TABLE 5 illustrates, there are systematic differences across types of programmes concerning their size, number of participating countries and the type of research supported.

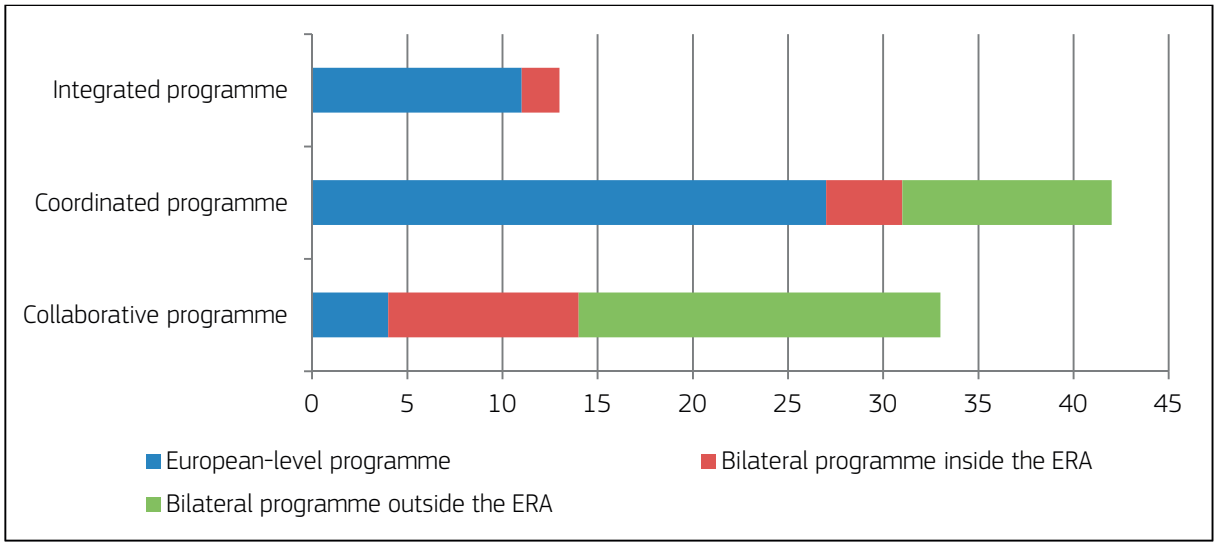
Table 5. Characteristics of joint programmes by type

	Participating countries (1)	Scientific quality score (2)	NABS 13 and all categories (3)	NABS 1-12 (4)
Integrated Programmes with integration of funding	4,7	3,0	1	2
Integrated programmes without integration of funding	10	2,6	3	7
Coordinated programmes with integration of funding	1,8	3,0	3	3
Coordinated programmes without integration of funding	4,6	3,1	13	23
Collaborative programmes with delegation of responsibilities	1,4	3,2	4	3
Collaborative programmes – parallel programmes	2,3	3,3	12	7
Collaborative programmes – independent programmes	1,4	3,6	4	3
Not available	3	3,8	2	5

[1]Average number of countries which participate in each type of programme. The number of participating countries can be less than 2 since we only counted JOREP participating countries.
[2]Average scientific quality of each type of programme.
[3]Number of programmes in the categories "NABS 13" and "All categories".
[4]Number of programmes in one of the categories from "NABS 1" to "NABS 12".

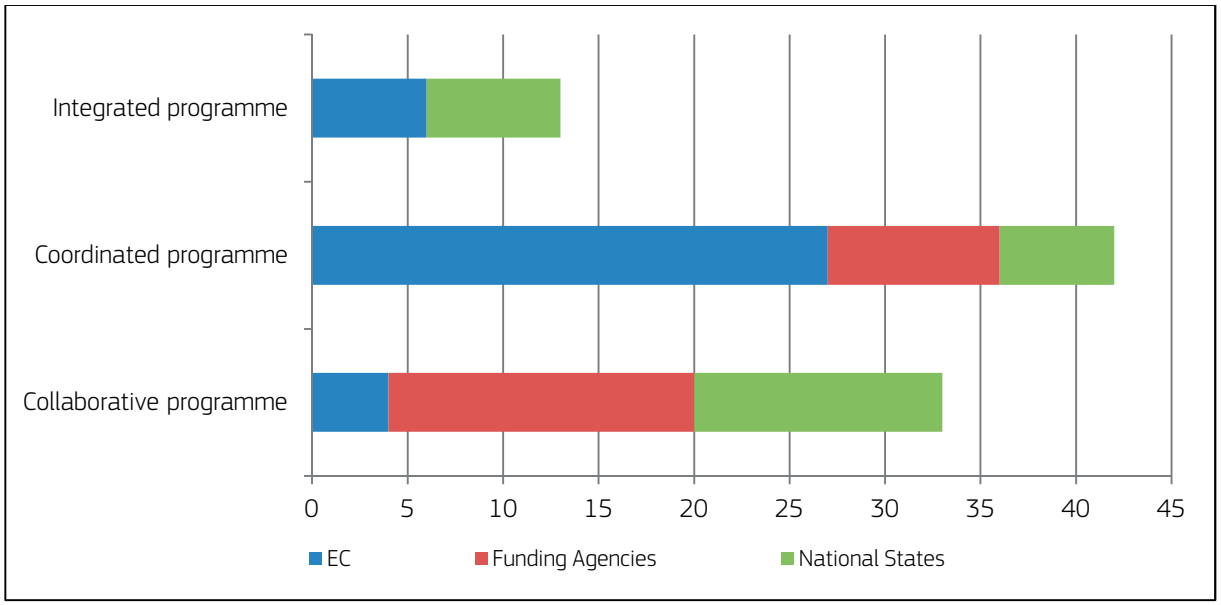
Integrated programmes are much larger, receive the bulk of EU funding and include almost all JOREP countries, while coordinated and collaborative programmes display, on average, more limited participation and lower budgets. Regarding the selection criteria, it is clear that most collaborative programmes are general-purpose and excellence-oriented programmes. On the other hand, integrated and coordinated programmes are mainly thematic programmes and the relevance criterion is more important, especially for what concerns integrated programmes.

Figure 12. European/ bilateral programmes and the typology of programmes (nb of programmes)



(ESA included, N=95)

Figure 13. Type of establishing agency by type of programme



(ESA included, N=95)

Most collaborative programmes are bilateral programmes and were established by funding agencies or National States. On the contrary, most coordinated programmes and integrated programmes are European-level programmes and were established by the European Commission (FIGURES 12 and 13). This hints at different historical dynamics underlying the establishment of these groups of programmes, which we will investigate further in the following section.

3.4. Where programmes come from

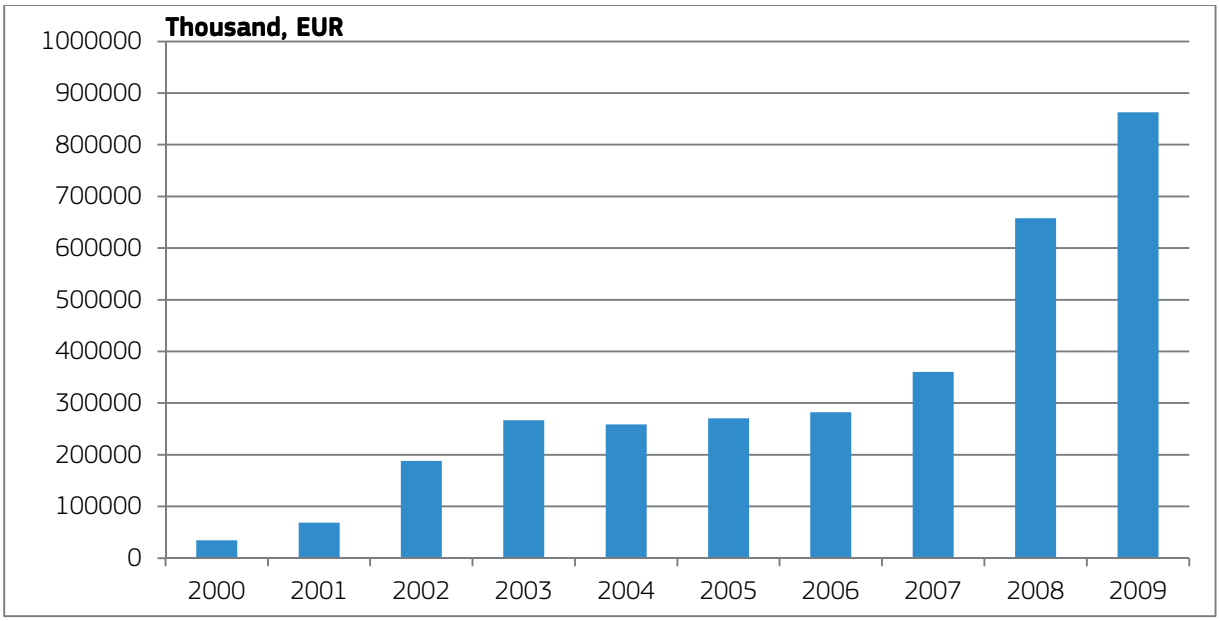
For the programmes in the 2009 perimeter, JOREP has also collected some retrospective information, including information on the year of foundation of each programme and budgets for the years 2000 to 2009. This information is helpful to analyse the dynamics of joint programmes in the last decade and to understand to which extent differences among types of programmes are related to their origins. It is however important to underline that programmes terminated before 2009 are not covered and this might, to some extent, bias the analysis of their evolution through time (although, in our view, this is not likely to greatly alter the aggregate figures).

Foundation dynamics. Our data highlight the great dynamism of joint programmes after the launch of ERA, as well as deep changes in the role of different actors. Only 10 programmes were created before 2000 – the oldest being COST (1971) -, 27 programmes between 2000 and 2005, and 60 in 2007-2009. Before 2000, the National States were the only actors establishing joint programmes – 8 out of 10 programmes being established by National States.

After that date, joint programmes were established by the European Union as well as by National States and funding agencies, but with very different roles. Integrated programmes were mostly established by the European Union, whereas – besides joining European initiatives – National States focused on launching collaborative bilateral programmes with third countries. Finally, national funding agencies (mostly research councils) are clearly emerging actors: after a phase characterised by collaborative agreements, they are rapidly moving towards stronger forms of coordination, including the establishment of lead agency agreements.

Overall budget and EU top-up funding. As FIGURE 14 indicates, the 2000-2009 period was characterised by an astonishing growth in the total budget of joint programmes. Their total funding volume more than doubled including the European Space Agency and increased tenfold excluding ESA; while we believe this increase is real, it might be somewhat exaggerated by the fact that programmes terminated before 2009 are not covered and some pieces of data on the budget for the earlier years are missing. However, the increase, especially in 2007-2009, is highly significant and related to the launch of some large-scale European initiatives.

Figure 14. Total budget of joint programmes

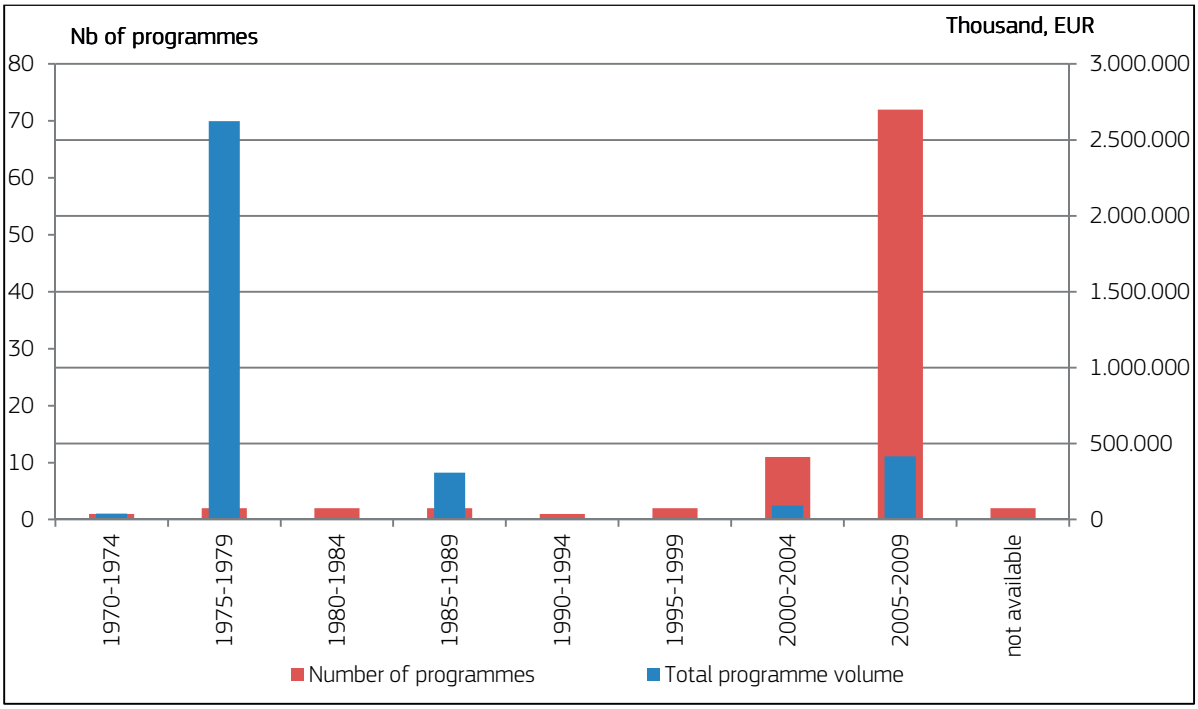


(ESA excluded, N=94, EUR)

The increase in total funding volume was complemented by a rise in EU funding in 2007-2009 both as volume and as share of the total (from 7% in 2006 to 19% in 2009, excluding ESA). This supports the interpretation that EU additional funding was critical in leading to greater commitment by national states.

Growth of programmes. A more disaggregated analysis by programme suggests some relevant patterns, which are crucial to design research policies at the European level. As FIGURE 15 confirms, the programmes do not display an overall tendency to grow larger in time. While two old programmes created by National States – ESA and Eureka – have grown very large, many European and bilateral initiatives from the years before 2005 did not significantly increase their funding volume.

Figure 15. Number of joint programmes and total funding volume in 2009, by funding year



(ESA included, N=95, EUR)

Growth of EU top-up funding in the most recent years. First, the growth described above is mainly due to the establishment of new programmes – 1/3 of the increase in total joint programmes budget in 2009 can be ascribed to programmes founded in that year – and, second, growth is strongly concentrated in few programmes, namely those with supranational agencies and receiving EU top-up funding. We consider this to be closely related to the fact that National States are reluctant to commit resources to supranational programmes: only those programmes which are sufficiently well-established through some kind of supranational structure are able to generate long-term financial commitment; however, in turn, this takes place only if the provision of EU additional funding creates suitable incentives to national policies.

3.5. Understanding motivations and policy rationales as intended and provided opportunities

This section discusses the results from the case studies in relation to the research questions and typologies of impact developed in the methodology part. Evidence from the documentary analysis and from the interviews is presented.

In the case of "intended opportunities", the aim is to go beyond some "basic" information, such as the start year of the programmes and changes occurred (i.e. partnership composition, countries involved, types of activities funded). Important aspects, such as the history of the programmes – understood as the decision processes and actors involved, leading to programme definition and launch, as well as the decision to participate –, help the understanding of policy rationales beyond official statements. As for aims and objectives, these too should be further explored, in order to better understand normative and knowledge dynamics rationales. Other aspects related to the types of participation and collaboration and the countries involved, as well as the differences between formal participation (signature of agreements) and actual participation (funding of calls) in EU-level programmes will be analysed in chapter 6. For what concerns national programmes, for example, types of participation and countries involved are interesting indicators of the different strategies and priorities the various countries adopt to achieve internationalisation.

The implementation rules of the programmes, which we refer to as "provided opportunities", are often thoroughly described in official documents. Differences among the modes of cooperation of the programmes, mainly referring to the "working" rules of the programmes, clearly emerge from the analysis and allow classifying the programmes according to the typologies suggested. Operating rules – selection, funding, and evaluation practices – are often clearly stated in official documents, in particular in the calls for proposals. Nevertheless, some limits do emerge. Firstly, it is difficult to verify whether rules and systems were the same in the past, what changes have occurred and, most importantly, what were the motivations leading to the changes (i.e. new topics/priorities to be addressed, launch of new programmes/initiatives at the European and national level, no further developments in a given research field). This gives a measure of the flexibility of the programmes.

Secondly, with respect to the organisation of the programmes, participation rules and main beneficiaries are the most important features. Here we have investigated the actual governance structure and division of power among the different bodies involved, how the rules reveal the actual opportunities the programmes are intended to provide, and how the beneficiaries perceive and mobilise these opportunities. The interviews about the programmes shed light on two main items: characteristics of actual participation, regardless of the eligibility rules stated in the programmes, and concentration of programmes on specific scientific areas, which is a measure of how broad the programmes actually are. Moreover, we have gathered information about the gaps the programmes try to fill. Information on technical gaps, which refers to administrative and funding rules potentially limiting the implementation of the programmes, provides evidence of the "learning effects" generated by the programmes, whereas information on the political gaps the programmes try to deal with shed light on the motivations for participation in joint and open initiatives.

The analysis offers few insights into the "perceived opportunities", which mainly account for the effects of the programmes. These could refer to the opportunities expected and those actually provided by the programmes. The former are captured by narrations concerning the motivations leading to participation and by information about the uptake by the scientific community and the stakeholders, whereas the latter mainly concern benefits perceived as actually provided by the programmes. Hence, perceived opportunities might offer some insights into the effects of the programmes, those not expected, not fully addressed, or different from the expectations which triggered the decision to participate.

Data concerning the intended and provided by programme are presented in the JOREP deliverable D9 'Analysis Report'.

3.5.1. Integrated programmes

Four integrated programmes have been investigated in relation to their motivations and rationales (opportunities intended and provided): the Nordic Top Level Research Initiative (TRI), the ARTEMIS Joint technology initiative, the Art. 185 AAL – Ambient Assisted Living, and EUROSTARS EUREKA.

Top-level Research Initiative (TRI) was initiated in December 2007 and fully launched in 2008. It is the largest and most ambitious joint Nordic research and innovation initiative to date and should last for a five-year period (expected end in 2013). The Nordic prime ministers began the process towards the TRI – Top-Level Research Initiative – at the highest political level in the Nordic countries during a ministerial conference, as part of their goal to set a new globalisation agenda for Nordic collaboration. No changes took place after the programme was agreed upon and launched by the ministries of the Nordic countries. Today, the TRI involves Denmark, Finland, Iceland, Norway, and Sweden and, in some cases, the autonomous Nordic areas (the Faroe Islands, Greenland and the Åland Islands). TRI focuses on climate change issues and aims to develop reliable climate models to predict future climate change, while also preparing society to better deal with the impact of climate change.

The AAL Joint Programme is based on Article 185, formerly "Article 169 Initiative" which indicates the corresponding article in the European Union Treaty. The AAL programme was set up in 2008 by 20 EU Member States and 3 associated countries, after a preparatory period from 2004 to 2006 when it was a Specific Support Action project under the IST priority within the 6th European Framework Programme. In 2008 “Ambient Assisted Living” (AAL) was included in a co-decision report unanimously approved by the European Parliament’s Industry Committee (ITRE) and, in the same year, the Council adopted the participation of the European Commission in the AAL JP. The AAL programme is due to last until 2013. Its participating countries are: Belgium, Denmark, Germany, Ireland, Greece, Spain, France, Italy, Cyprus, Luxembourg, Hungary, the Netherlands, Austria, Poland, Portugal, Romania, Slovenia, Finland, Sweden and the United Kingdom, as well as Israel, Norway and Switzerland, which fully joined the AAL joint programme in 2010.

ARTEMIS is a Joint Technology Initiative (JTI) set up by a regulation of the European Council under article 171 of the EC Treaty (now article 187 of the Treaty on the functioning of the European Union – TFEU) as a new way of implementing public-private partnerships in research at the European level. Its setting up article is dated 20th December 2007. The ARTEMIS European Technology Platform, which preceded the JTI, was launched in 2004. No changes have been observed yet, but larger participation by several EU countries is expected. Differently from other joint technology initiatives ARTEMIS pursues a long-term strategy, it is top-down, it has a pan-European nature, and it is a tripartite Public Private Partnership (industry, Member States, European Commission). Its governing structure includes a Governing Board, a Public Authorities Board, and an Industry and Research Committee. ARTEMISIA (ARTEMISIA Industrial Association) is the non-profit industrial association of the ARTEMIS Joint Undertaking, created on 17th January 2007, and represents the interests of the industrial partners. Membership in ARTEMISIA is open to all R&D players from EU Member States and Associated Countries.

The EUROSTARS programme was initiated in 2004 when the EUREKA ministerial conference stressed the need for EUREKA to work closer with the European Union Framework Programme to support SMEs. A High Level Group was created in 2004 to run the programme. The European Commission made a proposal in 2007, which was finally adopted in July 2008, allowing participation in EUROSTARS. The first two calls for proposals were launched in late-2007, with a first cut-off date in February 2008. EUROSTARS is due to continue until December 2013, but it will likely be extended, given its focus on SMEs and the importance of R&D for SMEs in the European policy agenda (e.g. Innovation Union flagship, part of the Europe 2020 strategy).

32 countries are currently participating in the EUROSTARS programme and any country can join if it provides the necessary funding and if the existing participants agree (full details are set out in Articles 2(e) to (h) and 10–11 of the 2008 EU decision document).

Therefore, there can be no partial participation by a country – i.e. participation without funding.

FURTHER INFORMATION ABOUT THE PROGRAMMES IS AVAILABLE IN DELIVERABLE D9 ‘ANALYSIS REPORT’.

The TRI is the only integrated programme, among the ones selected, which has a real common pot funding system instead of a national pot with additional EU funding. It was established by government institutions, Nordic institutions, NordForsk, the Nordic Innovation Centre, and the Nordic Energy Agency, which acts as Secretariat for the initiative. Differently, other programmes are managed by supranational governing bodies

where national funding agencies are represented (e.g. the AAL General Assembly) and which could also include private and industrial organizations representatives and the EC (e.g. EUROSTARS, Artemis).

Whereas the TRI is a large initiative dealing with energy and climate change divided into six sub programmes, each with its own managing body, according to the specific thematic priority addressed, other programmes are run by centralised bodies (Assembly or Secretariat) with no internal distinctions based on the priorities addressed. None of them have undergone relevant changes since their establishment; rather, enlargements will potentially occur upon renewal (for instance, in the cases of Artemis and EUROSTARS).

Two programmes, Artemis and EUROSTARS, mostly address entrepreneurial needs. For this purpose, the former has established the ARTEMISIA non-profit Industrial Association.

Differently, societal needs are indicated as relevant for the AAL programme, which has three main objectives: 1) to foster the emergence of innovative ICT-based products, services, and systems for ageing well at home, in the community, and at work; 2) to create a critical mass of research, development, and innovation at the EU level in the areas of technologies and services for ageing well in the information society; and 3) to improve conditions for the industrial exploitation of research results. As for the TRI, besides addressing big challenging themes such as climate change and energy, it also aims at strengthening collaborations among Nordic countries and at increasing the "Nordic added value". All programmes fund projects lasting between 2 and 4 years, scientific quality being the most important selection criterion, except for EUROSTARS and Artemis which consider relevance the most important criterion, consistently with the expected impact of activities funded under the programmes and the economic and technological challenges they address. As for the submission procedure, they all envisage a single entry point for submitting applications.

According to the interviews, the TRI is as a highly strategic initiative for Nordic countries, meeting national priorities but also international and European ones. It clearly emerges as a political initiative, based on a collaborative policy rationale: strengthening collaborations among Nordic countries on "challenging" and "big" research sectors like climate change and energy research, improving Nordic added value, providing training and knowledge exchange among Nordic countries. The instrument designing process was top-down and initiatives focus on two main topics: energy and climate change – the latter representing the real "research "area of the programme, a priority topic to be dealt with through a large initiative. The TRI, in fact, allows bringing together competences in a scientific field perceived to be split among Nordic research organisations. On the other hand, energy is perceived as a more "marketable" topic, already supported by several national programmes. For both topics, joint collaboration is conceived as the real added value, which allows reaching higher research quality compared to national programmes.

Interestingly, the opportunity perceived is that the TRI could strengthen Nordic cooperation, making Nordic countries stronger at the EU level in relation to European programmes competition, and leading them towards new areas of cooperation, mainly with Eastern Europe. So far, the main rationale of the TRI has been the improvement and promotion of the so called "Nordic added Value", which means improving and strengthening cooperation among Nordic countries, sharing common practices and rules, creating training, knowledge exchanges, and mobility opportunities for young researches.

Some critical comments emerged regarding evaluation practices, which, as also shown by the documentary analysis (see Deliverable D9), are mostly split among different levels (whole initiative, sub-programmes, funded activities), programme stages (whole initiative, midterm, and final evaluation), and bodies (final evaluations are carried out by an external agency – DAMVAD – appointed for the purpose; for each sub-programme, annual reports must be presented to the management board, while progress and activity reports must be presented to the sub-programme secretaries). In the interviews, sub-programme secretaries stated that they felt these aspects should be improved.

Main shortcomings are the lack of control by the centralised Management Board – which decides the general rules about funding but leaves selection and funding decisions to the sub-programme committees – and the duplication of evaluation reports (from projects funded to sub-programme secretaries and from them to the Management Board) without common procedures agreed for all the sub-programmes.

The AAL Joint Programme's main aim is to enhance the quality of life of older people through the use of new information and communication technologies. Interviews with those responsible for the programme showed that the aim of the AAL is to face a major societal challenge (ageing society), facilitating participation of a critical mass of researchers on a topic often perceived as having limited relevance, creating synergies, and promoting cost savings from cross-linking national activities in the health/social security systems, which emerged as being very fragmented across Europe. Independent evaluators see the AAL as a timely, appropriate initiative on an important topic, addressing the lack of international standardisation in the health sector (e.g. different health delivery systems, health insurance systems, health funding).

Nonetheless, the various interviews indicated that social uptake was underemphasised and limited, and no integrated actions were implemented at the national level according to the different cultures of European countries. In fact, in some countries the AAL programme promotes the development of technologies in very specific sectors, addressing the needs of few organisations (SMEs and health/social care organisations) not fully covered by national programmes, and often with limited funding. Other countries consider the AAL one of the many European initiatives in the ICT sector worth engaging in (e.g. Spain), so that participation in the programme is not driven by specific interest in the topic. Finally, few countries, where national programmes in the ICT sector for this specific field are largely diffused, have a leading role in the programme (e.g. the Netherlands). These countries also have specific funding rules to support social care organisations, which are separate from those concerning research organisations and private beneficiaries (e.g. the Netherlands vs. Italy).

This seems to account for the much-diversified perception of the programme by participating agencies. Some consider the AAL coherent with similar national ICT programmes and think that joint programming is likely to lend coherence to national programmes in relation to other large EU initiatives such as the EUFPs. Other agencies, such as the Spanish ones, see the AAL and national programmes as completely separate and do not believe the AAL can provide any added value or advantages, besides additional funding to SMEs.

Some shortcomings do emerge with respect to management, funding, and accountability practices; and national rules and the AAL common practices seem to operate on two separate levels. The lack of cohesion between common practices and national rules is highlighted in particular for what concerns funding of joint activities (differences in national budgets, long waiting periods from submission to funding) and accountability practices (European peer reviewing and joint evaluation of proposals, national eligibility checks and progress/financial reporting), which seem to limit the effectiveness of the programme. The respondents also believe that evaluation and mid-term evaluation processes should be improved, including more innovation studies, that key actors in the AAL sector should be involved (e.g. experts on e-health, on social innovation, and rapporteurs with innovation backgrounds), and that main stakeholders should be mobilised (as already done in some countries, e.g. Spain). Consistently with the data and indicators collected, the interviews show that ARTEMIS addresses industrial needs for research and development.

The management and governing rules of ARTEMIS are reported as sufficiently flexible to meet the applicants' needs, especially for what concerns funding (once a project is successfully reviewed, EU payments are automatic and there is no double jeopardy) and limitations arising from different national rules (the 'guide for applicants' is indeed quite comprehensive). EC administrators are aware of the need to delegate decisions concerning research areas to people actually engaged in industry and research. So, the first step of ARTEMIS was to delegate the production of a strategic research agenda to a designated group of researchers and industrialists under the European Technology Platforms. Later, a European Parliament decision enabled joint funding between EC and Member States in the ARTEMIS JTI.

EUROSTARS is presented by the interviewees as a new EC programme to support R&D in SMEs, seen as engines of growth, with the declared aim to fund international projects from national sources, and a specific focus on fast-growing, research-intensive SMEs, which have a high mortality rate. The respondents stated that EUROSTARS was launched to limit competition met by EUREKA clusters arising from new EC initiatives (e.g. JTIs, new ERA-NETs). Moreover, EUROSTARS is seen as a Dutch-European initiative, suitable for small innovative countries, such as the Netherlands, which are agile partners, with very international-oriented companies. These countries have no problems cooperating in joint projects with universities or high-tech partners from other countries because of their high level of internationalisation, low competition, and limited need to be conservative in their administration.

EUROSTARS is perceived as separate from the EUREKA programme as to the motivations driving countries' participation, management and governance rules, and project evaluation processes.

The motivations and procedures that drive participation in EUROSTARS vary greatly from country to country. Some have mainly political motivations (e.g. the Czech Republic, Denmark); others consider EUROSTARS interesting mainly due to its focus on SMEs (e.g. Spain).

Funding does not emerge as the main motivation triggering participation in the initiative; a more important role is played by the opportunities it provides for SMEs, the chance to increase networking, and the funding of high-risk research. EUROSTARS is perceived as having a high success rate, its procedures, rules, and tools are very clear (web-based), national funds are quickly released, and it is possible to avoid nation-based double jeopardy and funding delays. Nonetheless, harmonisation of national processes is still incomplete, especially with respect to funding rules, which has a negative impact on scheduled payments to beneficiaries.

Summing up, some of the features characterising the above-mentioned programmes clearly emerge. As for the AAL, the aims of strengthening social uptake and facilitating participation of a critical mass of researchers seem to be hindered by differences in national regulations and programmes across the participating countries. In this regard, it is worth noting that national engagement in projects regarding health and ageing issues, for instance through national programmes, is perceived as important to achieve expected "social" outcomes, whereas "market" outcomes are generally judged positive because of the financial support provided to national SMEs.

EUROSTARS is perceived as a successful initiative in its management and evaluation/accountability procedures, a fact which facilitates participation by SMEs. This is not the case for ARTEMIS. Hence, it could be argued that in larger programmes, with multifaceted aims and activities, participation rules and procedures are important, especially when national regulations are very much diversified. This limit can be overcome thanks to the presence of common supranational structures (Nordic agencies) and the implementation of shared rules, as in the case of the TRI.

3.5.2. Coordinated programmes

Coordinated programmes include the ERANET EMIDA, the ERANET ERASysBio and ERASysBio+, and the Germany-USA bilateral agreement on regenerative medicine.

EMIDA's history dates back to 1974 when the EU Standing Committee on Agricultural Research (SCAR) was created. Three development phases can be identified for EMIDA: firstly, in 2005, a Collaborative Working Group (CWG) was established by the EU Standing Committee on Agricultural Research; then, from 2008 to 2011 three calls were launched and later, in 2011, the third phase started with the launch of "Star–Idaz", the global network on animal disease and zoonoses research. The organisation of EMIDA is similar to that of all ERANET schemes. The Joint Secretariat – in charge of coordinating the selection of projects, including independent expert reviewing of proposals, and other boards – mostly manages activities related to the programme at the central level. National partner are in charge of funding decisions, according mainly to national rules, and of managing contracts with funded beneficiaries. The Joint Secretariat and the Executive Board/Steering Committee (SC) deal with the definition and diffusion of the calls, as well as decisions about their contents. National partners are involved in the diffusion of joint calls, although the Joint Secretariat defines the text of the calls, using national websites and the national call secretariats for this purpose.

No plans for ex-post evaluation of projects funded through the EMIDA common call are available at present.

ERASysBio was initiated in 2005 under EUFP6 as a Coordination Action and it springs from a Specific Support Action (SSA). ERASysBio+ is the successor of ERASysBio (2006-2011) and started in 2009, with expected end in 2013. Both programmes were decided at the EU level in order to address a rather new research topic, systems biology, which emerged at the beginning of the new century and whose scientific community was very much fragmented. In fact, systems biology is not developed jointly at the international level and it is often embedded in other programmes /disciplines such as Health, Biology, or Biotechnology. The strategic aim of the ERASysBio programme is summarised in the following sentence: "[Setting up] appropriate structures, both physical and virtual, can facilitate interdisciplinary training and mobility, deliver structured technological innovation, and provide a platform for the generation of high quality data to be made available to the entire scientific community." (Outcomes of the 1st ERASysBio Meeting of the European Systems Biology Centres, London, March 2007, and the ERASysBio Strategy Conference, Oxford, March 2007.) The organisation and the management of activities are similar to those of other ERANET schemes.

The bilateral agreement between Germany and the USA on regenerative medicine started in 2009 and was initiated by the German BMBF and the Californian Institute for Regenerative Medicine (CIRM). Collaborations between the two countries in the field of medical research date back to 1997, when the BMBF initiated funding of research into the ethical, legal and social aspects (ELSA) of molecular medicine as an accompanying measure to efforts in the field of human genomics. In 1998 a bilateral agreement between the Department of Health and Human Services (DHHS) and the affiliated National Institutes of Health (NIH) mainly concerned collaborations for cardiovascular research, cancer research, and lung research. In February 2010, the Federal Minister of Education and Research, the German Ambassador to the USA, and the American Deputy Secretary of State signed a framework agreement between the Federal Republic of Germany and the USA on scientific and technological cooperation in areas of joint interest and strategic importance.

FURTHER INFORMATION ABOUT THE PROGRAMMES IS AVAILABLE IN DELIVERABLE D9 'ANALYSIS REPORT'.

Coordinated programmes in this group are characterised by the use of a virtual common pot funding mechanism. For the Germany-USA bilateral agreement and the ERANETs EMIDA and ERASYS BIO, a virtual common pot scheme is used, whereas a mixed common pot scheme, envisaging top-up funding by the European Commission, applies to ERAYS BIO+, as is the case for many ERANET Plus schemes. Except for the Germany-USA bilateral agreement, established on the basis of an agreement between two National States, ERANETS stem from EC initiatives. Most activities, especially for the bilateral agreement, are based on common decisions taken by the countries involved (launch of calls, selection of projects) or according to the general rules governing the programme scheme (ERANET scheme). All funded projects have an expected duration of 2-4 years.

Interviews help identify different aims and rationales underlying the programmes. The strategic aim of EMIDA is to support collaborations in order to allow researchers to share information, coordinate activities, and work towards a common research agenda and mutual research funding activities in the field of animal health, including emerging and major infectious diseases of production animals, including fish and bees, and those conditions which pose a threat to human health. It excludes food safety issues relating to the handling of livestock products and diseases of wildlife, except where they act as reservoirs of infection for humans or production animals. EMIDA answers the need to overcome fragmentation, inefficiency and duplication in the research field of animal diseases, due to lack of trans-national coordination and dispersion at the European level of specialist research groups. Through EMIDA, scientists can devise a common research agenda promoting coordination and networking.

A partial rationale for coordination in the area, met by EMIDA, is also the provision of funding for the purchase of research equipment for infectious agents containment, although the ERANET does not fund equipment. Moreover, the interviewers emphasise the perception that EMIDA does not aim to fund new research themes, but rather it tries to make the most of national projects on animal health and to support new collaborations across Member States. This is confirmed by the fact that some national agencies did not start funding new research themes and the allocation of resources was still linked to national policy goals (e.g. in the Netherlands).

The relevance of national interests is reflected in the organisation and content of the calls, which are considered too fragmented (eight different research activity lines and 51 specific research lines), probably in order to accommodate national interests and the working method characterising EMIDA. Indeed, management is ensured through the activities of the Secretary Office, but the active participation of national agencies clearly emerges, especially in the selection process and in choosing topics for the calls according to national priorities. This is confirmed by the respondents, many of which stated that collaborations worked better because of the virtual common pot instrument, which allowed national agencies to have an active role in several programme phases (i.e. selection of priorities, drafting of the calls, eligibility checks, evaluation, funding decisions). This would not have been the case if a real common pot scheme had been applied. The selection procedures are seen as transparent, inclusive and reliable, since national funders are all involved and their priorities are taken into account in the organisation of the whole process. The same holds true for evaluation, which is carried out by using web conferences tools, whereas harmonisation of reporting requirements is still lacking.

As for ERASysBio, a twofold rationale led funders to launch it and scientists to participate in it. The former wished to improve coordination of trans-boundary research, administration of joint initiatives, and cooperation between funding agencies and ministries to establish best practices for strategy processes/common guidelines on systems biology. As for the latter, systems biology is very demanding from a technical point of view and the community of experts was highly fragmented across different countries. The ERASysBio ERANET provided a framework for strategic processes (e.g. writing a European research agenda) and trans-national calls (see, for instance, the SYSMO call, which funded a technological platform), whereas ERASysBio+ mainly aimed at funding a trans-national call to share knowledge in the field of systems biology, so that respondents judged it less strategic than ERASysBio.

Collaboration with the USA in the field of regenerative medicine is part of a consolidated health research tradition in Germany. The interviews underline that the Germany-USA bilateral programme for regenerative medicine was mainly supported by Germany's political decision to improve national research in regenerative medicine and human stem cells, not allowed in Europe because of national legislative limitations, by collaborating with the California Institute for Regenerative Medicine (CIRM), considered a world leader in the sector. The legal basis for the collaboration is a memorandum of understanding which ensures financial commitment by both countries but does not include shared practices and rules for the management of the programme, which remain separated.

Two main rationales for signing the bilateral programme are reported. The first is to fund projects that are now moving into the clinical stage, to translate research into applications (not only basic research but results that can be exploited with scientific and economic results also by other ministries). The other reason is the opportunity to share the costs and benefits of CIRM facilities and technologies, which are very expensive. A third reason can be identified: increasing the scientific visibility of German experts in this field, with greater recognition of their scientific achievements, unattainable through national programmes. It should also be noted that, for the time being, no EU programmes exist in the field.

Summing up, the interviews highlight that the ERANETs and ERANET PLUS fulfil the need to foster networking and cooperation among mostly isolated groups of researchers at the European level. Large universities and research centres are the main beneficiaries, whereas the participation of SMEs and industries is limited. This might depend, in the opinion of respondents, on the fact that research carried out by ERANETs is perceived as highly innovative and risky, thus not fully suited to private partners' expectations and needs. Secondly, the two levels of cooperation, European and national, seem to be well harmonised in the funding schemes thanks to their organisation and management rules (i.e. Call Secretariats), although the need to consider national interests and priorities limits effectiveness. Thirdly, ERANETs have allowed countries to collaborate in additional activities, such as the development of equipment, showing that collaboration and networking are effectively supported.

The Germany-USA bilateral agreement is completely different, since it is based on a national initiative. Its aim is to consolidate and provide an institutional framework for stable research collaboration existing between the research communities of the two nations.

3.5.3. Collaborative programmes

The Collaborative programmes analysed here include: the LAA - Lead Agency Agreement (with delegation of responsibilities)[2], and the ORA (independent programmes).

The Swiss National Science Foundation (SNSF), the German Research Foundation (DFG), and the Austrian Science Fund (FWF) signed the LAA Lead Agency Agreement in May 2008. This came about after the D-A-CH agreement signed in 2003, which created an informal platform and a permanent cooperative association among research funding organisations from Germany (DFG), Austria (FWF) and Switzerland (SNSF). Under the D-A-CH scheme, the three countries had the opportunity to consolidate the process of administration and peer reviewing of individual funding proposals. The LAA is governed by national rules and based on an agreement among national research funding agencies, thus differences between its implementation in the two countries, Switzerland and Germany, do exist. No supranational structures, such as a secretariat or a joint office, were established to govern the programme. The parts of projects carried out in the individual countries must be interdependent and complementary and proposals must have a joint research question and a joint research plan. Lead Agency proposals must not overlap thematically with other proposals submitted to the SNSF or projects already funded. As for eligibility, researchers must inform the division competent for the disciplinary sector of the project about their proposal.

Two DFG (Deutsche Forschungsgemeinschaft - German Research Foundation) bilateral programmes, one with the UK ESRC and one with the French ANR, focus on Social Sciences and Humanities and are based on a common administrative framework to provide financial support to research projects. The DFG-ANR agreement was signed in 2006, and the first call for proposals was launched in 2007. French-German bilateral projects are funded under the ANR-DFG scheme for Social Sciences and Humanities, whereas the DFG-ESRC bilateral scheme was replaced by the ORA (Open Research Area) Programme.

Four partners signed the ORA Memorandum of Understanding (MoU) in June 2009 (ESRC, DFG, ANR and NWO). Three of them, except the ANR, were already collaborating in the NORFACE ERANET. The ORA was established within the context of the EuroHorcs' Roadmap to Excellence in Science in Europe. The first ORA call for proposals was announced in 2009, with a deadline for applications in April 2010. A second call for proposals closed on 30th September 2011. The German research foundation, DFG, hosts the ORA website.

FURTHER INFORMATION ABOUT THE PROGRAMMES IS AVAILABLE IN DELIVERABLE D9 'ANALYSIS REPORT'.

[2] Like all the programmes under the category of delegation, also the LAA programme could be classified under the coordinated type. Here we adopt the same classification used in the data analysis.

The LAA and the ORA are two collaboration schemes characterised by national pot funding mechanisms. The LAA programme is based on an agreement between the respective research councils in order to ensure that the two agencies can act as lead agencies. Thus, it is characterised by a delegation mode of functioning whereas the ORA programme is based on independent selection by the participating national agencies. For both programmes scientific quality is the most relevant criterion in the selection process. They started between 2007 and 2008 and no end dates have been set. The LAA represents an example of a collaborative programme with delegation of responsibilities. "Lead agency" means that individuals can submit the project where most of the activities will be performed (SNF in Switzerland, FWF in Austria, and DGF in Germany), and the organisation of the country which receives the proposal is the lead agency. The selected agency decides about funding, and the other partner organisations accept to pay their share. The Lead Agency Agreement aims to make it easier for researchers to submit trans-national applications and to simplify the evaluation of trans-national projects. It allows researchers to simplify the procedure for submitting their joint applications, presenting them to one of the research funding organisations only (the lead agency, usually the country whose funding amount is highest) but following the usual local procedure.

The Lead Agency procedure is thus a bottom-up procedure, which facilitates collaboration based on mutual trust among EU countries. Motivations for setting up the LAA procedure were mainly related to the need to simplify administrative and management processes for funding non-thematic and not politically driven bottom-up projects, involving researchers from countries with a long tradition of collaboration, without establishing a new set of procedures and rules but using existing national rules.

The Lead Agency Agreement is characterised by long-term cooperation among signatory countries already in place, mutual trust, and reliability of funding agencies. Two main shortcomings are detected: limited innovation value and limited scope of the LAA as a funding instrument. As for the first point, the LAA is perceived as less innovative than other initiatives in relation to contents tackled and partnerships supported (no new networks but mainly already existing collaborations). As for the second point, the LAA is perceived by researchers not as a specific funding instrument for research but as a "Way of opening another pot for funding, providing no fresh money".

The two DFG (Deutsche Forschungsgemeinschaft - German Research Foundation) bilateral programmes have been chosen as case studies, since they are moving into a different programme, named ORA (Open Research Area); hence, they lend themselves well to an analysis of programme dynamics. The interviews underline that the ORA was signed in order to improve cooperation between France and Germany on the one hand and the UK and Germany on the other hand in the field of SSH research, considering that social and human sciences are key topics to be taken into account to solve specific questions in modern and old societies. More generally, the primary objective of the ORA Programme is to fund high-quality research, strengthening research in the social sciences and establishing research groups in cognate areas in the different countries to work more closely together in order to develop and complete internationally advanced collaborative research and publications.

The ORA programme represents a way for different countries to collaborate in research funding while retaining their national funding rules. The roots of the ORA can be traced back to the 'Bonn Group' (the social sciences parts of the national agencies in DE, FR, NL, and the UK), which involved agencies from different European countries aiming to develop new funding and collaboration instruments. Another experiment was working together under the ESF ECRP (EUROCORES) based in Strasbourg, an organisation that had a social sciences programme, similar to that of the ORA, for non-thematic, bottom-up social sciences research with competitive calls for proposals. ERA-NETs have also helped funding agencies to develop close relationships and build trust to implement direct collaboration projects.

Thus, the ORA is based on previous collaborations among participating countries (DE, FR, NL, and the UK) but the idea is that each country can establish its own new collaboration rules. These are not yet stabilised but still under evolution (examples are provided by changes in submission procedures and call regulations) and moving towards a different organisational and management model (e.g. the development of a collective, central point for application submissions, a dedicated ORA platform, and a unified evaluation and reporting system). So, although the NORFACE programme was indicated as the model for the ORA, besides some obvious differences (e.g. NORFACE is themed, top-down, whereas the ORA is open, bottom-up), the ORA seems to move towards a different, not yet fully identified model of cooperation.

The interviews let some differences between the two collaboration models emerge. Firstly, the ORA is still an "in between scheme", whose effectiveness (e.g. low success rate) seems to be limited by the mixing of different programme models (virtual common pot funding scheme, lead agency management model, NORFACE cooperation model). In the Lead Agency Agreement no harmonisation of national rules is required or envisaged, but collaboration is based on mutual trust, confidence and reliability of funding agencies, whereas

in the ORA new collaboration rules are being developed and considered a requirement for the programme's success.

The LAA does not aim to facilitate the creation of new networks but to make existing collaborations easier, whereas the development of new and larger networks is an important aim for the ORA. Correspondingly, evaluation criteria are different: the international dimension of proposals is important in the ORA but not in the LAA. Hence, the two programmes are driven by different aims, fully met in the opinion of respondents: the LAA supports existing collaborations in different disciplinary areas by simplifying application and evaluation procedures, while the ORA facilitates international collaborations in SSH by setting up new collaboration rules. It is also true that the former is closer to the coordination type of transnational research, while the latter is a real collaborative scheme.

4. THE NATIONAL LANDSCAPE OF JOINT PROGRAMMES

Public research programmes, including the joint ones, should be seen as policy instruments, i.e. tools through which States pursue a policy objective. It means that they are able to represent the main goals of a national government and the actual strategies the different actors involved, both national and supranational, put in place in order to pursue them. Analysing joint programmes is a way to shed light on the national policies and strategies for trans-national research activities, in the case of both European initiatives and national ones.

One interesting aspect to investigate in order to understand the reasons behind participation in joint programmes and their implementation is the nature and types of actors involved and the role they play in the different phases of programme design and management. Motivations and rationales as well as impact are also affected by the role the key actors play; a multi-layered and multilevel research funding system allows for the presence of a constellation of actors, which in the case of joint programmes is supposed to be more complex than in the case of national ones. Joint programmes in fact involve different National States; moreover, in most cases they require the interplay between the national level and the European level. Thus, two main questions arise when the perspective of National States and the actors' role are concerned: a) why (under what conditions) do National States decide to initiate or participate in joint programming b) how is the process of participation implemented and which are the key actors involved?

The first question refers to the motivations driving the decision of national countries to create or to join a joint programme; the second question refers to actual participation practices. Both questions concern the national strategies affecting national involvement in trans-national research activities, and the reasons for different participation practices. Using the JOREP dataset and the information from the case studies it is possible to provide some insights which can help in answering the two questions.

Box. Highlights on national logics for joint programmes

The internationalisation of research has gained increasing importance since 2000, producing effects on the decisions by national government about R&D allocation, on the creation of schemes of project funding and incentives, and on national awareness about the relevance of different governance levels (national and international).

The JOREP mapping exercise highlights major differences among countries, which concern: their participation in joint programmes, the decision to undertake joint instead of bilateral collaborations, the level of agencification, and the role played by the State in funding allocation decisions. It also indicates that national participation in joint programmes reflects national governance characteristics of the research funding system and national patterns of internationalisation of research.

The exercise also shows that European initiatives and bilateral programmes clearly play two different functions in the internationalisation of research systems: the former strengthen networks of ERA countries around a core group of countries (UK, DE, FR, NL), the latter help individual ERA countries to connect with the rest of the world with no or very limited improvement of European-level bilateral cooperation.

Finally, the case studies provide some more details about the reasons that lead countries to join integrated, cooperative, and collaborative joint programmes, showing the aims and objectives of integration.

4.1. Why different countries engage in joint research activities

From the 2000s, policies developed at the European level have played a major role in raising awareness about the importance of research internationalisation (Trondal, 2002). The European Framework Programmes, the Lisbon Strategy, and new concepts regarding the European Research Area-ERA (David and Metcalfe, 2007; ERAWATCH, 2009; EC, 2001; Id., 2007) are factors driving the emergence of trans-national research, generating different effects, such as influencing government R&D allocation, setting up specific schemes of project funding and incentives, changing the political rhetoric in terms of rationales and justifications for

public investment in R&D, but also modifying the awareness of research organisations about the relevance of the non-national level of governance.

Further important elements that must be taken into account are the different characteristics of the disciplines (Whitley, 2000), the modes of knowledge production (Gibbons et al., 1994; Nowotny et al., 2001, Hemeriks et al, 2008), the "search regimes" (Bonaccorsi, 2008), the dynamics of the research sectors (Ziman, 1996, PRIME Eradynamics, 2007; van den Besselaar et al., 2007), and the influence of the invisible colleges (Zuccala and van den Besselaar, 2009). Addressing our questions about why and how integration and coordination through joint programming can occur needs a different theoretical framework referring to the way in which the leading forces shaping research and government dynamics act. For this purpose, three different perspectives ought to be mentioned.The first perspective considers the different national agents moving within specific interaction spaces of the national research systems, which correspond to different coordination modes in public funding: project-based, mixed, and vertically integrated modes (Lepori, 2011). The former mode is characterised by interaction spaces in which different intermediaries (i.e. funding agencies) coexist and in which State control can go from the sharing out of funds among the different agencies to determining the funding allocation criteria; in all the cases, the agencies retain control at least over the selection of beneficiaries.

The vertically integrated mode is dominated by "umbrella organisations" acting as basic layers for research funding and is characterised by extensive delegation of state control. The mixed mode might include project funding in combination with other modes. For instance, funding is distributed to consortia and networks (i.e. centres of excellence), which then regulate the sharing out of resources among the partners. Another model is the higher education core funding mode, in which the main funding relationship is between the State and HEIs. The balancing among the different modes shapes the national configuration of the research system and the different modes of joint programming.

Another perspective concerns European dynamics as shaped by the interaction between research spaces and disciplinary spaces. For what concerns the organisation of European science, the notions of "global research field" and "localised research spaces" have been presented as possible ways to conceptualise the tensions existing between the drive coming from the research fields, which deal with an international arena, and that coming from the research space shaped by the conditions existing at the local level (Nedeva, 2012). These tensions affect the way in which programmes are designed and managed; a possible approach to ease the tension between the local and the global level would be to expand the research spaces as a result of social processes which are driven by the presence, or the absence, of some conditions: an influential group supporting the change, the institutionalisation of expansion, and support provided by the national organisational actors.

Barré et al. (2012) propose a further framework to understand the dynamics of integration and coordination of the European Research Area, which are useful for an analysis of political actors and political functions. As to the former, for analytical purposes the authors state that, in order to understand their dynamics in relation to ERA, one can distinguish between the level of involvement of the different national actors (ministries, funding agencies, research performers, with special attention to public research organisations and firms), and supra-national actors (the European Commission). In fact, actors can be individually or jointly involved at the political level (handling the orientation function and deciding about the general objectives and the level of financial resources to mobilise), at the intermediary level (managing the programming and funding functions, thus dealing with the practical designing of programmes), and at the research performing level (dealing with the actual research activities). Countries differ as to the way in which the functions of orientation, programming, and research performance are distributed among national actors, putting one actor in charge of different functions or delegating functions from one actor to another.

Furthermore, the EC itself can play different roles. It can act as facilitator (providing no funding but, for instance, an overall framework for collaboration, as in the case of the ERANETs), as full partner (providing funding but not performing research, thus implicitly inviting all Member States to join), or it might also not play any role at all.

The JOREP data do not allow for a full analysis of the national coordination modes, rather they suggest some considerations using the other two conceptual perspectives. Moreover, the typology proposed is based on the logics of integration implemented by the programmes, and it provides some evidence regarding the national landscape of joint programmes both when the EC plays a role and when it does not play any role.

4.2. National participation in European and bilateral joint programmes

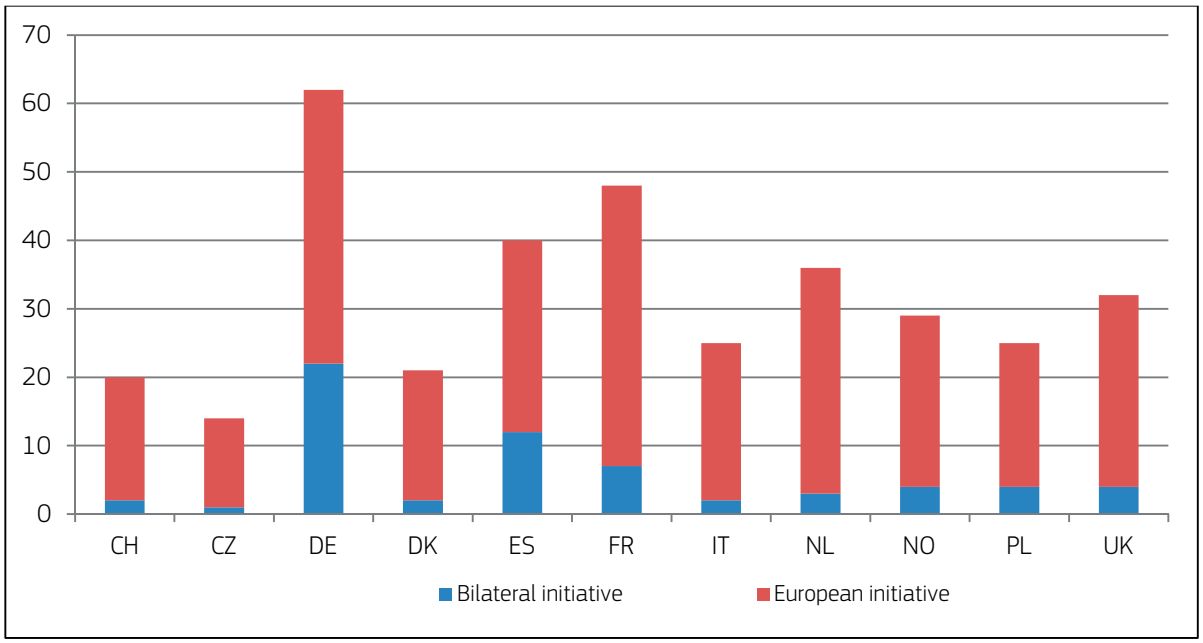
ERA countries are, to a large extent, free to decide whether to participate in joint programmes and how much budget to allocate to them. Differences might reflect different levels of opening and internationalisation of national research policies or a different organisation of national funding structures. Thus, we expect the share of joint programming within the total national R&D budget to differ from country to country. We also suppose each country in our survey to have a specific profile regarding its involvement in European initiatives vs. bilateral programmes. To test this, we focus on some differences:

Differences in the number of participations in joint programming, distinguishing between European initiatives (programmes initiated by the European Union through a dedicated programme scheme within the Framework Programmes, or multi-lateral European initiatives) and national ones (bilateral programmes set up by two or more countries and regional initiatives, like the TRI);

Differences in the amount of funding transferred in 2009 by an official funding source to the concerned funding agency, expressed as % of GBAORD.

The picture provided by Figures 16 and 17 is not complete. Some observed differences might be related to JOREP's coverage of joint programmes, which excludes cooperation agreements involving large public research organisations (PROs). In countries like France, Germany, Spain and Italy, where PROs account for a significant share of public research activities', this might result in lower figures.

Figure 16. Number of participations to bilateral and European initiatives programmes, by country, in 2009



(ESA included, N=95)

Nevertheless, some clear indications emerge:

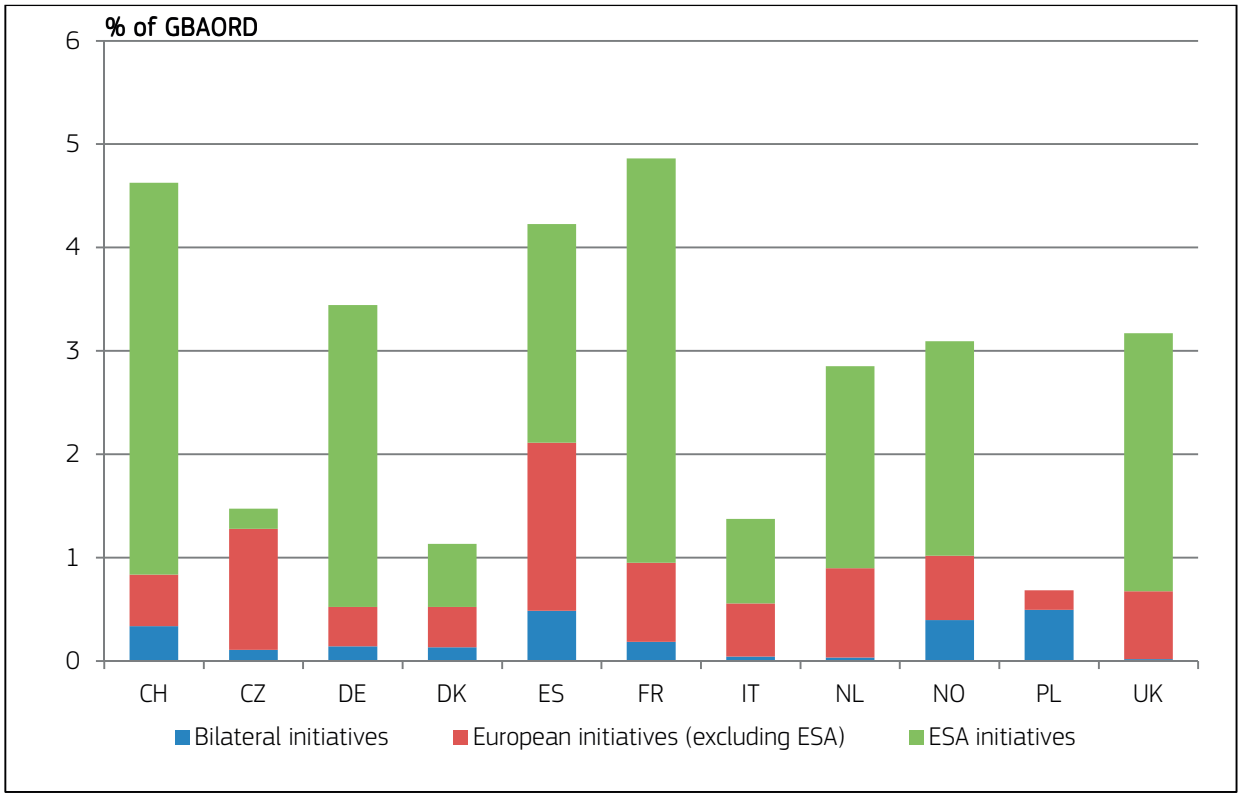
- The number of participations indicates variations among the countries for what concerns their interest in developing bilateral projects based on national programme initiatives vs. European initiatives;

- Germany emerges as the country in which joint initiatives are more numerous, both national ones and European ones;

- When funding volume is analysed (and ESA is not included), the balance among the countries changes, since Spain and France take on a prominent role, due to the large amount of resources devoted to Eureka;

- The average investments in joint programmes as percentage of GBAORD by smaller JOREP countries (CZ, CH, DK, NL, NO) are equivalent to the average investments by the largest JOREP countries (DE, ES, FR, IT, PL, UK) (respectively 0.93% and 0.96%, when excluding ESA). In greater detail, it can be noted that the share of participation in bilateral vs. European initiatives also differs from country to country. Switzerland and Norway allocate a rather large portion of their budget to bilateral initiatives, which is probably due to the fact that they are not EU member States. On the contrary, the UK, the Netherlands, Italy, France, and the Czech Republic spend most of their joint programmes budget on European initiatives.

Figure 17. Total funding volume to joint programmes by country as a percentage of GBAORD, including ESA, in 2009



(ESA included, N=95, EUR. Remarks: the data on the budget allocated to ESA in Poland is not available)

4.2.1. Establishing authorities of the programmes

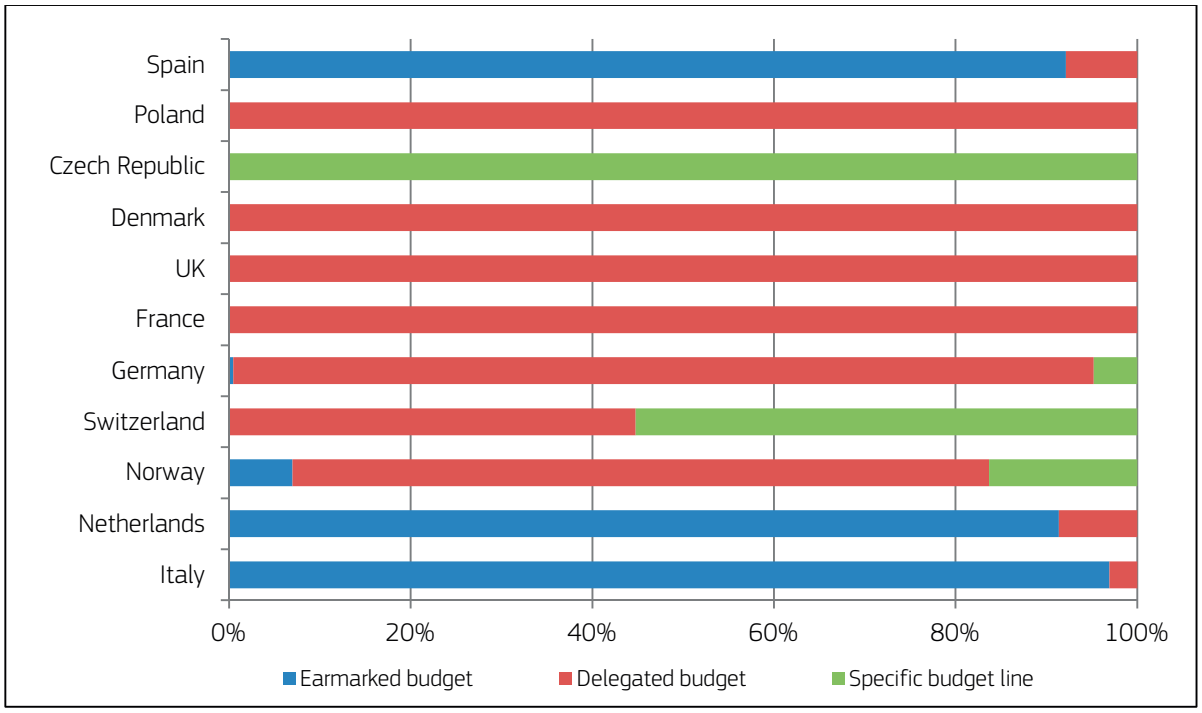
To shed light on why and how countries wish to participate in joint programmes, the decision-making process must be investigated, in order to identify the actors involved and what kinds of decisions they are in charge of. This analysis also helps us to understand the role played by central governments in relation to delegated intermediary actors of joint programmes, and the content of said delegation in terms of power transferred to the agencies. Moreover, the different types of agencies involved are another interesting matter, since the existence of different national coordination modes implies the presence of different national configurations of shared responsibilities, according to the characteristics of the governance of the research funding system (Lepori, 2011).

The JOREP mapping exercise provides some evidence of different national situations in this respect: some countries adopt a more centralised approach, whereas in other countries decisions to participate in joint programmes are taken at the agency level (for instance, in Switzerland). FIGURE 10 in Chapter 3 about the establishing authority of each programme highlights the prominent role played by national funding agencies in promoting joint programmes, although their initiatives are of much smaller size.

FIGURE 18 presents the type of budget for each programme (budget line, earmarked, delegated) by country and using funding volumes. This is a relevant indicator, as it provides information about the level of control exerted by national states over participation in joint programmes.

A broad range of agencies participate in joint programmes, including research councils (102), sector agencies and ministries (72), innovation agencies (60), public research organisations (49), and research ministries (43).

Figure 18. Type of budget for each programme, by country, 2009



(ESA excluded, N=94, EUR)

Major differences emerge among countries in delegating decisions about joint programmes to national funding agencies. In six countries (Poland, Denmark, the UK, France, Germany, and Norway) decisions regarding financial commitment are essentially delegated to agencies, whereas in three countries these are the remit of the State (Spain, Italy, and the Netherlands). To some extent, this is likely to reflect underlying differences in the level of agencification of the various countries.

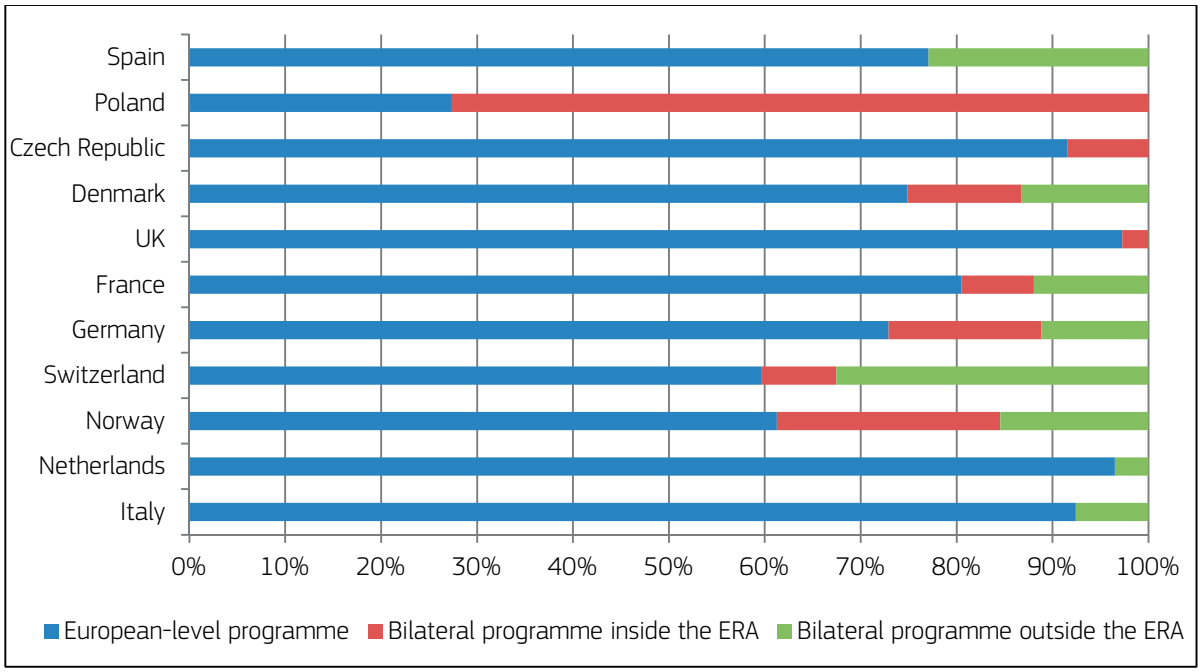
Two further aspects can contribute to understanding national strategies in relation to trans-national research. One is the relationship between Europeanisation and globalisation in joint research activities; the other regards participation in joint programmes.

4.2.2. Europeanisation and globalisation

A certain degree of specialisation among ERA countries can be expected. European multilateral programmes take on greater importance at the ERA level, whereas bilateral programmes mainly focus on cooperation with the rest of the world, especially with emerging countries or specific countries (e.g., Spain mostly implements projects with Latin America). Furthermore, ERA internal schemes are likely to be more important than bilateral schemes in terms of programme budgets.
As for the first item, only 11 out of 53 bilateral programmes involve more than one cooperating country, generally North American and emerging countries (China, US, Japan -6 programmes, and India -5 programmes). All countries in the dataset participate in integrated programmes, whereas participation in coordinated and collaborative programmes is more limited.

FIGURE 19 shows how different the countries considered in the JOREP project are when we look at the share of budget devoted to European-level programmes, bilateral programmes within ERA, and bilateral programmes outside ERA. Although involvement in European joint programmes prevails in all the countries, strong differences emerge both in the volume of funding devoted to them and in the weight of ERA and non-ERA collaborations. The data reveal how national traditions and history influence national choices regarding trans-national research. On the one hand, European funding schemes help consolidate a shared network among all the countries; on the other hand, national diversities play a role as drivers of globalisation through joint programming.

Figure 19. Participation by country to different types of programmes in 2009 (volume)

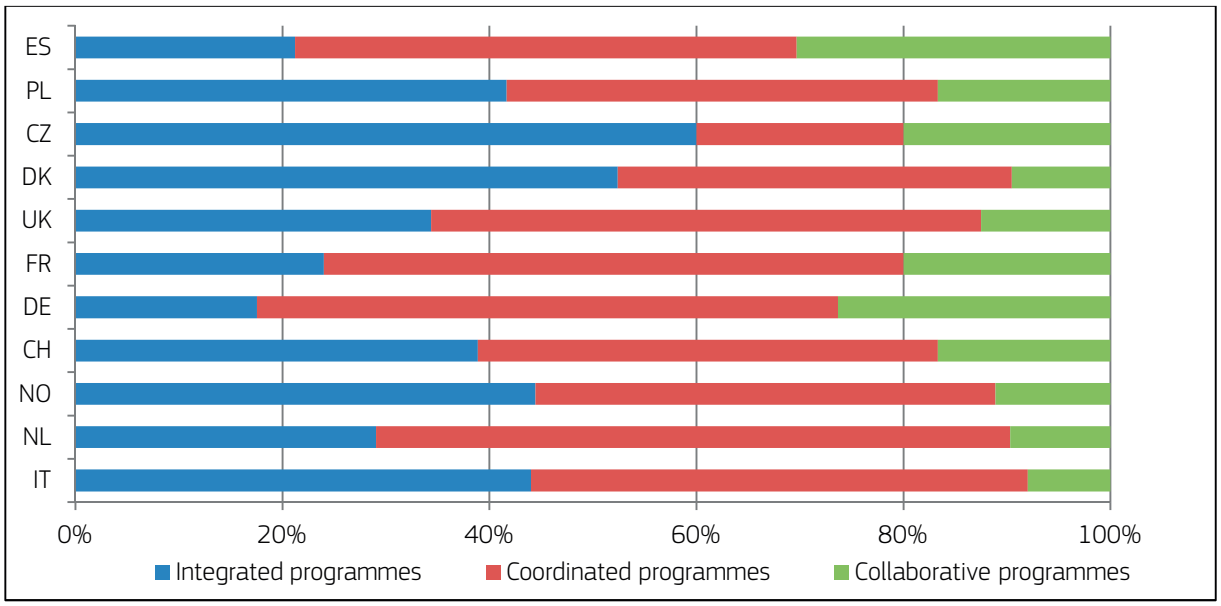


(ESA excluded, N=94, EUR)

4.2.3. Participation of the countries in joint programmes

As to differences among counties for what concerns participation in joint programmes, most of the countries are mainly involved in coordinated programmes. On the contrary, the share of collaborative programmes over the total number of programmes in which countries are involved is relatively low (except for Spain, where collaborative programmes are around 30% of the total programmes). Integrated programmes represent a significant share of the Danish and Czech involvement in joint programmes.

Figure 20. Participation of countries to joint programmes, depending on their type (nb of programmes)



(ESA included, N=95)

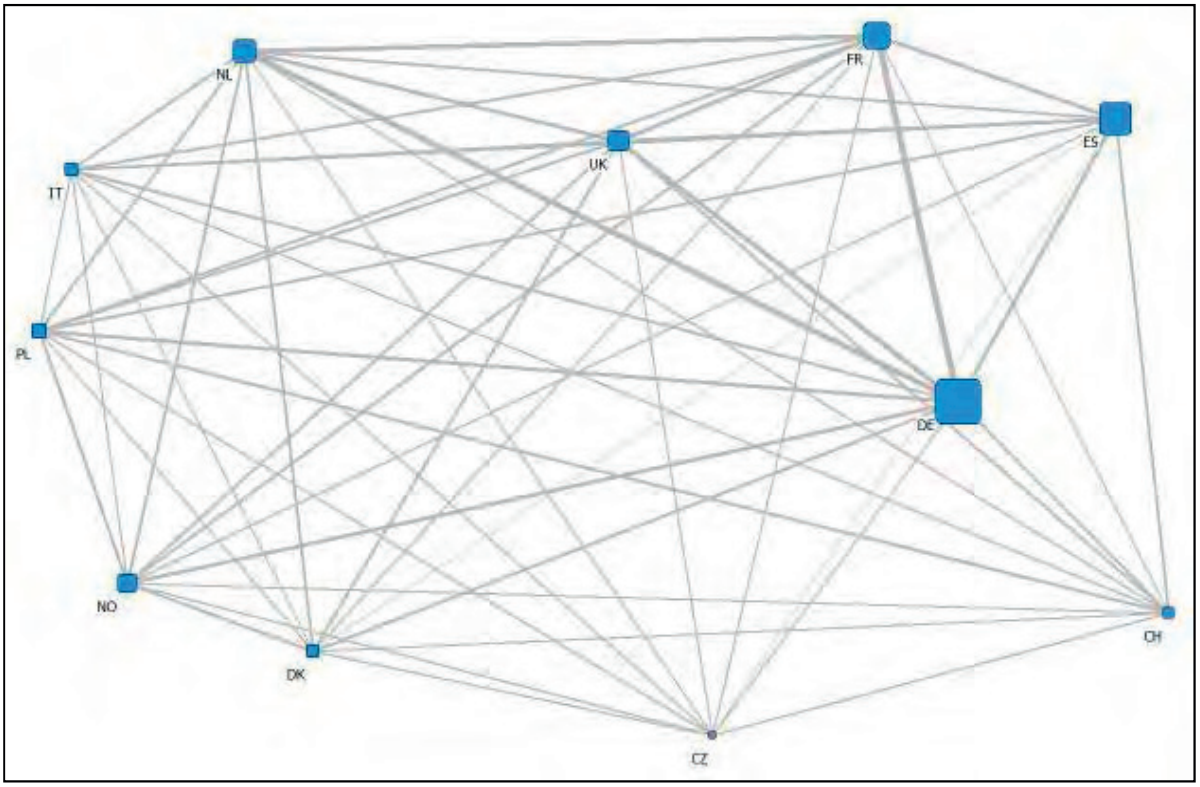
Participation without budget is a rare case for bilateral programmes (3 out of 65 participations); on the contrary, in the case of European initiatives participating without a budget is quite common (25% of the cases), with lower rates for integrated programmes (13%) than for coordinated and collaborative ones (33%).

4.2.4. Collaborations in the same programme

The JOREP data show that not all the countries participate in the same programmes at the same time. Two mechanisms should be distinguished in this respect: as for European initiatives, countries might choose to participate or not depending on the type of initiative and whether it is in line with their national policy goals; common participation in bilateral initiatives can instead be interpreted as an explicit policy decision to cooperate with a specific country.

Accordingly, an analysis of common participation might shed light on special links, alliances, and commonalities in the internationalisation strategies of different European countries.

Figure 21. Common participation to joint programmes



Source: designed with UCINET from JOREP data.
ESA included, N=95

The JOREP mapping exercise shows that European initiatives and bilateral programmes clearly play two different functions in the internationalisation of research systems. The former help build a strong and relatively homogeneous network among ERA countries, integrating the less central countries around a core constituted by Germany, France, the UK, and the Netherlands; the latter link individual ERA countries with the rest of the world, but hardly contribute to fostering European-level bilateral cooperation. In other words, the National States display a common propensity towards participating in European joint initiatives; on the contrary, when designing bilateral initiatives, they are driven by national/regional interests, which consolidate existing networks unrelated to any interest in European integration.

For a more detailed presentation of the JOREP results, refer to JOREP deliverable D9 'Analysis Report'.

4.3. National strategies in the case studies

The case studies provide some more details about the reasons that lead countries to join an integrated, cooperative, and collaborative joint programme, showing the aims and objectives of integration.

4.3.1. National strategies towards integration

According to the interviews collected, programmes with strong EC involvement, like EUROSTARS, are seen as engines of growth, with the declared aim to fund international projects from national sources, and a specific

focus on fast-growing, research-intensive SMEs, which have a high mortality rate. Thus, all the States formally recognise their strategic aim and are willing to participate, and integration is seen as the best way to achieve programme objectives. Nevertheless, the interviews confirm that the motivations and procedures that drive participation in EUROSTARS vary greatly from country to country. Some have mainly political motivations (e.g. the Czech Republic, Denmark); others consider EUROSTARS interesting mainly due to its focus on supporting applied research in SMEs, which represents a national strategic objective (e.g. Spain). The ARTEMIS JTI comes from a previous initiative and has been able to address industrial needs by providing a flexible integrated funding tool, dealing with the long-term research agendas of different European countries and the needs of the interested stakeholders. The combination of these elements allows the countries to join the initiative.

The AAL scheme is an integrated programme in which national strategies and practices do not match those elaborated by the programme, and also the alignment of the national research agenda around the objectives of the programme is questioned, due to the different perceptions the funding agencies have in relation to their own priorities.

On the contrary, the regional TRI emerges as a national political initiative, based on a collaborative policy rationale: strengthening collaborations among Nordic countries on "challenging" and "big" research sectors, like climate change and energy research, improving Nordic added value, and providing training and knowledge exchanges among Nordic countries. The common set of rules supported by well-established cooperation agreements ("By creating a common pot you create a common set of rules") is the result of trust and mutual recognition among national funding agencies, which is grounded in long-term collaborations. The TRI is greatly appreciated and seen as a successful initiative worth participating in, whose benefits are perceived at different levels. Hence, the main positive aspects of the TRI concern its ability to improve networks and to provide a less bureaucratic collaboration instrument. The willingness to extend the agreement to other European countries is combined with the need to accept joining countries whose funding agencies share similar standards as to selection criteria and strategic aims. Thus, integration emerges as a result of national strategies to bring together different but homogeneous countries, which are willing to collaborate to address research challenges in selected strategic fields.

4.3.2. National strategies towards coordination

The strategic aim of the ERANETs (ERASYS BIO and EMDIA) is to support collaborations and work towards a common research agenda and mutual research funding activities. Both programmes concern topics which are relevant for national research. Nevertheless, the EC does not contribute by supplying funds, but it rather facilitates coordination among different partners in different countries. The Joint Secretariat and other boards mostly manage activities related to the programmes at the central level.

National partners are in charge of funding decisions according mainly to national rules, and of managing contracts with funded beneficiaries. The Joint Secretariat and the Executive Board/Steering Committee (SC) deal with the definition and diffusion of the calls, as well as with decisions about their contents and evaluation of proposals. The function of the Secretariat is to coordinate the selection of projects, including independent expert reviewing of proposals. However, national funders have the final say in the selection process. The virtual common pot instrument allows the national agencies to play an active role in several phases of the programmes (i.e. selection of priorities, drafting of the calls, eligibility checks, evaluation, funding decisions). Hence, this is clearly a programme in which the tensions between the global research field and the local research space affect the chances of participation of different countries. In some cases, the interviews underline the lack of strong commitment at the government level because of the lack of some requirements at the local level (a high-standing influential academic community able to mobilise political interest, and technical competences about participation in European-coordinated research programmes).

The bilateral agreement between Germany and the USA on regenerative medicine is based on Germany's long-standing health research tradition. Indeed, bilateral agreements should consolidate already existing collaborations into a more institutionalised framework for common activities. The rationales and strategic aims here are part of the country's long tradition in research activities; the availability of funding confirms that collaboration is seen as a priority and that there is actual commitment by the funding agency.

4.3.3. Joint collaborations

The LAA-Lead Agency Agreement is an example of collaborative programme with delegation of responsibilities. Differently from the TRI, here the funding agencies do not decide to integrate processes and means of actions; rather, they use the form of delegation in order to coordinate their research efforts. The selected agency decides about funding, and the other partner organisations accept to pay their share. The LAA aims to make it easier for researchers to submit trans-national applications and to simplify the evaluation of trans-national projects, presenting them to one of the research funding organisations only (the lead agency, usually the country whose funding amount is highest) but following the usual local procedure. The Lead Agency procedure is thus bottom-up and facilitates collaboration based on mutual trust among EU countries. The long-term goal of the Lead Agency Procedure is to replace "joint calls" with sister organisations and other individual agreements in order to keep applications to international partners as simple as possible.

The Lead Agency Agreement applies to Germany, Switzerland, and Austria, so that is possible to develop both bilateral and trilateral agreements. It is governed by national rules and based on an agreement among national research funding agencies. No supranational structures, such as a secretariat or a joint office, were established to govern the programme. The Agreement is characterised by long-term cooperation among signatory countries already in place, mutual trust, and reliability of funding agencies. The funding agencies do not expect specific benefits from this scheme besides simplification of procedures used by funding schemes for national projects, making bottom-up initiated and larger combined projects possible.

The ORA Programme represents a way for different countries to collaborate in research funding while retaining their national funding rules. The ORA is based on previous collaborations among participating countries (DE, FR, NL, and UK), but the idea is that each country can establish its own new collaboration rules. The funding scheme is evolving, moving towards a different organisational and management model (e.g. the development of a collective, central point for application submissions, a dedicated ORA platform, and a unified evaluation and reporting system). So, new collaboration rules are being developed and considered a requirement for the programme's success. What is interesting here is that this is a good example of the growing role played by funding agencies for what concerns decisions about joint programming. Moreover, it is clear that the specific disciplinary sectors (social sciences) are core elements of the programme.

5. THE DIFFERENT FACETS OF OPENING OF NATIONAL PROGRAMMES

Opening of national research funding programmes – i.e. the opportunity for organisations located abroad to participate in national programmes – is considered a key dimension in the establishment of a European market of knowledge, together with the creation of joint programmes (Commission of the European Communities 2000, Elena Pérez, De Dominicis and Guy 2010). In a policy context in which most of the R&D funding is channelled through national programmes, the participation of foreign partners is important in order to promote international research collaboration and increase the quality of European research thanks to the integration of competences and stronger competition – beyond the limitations of closed national research spaces.
Despite this political relevance, there is a lack of systematic information on patterns of opening of national research funding programmes, as the few available studies mostly rely on case studies and anedoctal evidence (Optimat Ltd and VDI/VDE/IT 2005, Elena Pérez, De Dominicis and Guy 2010). These studies suggest that opening is a complex and multidimensional phenomenon and that the different modes of opening – from initiating international collaborations on the one hand to full funding of research abroad on the other hand – should be carefully distinguished (European Commission 2011). Moreover, the studies underline the fact that policy motivations and strategies for opening are influenced by different rationales, by the characteristics of the national research systems, and by national legal frameworks. Accordingly, both a more differentiated analysis and careful consideration of national policy motivations and contexts are required in order to understand this phenomenon.

In this context, the JOREP project has pursued three main aims: 1. providing a framework to identify different dimensions of opening, as well as developing an empirical instrument to systematically analyse these dimensions in national programmes; 2. collecting empirical evidence on levels of opening, as well as on differences among countries in this respect; 3. analysing the motivations of national actors and understanding to which extent they help explain the observed patterns of opening and identify major barriers to opening at the national level.

Box. Highlights on Opening of national research programmes

Opening of national research programmes is a complex and multidimensional phenomenon, which includes different dimensions: the portability of grants when moving abroad, opportunities for international collaboration (with complementary funding), participation of foreign partners in research activities. International collaboration is encouraged in many national programmes, whereas research funding to partners abroad is possible only under specific circumstances which are beneficial to the national research system (like acquiring specific competences) or pursue foreign policy goals (like development aid or cooperation with other countries).

Bilateral joint programmes are the favourite method to open national programmes to partners abroad. They take two main forms: bilateral international cooperation lines alongside national programmes and lead agency agreements among funding agencies.

The characteristics of national research systems and of individual programmes influence their level of opening. For example, portability is limited in France, as projects are attributed to research organisations rather than to individuals. Science-oriented programmes tend to be more open than economy-driven programmes. National policy goals and the needs of the national research communities are more important drivers of opening than European policies and lead to nation-specific patterns, as well as to great differences among countries.

5.1. Opening and open programmes: a framework for the analysis

Broadly speaking, “opening” refers to the fact that actors not belonging to the national research space can participate in research funding programmes.

Previous studies highlighted that opening is a multidimensional phenomenon and that, depending on the dimension considered, different patterns emerge (Elena Pérez, De Dominicis and Guy 2010). The aim of this section is to highlight some basic distinctions in this respect.

a) Nationality and territoriality. First, a distinction is made between opportunities for participation in research funding programmes given to individuals of nationality different from that of the country (nationality) and to research organisations located abroad (territoriality).
Participation by foreign researchers can take on two forms: first, they might be hired by national research organisations and be eligible to apply for national programmes. This form of opening is more related to the internationalisation of research and higher education institutions, since eligibility requirements are usually related to employment and not to nationality. Second, foreign researchers might be eligible to apply for grant schemes on condition that they are then hosted by a national research organisation during their research period. This dimension of opening of grant schemes (focusing on individuals rather than on organisations) is fundamental in order to attract talented researchers. There is some evidence that this is an emerging trend in national research policies, as shown, for example, by the Italian Montalcini programme or the Swiss Ambizione programme.

As JOREP deals with research programmes rather than personnel grants, we will not investigate this dimension of opening further. We will focus, instead, on the notion of "opening" referring to the fact that participants in a research project are employed by a research organisation located outside the country(ies) providing funding for that programme. This definition refers to the place of employment and not to the location where the research is carried out, as there might be instances of researchers doing field research abroad because of their specific research topic.

b) Modes of participation. Second, there are various possible modes of participation in national research programmes by foreign organisations. The observed patterns of opening are likely to depend on the modes considered. Based on previous studies and on the results of JOREP, the following broad categorisation is proposed, identifying increasing levels of opening:

International cooperation. In this mode, national participants cooperate with partners abroad within the framework of their project, for example through regular exchanges of information and results. The partners abroad usually have their own project and national funding in the same area. They do not take on a formal role and responsibility for the national project – they are not expected to produce deliverables or reports. However, funding might be provided for exchanges, visits, or the organisation of workshops.

Participation with no research funding. In this mode, partners abroad are eligible to take on a formal role and specific duties within a project. They cannot receive funding for research activities, but this is usually possible for meetings and travel expenses. Their legal status is likely to depend on national regulations – in most cases, they are expected to be official project partners (for example co-applicants), but other statuses might be possible, such as subcontractors. The main criterion is the fact that they take on some responsibility in relation to project activities and results.

Participation with research funding. In this mode, partners abroad take on a formal role in the project, and are also eligible to receive research funding, usually meaning that they can be hired as project research staff.

We notice that pure subcontracting to purchase specific services – like laboratory analyses – is not considered a form of opening, as it is not related to research cooperation, but rather to considerations regarding price and/or practical issues (like performing analyses in the place where the materials are collected).

c) Time dimension of opening and portability. Third, opening might refer to different stages during the life-cycle of research projects. Most analyses refer to the stages of proposal submission and funding decision for two main reasons: first, the basic organisational setting of the projects is defined at this stage and, second, information is easier to retrieve, since funding agencies usually add specific conditions for partners abroad in the call for proposals. However, it is also relevant to look at opening during the execution of the project, i.e. at the chances offered to foreign partners to participate at later stages.

The most important issue in this respect is whether a project can be moved abroad when a key project participant – for example the principal investigator – moves to a research organisation abroad while being involved in said project. In this case, formal responsibility is transferred abroad and funding and (some of the) research staff moves abroad or new people are hired. This is what we call portability of the grant. There are two reasons why portability is an important issue: first, if the success of a project is related to key competences possessed by certain individuals and if project grants do not follow said individuals, results of

lower quality are likely to be produced; second, lack of portability might be an obstacle to international mobility of researchers and reduce their output after mobility, as they need some time to access research funding in the recipient country.

5.2. The rare phenomenon of open programmes

In its early stage, JOREP's approach to open programmes was based on a restrictive definition of open programmes, i.e. publicly funded research programmes in which research organisations not located in the countries providing resources for the programmes are eligible to participate as official project partners, perform specific research tasks, and receive funding for research purposes (in practice, meaning that the staff of these organisations can be funded). This restrictive definition thus excludes programmes in which foreign partners can participate but receive no funding or complementary funding (for example for travelling and workshops).

For a general discussion of the methodology, refer to JOREP deliverable D3 'Study methodology' and deliverable D9 'Analysis Report' (methodology for opening of national programmes)

For a more detailed presentation of the results, refer to JOREP deliverable D9 'Analysis Report'.

On this basis, data have been collected in the eleven JOREP countries for the programmes matching this definition. The information collected includes a set of programme descriptors largely identical to those used for joint programmes, as well as some specific descriptors for open programmes:

- The year in which the programme was opened.
- The countries for which participation is possible.
- The eligible status of partners abroad (coordinator; co-applicant; sub-contractor).
- The conditions for funding (not possible, with a ceiling, with no conditions).
- An estimate of the share of projects with partners abroad.
- The amount of funding transferred to partners abroad.
- All data refer to 2009, the JOREP baseline year.

5.2.1. Results

TABLE 6 lists the seven programmes which have been identified as open by the JOREP national experts on the basis of the above definition. It summarises the main information collected. We notice that the correct identification of the perimeter was highly problematic. Indeed, there are some cases of national programmes in which funding to partners abroad is formally possible, but national experts stated that in practice this hardly ever happens. Some of them are included in the list (like the two UK programmes), whereas others are not, like the Danish research programmes, which are all formally open to foreign partners.

Table 6. Data on the 7 programmes identified as "open programmes" in the JOREP data collection

Name of the programme	Country	Starting year	Year of opening	Total funding (mio. €)	% of funding abroad	NABS	Scientific quality score
Basic grants	CZ	1991	2004	52	1%	13 General advancement of knowledge	4
Programmes for Interuniversity cooperation and Scientific Research (PCI)	ES	2003	2003	22	50%	All categories	3
Sinergia	CH	2008	2008	33	5%	13 General advancement of knowledge	4
Cooperation programme with Eastern Europe (SCOPES)	CH	2005	2005	7	30%	All categories	3
Cooperation programme with developing countries	CH	2005	2005	0.2	30%	All categories	3
International Co-Investigators Programme (ESRC)	UK	2009	2009	NA	0%	13 General advancement of knowledge	4
International Co-Investigators Programme (MRC)	UK	2009	2009	NA	0%	13 General advancement of knowledge	4

(*) The budget is probably much higher but we do not have the figure at this stage.
(**) This is an estimate. There is no research funding provided abroad but only for travelling.

Despite the small number of programmes, some interesting patterns emerge. Two groups of programmes can be identified: investigator-driven programmes focusing on the advancement of knowledge, and programmes dedicated to cooperation with specific groups of countries (developing countries or Eastern European countries).

The first group (four programmes) is generally open to all countries worldwide (with the exception of the Czech programme open only to ERA countries) and displays low shares of projects with foreign participants receiving funding; funding abroad is subject to some restrictions – such as the fact that no similar competences exist in the country (Sinergia). These programmes are all managed by national research councils and are science oriented. It should be underlined that, for these programmes, estimating the portion of projects with foreign partners (and the corresponding level of funding) proved to be quite problematic and the percentages indicated are, at best, educated guesses. The Swiss Sinergia programme has a specific position in this group, as it does not fund individual projects, but rather small research networks including three to four distinct organisations. Opening implies that a research group abroad can be included as full partner if it has specific competences beneficial to the whole network (and, accordingly, to the Swiss research landscape). Given its characteristics and the rather high level of opening, this programme is more thoroughly investigated through interviews (see the section on policy perspectives below).

The second group seeks to establish cooperation with specific groups of countries and the projects supported are in fact quite similar to joint bilateral cooperation projects – projects must include partners in foreign countries and, accordingly, the share of funding abroad is rather high. These open programmes follow a foreign policy rationale aimed at supporting research in less developed countries – hence the choice of providing national funding rather than establishing bilateral programmes. The research agenda of these programmes is also driven by the specific research and social needs of the target countries – so that scientific relevance has limited prominence.

Finally, all these programmes are open to the public sector (including higher education), but only one is open to private companies (the Spanish cooperation programme). It can be concluded that supporting companies abroad seems to be more problematic than supporting public research organisations abroad.

5.2.2. Comments and methodological remarks

Despite its limitations, data collection on open programmes (in their very restricted sense) leads to a number of relevant methodological conclusions.

At the methodological level, the attempt to adopt a clear-cut definition of open programmes (using the same approach adopted for joint programmes) proved to be highly problematic and, to some extent, led to misleading results. Moreover, the focus on levels of funding abroad is contestable from a national research policy perspective: the opportunity to have partners abroad in the largest national funding schemes – even though without funding or with limited funding to a minority of projects – might well have a deeper impact on research than the establishment of smaller open programmes in which most of the projects have partners abroad. Also in terms of data collection this definition proved to be difficult to adopt since, besides the very few programmes with regular foreign participation, all kinds of different situations are found – formally open programmes in which partners abroad are an exception, programmes without explicit rules but in which there are projects with partners abroad, etc. This leads national experts to operationalise the definition in different ways – UK funding schemes were included, while the Danish programmes were not – with potential consequences on the comparability of results.

In practical terms, these results hint at the emergence of two different patterns of opening. The first regards the large science-oriented programmes, which are the largest national programmes in most European countries: opening of these programmes provides additional opportunities for national performers – for example, to further an established collaboration or if a foreign partner has specific research competences. The second pattern concerns programmes explicitly aimed at international cooperation with less developed countries, related to national foreign policy and development aid strategies. These often represent an alternative to bilateral collaboration programmes when the target countries do not have sufficient financial means; accordingly, including a foreign partner is usually a formal eligibility requirement. These programmes are smaller in size, more focused on policy relevance and display a substantial share of funding abroad.

5.3. National specificities in opening of national programmes

Based on these insights, JOREP has implemented a pilot trying to characterise the opening of national programmes by focusing on the larger national programmes, which constitute the bulk of national project funding. The underlying rationale of this approach is that, while open programmes stricto sensu are a rather marginal phenomenon in the European funding landscape, national programmes are characterised by varying degrees of opening and there are wide variations among countries in this respect. Furthermore, we assume that opening is not oriented towards providing research funding abroad, but other dimensions are relevant for the development of international collaboration in research, like portability of grants, funds for networking, etc. For practical reasons, the pilot is limited to three countries (France, Italy, and Switzerland) and its purpose is to provide indications on the applicability of the methodology.

5.3.1. Perimeter and methodology

The perimeter for the analysis of opening of national programmes includes all large national research funding programmes. The criteria for inclusion are based on the financial volume of the programmes (e.g. up to a threshold) as well as on their importance within the national funding landscape. National experts are responsible for the final decision on inclusion. When data on the total volume of national project funding are available (for example from the OECD/NESTI project), these can be used to assess coverage. In the pilot, slightly different choices have been made concerning the perimeter (TABLE 7). In Switzerland, the main instruments for project funding at the national level are covered, corresponding to ¾ of total national project funding. Even though complete data on project funding are not available, the same can be said for Italy, since the large instruments of the Ministry of Research are included.

As for France, the pilot is limited to the Agence Nationale de la Recherche (ANR). Programme selection was slightly more difficult as the ANR has many different programmes and some of them are in fact joint programmes with other countries (like the Blanc International programme). This large number of programmes reflects the organisation of the ANR, with separate thematic programmes by topic (rather than a single programme divided into sub-areas but with common rules).

Table 7. Perimeter for the pilot on opening

	France	Italy	Switzerland
Programmes included	Thematic programmes by the Agence Nationale de la Recherche (39 thematic programmes by field).	FAR (Fund for the promotion of Research) FIRB (Basic Research Investment Fund) FIRB (Futuro nella Ricerca) FIT (Fund for Technological Innovation) Programme for the diffusion of scientific culture (Law 6/ 2000) Funding of "Programme agreements". PNRA-National Programme of Research in Antarctica National Space Plan	Swiss National Science Foundation: Research projects. National research programmes. National competence centres in research. Sinergia. Swiss Innovation Agency: cooperation projects with the industry.
Involved agencies	Agence Nationale de la Recherche (ANR)	Ministry of Research (MIUR); Ministry of Economy. Italian Space Agency	Swiss National Science Foundation; Swiss Innovation Agency.
Total budget 2009	392 mio. Euros	137 mio. Euros	426 mio. euros
Share of national project funding	N.A.	N.A. but the largest instruments are covered.	76% (OECD NESTI)

For each programme, a set of descriptors is produced in order to characterise patterns of opening by types of programmes. These are identical to those used for joint programmes and follow the same definitions (see chapter 3 in this report). A specific set of descriptors is then developed to characterise different dimensions of opening.

Descriptors concerning the formal and legal level of opening. They include portability of grants, the possibility that foreign research organisations might be official project partners (and/or project coordinators), and the possibility that foreign research organisations might receive funding for research activities. We also focus on whether complementary funding is available to support international cooperation.

Descriptors on language barriers and information. These descriptors regard the use of English versus national languages in relation to the visibility of information concerning foreign participation opportunities. More specifically, we focus on three features: if the calls for proposals are in English, if proposals can be submitted in English and, finally, to which extent information on foreign participation is available (for example in call texts and on websites).

Data on actual level of opening. These data are important to assess the actual level of opening, as formal opening does not always translate into a significant share of projects with foreign participation. This information also helps to better understand the significance of opening – e.g. real opening to competition vs. selective opening in specific cases (e.g. when competences are not available at the national level). Two indicators are devised for this purpose: share of projects with official participants abroad and share of projects with participants abroad receiving research funding.

5.3.2. Results

Our results show that France, Italy, and Switzerland display very different attitudes in relation to each of these characteristics.

Portability of grants. There are major differences concerning the portability of grants, mainly due to differences in the organisation of national funding systems, as well as different cultures and missions of the funding agencies. In France, grants are given to research organisations rather than to individuals and thus are not portable by definition, while in Italy portability does not seem to be a relevant issue for national project funding. On the contrary, in Switzerland, research council grants (Swiss National Science Foundation) are

mostly allocated to individual researchers, thus they are generally portable at both the national and international level (on condition that the project has already started). This is not the case for collaboration projects with the industry supported by the Swiss Innovation Agency, as its mission is strictly related to the promotion of the national economic space in Switzerland. A second set of differences concerns the goals and the types of programmes considered: investigator-driven projects tend to be linked to the individual competences of the principal investigator (thus, there is a strong rationale for them being portable), whereas applied research and networks are more related to their (national) context of usage or to specific research organisations (thus, they tend not to be portable).

Participation of foreign researchers. TABLE 8 illustrates participation opportunities. International collaborations – without direct involvement of a foreign organisation in the research work - are possible for the three countries investigated in most national programmes and funding can be provided for travelling abroad or for inviting foreign experts. In the French programmes, research organisations from other countries can have an official status and thus be recognised as full research partners although, in most of the cases, foreign partners have to bear their own costs (37 out of 39 programmes surveyed). Nonetheless, in principle, in all programmes they can be entitled of project coordination. As a matter of fact, some ANR programmes have a separate funding line for joint activities with other countries (based on bilateral agreements).

On the contrary, there are very few cases of programmes in which it is possible to fund research abroad and this is essentially limited to Switzerland, the only other example being the Italian FIRB programme. Interestingly, in the Swiss case there is a clear tendency towards conditional opening of the other large programmes managed by the Swiss National Science Foundation. Remarkably, opening is limited in most cases to countries with which cooperation agreements have been signed – the Lead Agency Agreement with Germany, Austria, and Luxembourg includes both a provision for opening (money follows cooperation line, when the foreign partner has a limited budget) and a provision for joint programmes (lead agency model). Most of these provisions have been introduced in the last 2-3 years.

Table 8 . Conditions of participation of foreign researchers (n. of programmes)

	Coordinator abroad			Partner abroad			Research funding			Cooperation funding		
	No	Cond.	yes	No	Cond.	yes	No	Cond.	yes	No	Cond.	yes
CH	5	0	0	1	3	1	1	3	1	1	0	4
FR	0	0	39	0	37	2	39	0	0	0	0	39
IT	5	2	1	3	0	5	7	0	1	1	0	7

Language barriers and information. The pilot indicates that there are major differences among the three countries in relation to the use of their national language and the level of available information on international participation.

In Switzerland, all the information is available in English and proposals can be submitted in English for all programmes. This is due to the very high level of internationalisation of Swiss research and the widespread practice of international refereeing. Moreover, great efforts have been made to increase transparency concerning the conditions for foreign participants and to achieve better formalisation of the rules: the SNF website includes a specific section clearly explaining the various opportunities for international collaborations and also presents available opportunities within national programmes.

On the contrary, in Italy the use of the national language both in the calls and in the proposal is widespread, and there is very limited information on participation opportunities for foreign partners. The French case displays a higher level of information provided, as opportunities for foreign participation are clearly specified in the calls, but the calls are in French. However, the ANR has tried to achieve greater transparency in the last 2-3 years: potential foreign participants can read an abstract of most of the calls in English, in the English section of the ANR website. In the French case, the use of English in the proposals is not related to the internationalisation of the projects themselves, but rather to the internationalisation of the reviewing process.

5.3.3. Actual level of opening

In methodological terms, measuring the levels of participation clearly represents the most problematic area for data collection. Differently from the case of programmes officially labelled as forms of international cooperation, for national funding schemes there are no official statistics on the frequency of foreign participation. Hence, the only solution is to analyse anecdotal information or to go through lists of projects case by case.

TABLE 9 shows that, even in programmes for which partners abroad are allowed, there are usually very few projects involving foreign participation – with the exception of some very small programmes.

Table 9. Foreign participation to national programmes

	Number of programmes						
Share of projects with foreign participants in national programmes	0%	<1%	<5%	<10%	<20%	>20%	NA
CH	2	2	0	0	0	1	
FR	17	0	3	7	2	4	6
IT	0	0	0	0	1	0	7
Total	19	2	3	7	3	5	13
Programme budget	Programmes budget						
CH	118	275				32	
FR	175		42	70	16	20	68
IT					4		132
Total	294	275	42	70	21	52	200

Number of programmes by % of project with foreign partners and total budget of the programmes in each category (mio. Euros)

Overall, these data indicate that when opening is an optional choice and not an integral part of programme design, only a few projects take advantage of this opportunity. This outcome is not surprising for two reasons: first, the main goal of these programmes is to support national research – thus, a large share of participants from abroad cannot be expected – and, as for applicants, these programmes entail higher coordination costs – either because there are limitations or because foreign participants need to find their own resources. Thus, logically, foreign participants are involved only when they provide added value in comparison to national participants.

When international cooperation requires funding research in different countries, national funding agencies prefer to establish joint programmes – in the cases of the ANR and SNF bilateral agreements extend national programmes to international collaboration.

5.3.4. Comments and methodological remarks

From a methodological point of view, the results of the pilot are rather encouraging. They indicate that analysing the opening of (large) national programmes is a more effective approach than characterising open programmes and that no problems concerning principles have been identified with the proposed methodology, which could thus be extended to a broader set of programmes and countries with a reasonable effort. Hence, we strongly recommend adopting this approach in further studies, rather than focusing on programmes supporting research abroad directly.

The results also show that the opening of national programmes is more widespread than expected. In practice, the phenomenon mainly occurs not by providing funding to partners abroad but rather by softening the rules for national programmes in order to make international collaboration possible (with varying degrees of engagement). This is in line with findings concerning joint programmes: national states are willing to internationalise their funding policies as long as this allows them to strengthen their national research, and they are not generally willing to transfer resources abroad.

The pilot reveals that the degree of opening of national programmes depends on the countries and types of programmes considered. For what concerns the countries, their levels of opening are strongly linked to the levels of internationalisation of their national research systems – with Switzerland being more international than France and Italy, as can be inferred from the varying shares of international academic staff in these countries. Hence, internationalisation of research systems is a driving force of opening, as researchers will have more international ties and reasons for cross-border cooperation in their projects. Concerning the types of programmes, as expected, science-oriented programmes tend to be more open than programmes focusing on national needs, related to either national economy or policies. Of course, given the small size of the sample, these results should be considered provisional and need to be tested against a larger sample.

5.3.5. A policy perspective: motivations and barriers

In parallel with the quantitative analysis, interviews were carried out with key operators in charge of open programmes and international strategy. As for open programmes, the Swiss Sinergia scheme was considered. The pilot analysis on the opening of national programmes involved looking at official documents (e.g. calls for proposals and annual planning) for Italy and Switzerland. In the case of France, interviews with Agence Nationale de la Recherche staff were also conducted. These sources provide additional insights into motivations and barriers to open programmes and the opening of national programmes.

Most of the Italian programmes analysed, especially the PNRA, are open to foreign collaboration to enhance the quality of projects by accessing complementary assets and knowledge not available nationally. The same is true for the Swiss Sinergia programme, which also aims at filling network gaps in the Swiss project funding system by acting as the main instrument to fund bottom-up projects presented by research networks instead of individual projects. However, in practice, the involvement of foreign organisations is not always the rule for Swiss groups and funding abroad seems to be rather rare because of national regulations and limited political acceptability.

Opening can also represent a strategic option to be exploited by national applicants according to their project needs and aims. An example of this is the Italian Programme for the diffusion of scientific culture (funding of "Programme agreements"). Differently from what happens with bilateral agreements, then, opening represents an opportunity for improving project quality or strengthening networking among similar institutions when the cognitive needs and aims of international collaborations are not identified ex-ante by the programme.

For what concerns the ANR security programme between France and Germany (Concepts, Systems and Tools for Global Security - CSOSG), strategic and cognitive motivations emerge to be relevant, but they are twofold. The cognitive motivations of both countries are mentioned in most of the calls and documents related to this programme. However, in practice, the programme mainly aims at boosting the strategic supremacy of the "French-German couple" in the security domain in Europe, giving access to knowledge and skills that are not available nationally, while protecting national leadership on strategic issues.

The same motivations emerge in relation to topics such as Sustainable Energy, the IT sector and Engineering. The ANR annual programming addressing these issues is technology-oriented and very strategic at the economic level. It aims at boosting national skills first, using foreign competences when available. Moreover, the opening of national programmes is reported, in some cases, to be less complicated and time-consuming than undertaking joint initiatives or signing bilateral agreements, which require a formal engagement by national and foreign institutions, often at the government level.

Hence, the analysis shows that most Italian and French national programmes of large size, which represent the bulk of national project funding, display a certain degree of opening. The motivations driving the opening of national programmes are mainly cognitive, since the opening of national programmes gives access to knowledge and skills that are not available nationally, and/or strategic, since opening serves national economic interests. In some cases, the procedural aspects also seem to be very important. Furthermore, opening might represent a valid alternative to keeping a programme national or to establishing joint initiatives

and bilateral agreements, but the choice mostly depends on the types and aims of collaborations and the fields of research to be opened to international collaboration.

The information emerging from the documents and interviews also sheds light on the main barriers to the opening of national programmes to foreign participation and the launch of joint programmes. These could be summarised as follows:

- national policies for science and innovation primarily based upon improving national scientific and technological capacity in order to address national priorities;
- the volume of high-quality proposals received from national applicants is more than sufficient to satisfy national needs;
- national programmes lack explicit criteria encouraging transnational activities;
- the legal frameworks within which research programmes operate explicitly forbid the transfer of funds to non-residents;
- lack of reciprocity in collaborations among countries which limits the opportunities for the establishment of collaboration agreements;
- funding flows abroad not politically acceptable.

Summing up, motivations for open programmes and for the opening of national R&D programmes are highly differentiated and context-related, since they depend on the national context in which opening takes place and on the field of research in question. As for the national context, more or less internationalised research systems, the degree of flexibility of national legal frameworks, weak or strong R&D capabilities, and relations with more or less developed countries might be seen as facilitators or obstacles to the opening of national programmes. Regarding field specificities, some research topics are more internationalised than others or need additional equipment, and these factors influence the degree of openness of national programmes as well as the chances and willingness to launch open ones.

Hence, opening is an approach that can be adopted to improve knowledge on strategic issues which cannot be fully addressed by relying on national resources. Yet, differently from joint programmes, opening does not usually require any funding commitment by national authorities. Moreover, opening can represent a strategic choice preferable to undertaking joint activities when national supremacy in strategic domains must be preserved.

6. THE IMPACT OF THE PROGRAMMES

Investigating the impact of the programmes refers to how the opportunities intended and provided by joint and open programmes are perceived by participants before the research begins (and what motivates them to apply), how these opportunities are actually implemented, and what new activities are carried out thanks to them. A web-based survey of programme beneficiaries was devised to gather data on the above aspects (see chapter 2).
The survey was developed in order to collect evidence on three issues related to the impact of joint and open programmes:

- Modifications to any of the objectives that can be at least partially attributed to specific joint or open programmes (or to the existence of such programmes in general).
- Beneficiaries' perceptions of the opportunities offered by joint or open programmes.
- Ways in which the opportunities have been mobilised by the beneficiaries.

Respondents were selected by using a staged procedure. Some of the joint and open programmes are rather large, which brings to the fore the need to ensure coverage without having to involve a very large number of respondents (which is in any case unnecessary). Thus, in the case of the smaller programmes, it was possible to approach all the beneficiaries within a specific time span. In the case of the larger programmes, we considered only a sample of projects and approached all the participants in the projects within our sample.

Box. Highlights on Impact of joint programmes

The analysis of motivations and impact of joint and open programmes allows investigating what motivations trigger applications to joint and open programmes and what opportunities (expected or not) are mobilised in the perception of the beneficiaries. It should be noted that the generative mechanisms of impact require further investigation. The analysis highlights different motivations triggering participation, depending on programme typologies (for instance, funding and implementation of cross-boundary activities for integrated programmes and coordinated programmes, and the chance to include a more international network of partners for collaborative and open programmes).

Generally, funding is not the main motivation to apply, nor is the chance to carry out high-risk activities and improve industry-academic collaborations. The same holds true for the opportunity to develop or access new specialised equipment. Also, the fairer and more transparent assessment of proposals emerges as a weak motivation, confirming that the participants have limited confidence and interest in evaluation procedures. Differently, cross-boundary and cross-disciplinary collaborations appear to be important motivations for participation, as well as the opportunity to enter or to extend international networks of partners.

As for impact, cross-boundary opportunities and industry-academic collaborations are actually perceived and mobilised for almost all typologies of programmes, differently from the opportunity to undertake high-risk activities, which is generally neither perceived nor mobilised. For what concerns coordinated programmes, their impact appears to be non-homogeneous across the various funding schemes, showing that different logics are at play under the wide umbrella of coordination. The same holds true for collaborative programmes, showing that these are mainly evolving schemes.

The only open programme investigated clearly shows that trans-national and cross-boundary opportunities are main expectations realised by the scheme or represent an additional and unexpected effect.

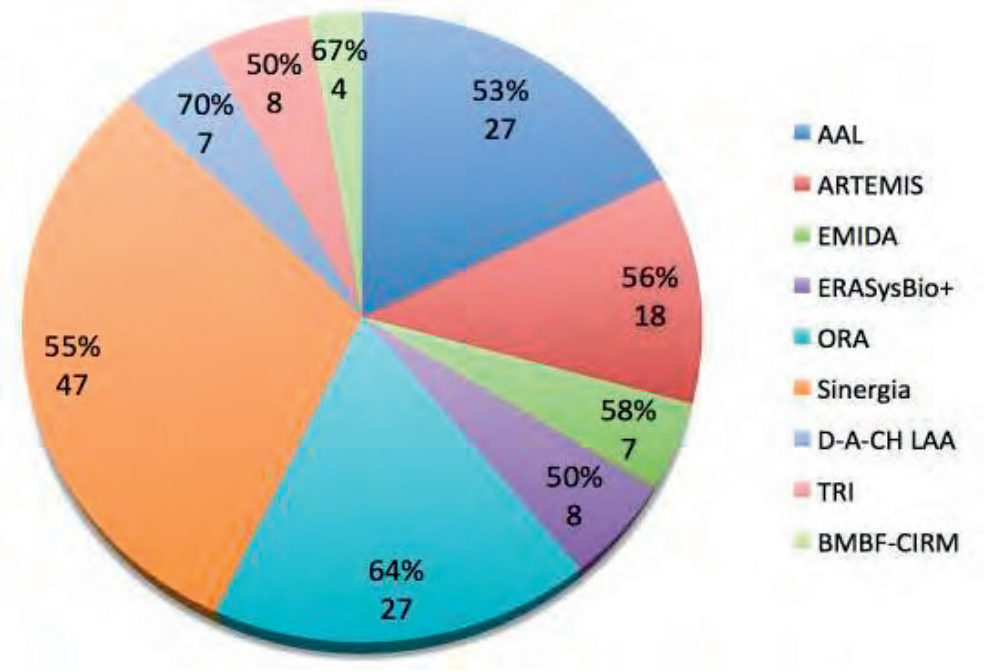
EUROSTARS beneficiaries were excluded from the survey, because an officially endorsed EUREKA committee, called the Impact Assessment Working Group (IA WG), carried out an impact assessment study in 2011. In 2012, the Impact Assessment WG was asked to deliver the first impact report on the EUROSTARS programme (EUROSTARS, 2012), which also includes the results of a survey on beneficiaries. Then, it was agreed with the Commission to use those results for the purpose of motivations and impact analysis.

6.1. Response rate and general results

The overall response rate to the survey was 56.7%, or 153 individual beneficiary responses out of an original sample of 270 people. The sample was well balanced both in terms of countries covered and types of programmes. The population only includes those that have been funded by the programmes; no information was collected on applicants not selected for funding.

A breakdown of the responses collected is shown in FIGURE 22 below.

Figure 22. Beneficiary Survey response numbers and percentage response rates by programme



Grouped by programme types, the number of responses was as follows:

Table 10. Number of responses by programme type (overall)

Programme type (overall)	Responses	Percentage
Integrated (AAL, ARTEMIS, TRI)	53	34.6%
Coordinated (BMBF-CIRM, EMIDA, ERASysBio+)	19	12.4%
Collaborative (D-A-CH LAA, ORA)	34	22.2%
Open (Sinergia)	47	30.7%
TOTAL	153	100%

Cross tabulation of the survey questions allowed retrieving information about three main sets of issues:

- Information on participants and their involvement in the programmes;
- Information on the motivations driving participation and impact expected and realised;
- Information on new experiences deriving from the programmes provided as free text responses to an open question.

General data concerning the points in the above list are presented in JOREP deliverable D9 'Analysis Report'.

The frequency of responses provides some general information about the participants and their involvement in the programmes. A few items can be highlighted.

First, besides the importance of official European websites/newsletters as means used by the beneficiaries to find out about the programmes, also word-of-mouth information plays an important role for all the programmes analysed. As to the sectors and fields, industry respondents were mainly beneficiaries of the AAL, ARTEMIS (both integrated programmes) or EMIDA programmes. Empirical data on these programmes are discussed jointly with the EUROSTARS Impact Report (Eurostars, 2012). Respondents mainly belonged to the Health, ICT, and Social sciences and Humanities fields. "Other fields" refers to various disciplinary areas.

In general, the data show that funding is rarely the main motivation driving application to programmes; indeed, the two questions concerning funding volume and funding duration received a majority of negative responses. The same holds true for the opportunities to carry out high-risk activities and improve academic-industry collaborations. Not surprisingly, the chance to develop or access new specialised equipment emerges as a main driver for applying. The fairer and more transparent assessment of proposals seems a weak motivation, which shows the limited importance attributed by participants to project evaluation procedures. Conversely, cross-boundary and cross-disciplinary collaborations are considered important motivations for participation, an aspect confirmed by the relevance attributed to including more international networks of partners.

After having received the funding and having participated in the programmes, the beneficiaries gave very positive answers to questions regarding funding issues. The release of funding is considered very quick by the majority of respondents, and its amount and duration sufficient to meet research objectives. Participation and funding allowed the beneficiaries to become involved in risk-taking activities, although to a limited extent, as expected before applying. The chances to start industry-academic collaborations and to move into new research fields were mentioned by very few respondents.

Expectations about the opportunity to carry out cross-boundary activities were fully met and very positive results also emerge in relation to increasing research team size and training new PhDs and researchers. In this respect, it could be argued that programme participation stimulated the creation of new knowledge and improved the research activities of most of participants. The majority of respondents consider bureaucracy acceptable (83.4%); this confirms that expectations about less bureaucratic procedures for applying and managing the projects were fully met.

The survey cross-tabulation also concerns expected/realised opportunities, in order to detect the degree of coherence between expectations at the beginning of the project and actual results achieved. Trade-offs between expectations and opportunities realised can be attributed to the bad channelling of information about the programmes (opportunities provided), or to misunderstandings on the part of the beneficiaries, or to distorted effects that, although expected, cannot be avoided (collateral effects), or to unexpected and unintended events.

Overall, the most common configurations were:

- Greater risk-taking opportunities were not perceived as a reason to apply beforehand and high-risk activities were not mobilised afterwards (45% No/No answers to these two questions);

- Comparatively greater opportunities to perform trans-national/cross-disciplinary activities were perceived as a reason to apply and were later actually mobilised (71% Yes/Yes answers to these two questions);

- No perception of greater industry-academic collaboration opportunities from the programme, and no actual realisation of this aspect (60% No/No);

- No perception of less complicated/bureaucratic research proposal preparation and submission, followed by actually acceptable levels of bureaucracy, e.g. for accountability and reporting (45% No/Yes). Some respondents indicated they expected comparatively less bureaucracy and also found post-financing bureaucracy levels acceptable (40% Yes/Yes).

6.2. The opportunities perceived and mobilised

Perceived and mobilised opportunities shed light on how well the beneficiaries understand the signals provided by the programmes through their funding rules, management procedures, and eligibility criteria. Said signals give a perception of how new and how special a programme might be, what objectives it pursues, what advantages it might provide, and what results are intended or unintended. These perceptions can then be realised during the research activity, generating expected and unexpected results.

6.2.1. Perceived opportunities before the programme

Looking at perceived opportunities before the programmes started (see TABLE 11), it can be seen that, compared to the other typologies of programmes, integrated programmes were supposed to offer their participants the following advantages: longer duration of funding (although this was a weak motivation overall) and the opportunity to implement cross-boundary activities (trans-national/cross-disciplinary), to start industry-academic collaboration, to acquire/develop specialised research equipment, and to disseminate their results (although this advantage was weak overall).

The beneficiaries of coordinated programmes were motivated to apply because they expected to: receive more money, be able to include a more international network of partners, profit from a fairer/more transparent application process, pursue higher-risk research, initiate cross-boundary research (cross-disciplinary/trans-national), increase their team size/employee numbers, and train young researchers. Also, in comparison to other programmes, the weakest motivation to apply to coordinated programmes was including a larger network of partners.

As for collaborative programmes, the most important motivation to apply was to include a more international network of partners and the weakest motivation was that of an uncomplicated/non-bureaucratic application process.

Looking at the open programme SINERGIA, the strongest motivations for application were to include a comparatively larger network of partners (but a more international network was the weakest motivation), to perform trans-national/cross-disciplinary activities, and to deal with less bureaucratic procedures.

Table 11. Perceived opportunities BEFORE the programmes (% Yes answers)

Programmes typology / Opportunities	Integrated	Coordinated	Collaborative	Open	Total
Monetary resource	15.1%	36.8%	5.9%	29.8%	20.3%
Funding duration	18.9%	5.6%	5.9%	8.5%	11.2%
Risk-taking	21.2%	26.3%	24.2%	29.8%	25.2%
Cross-boundary (geographic or intellectual)	58.5%	68.4%	79.4%	83.0%	71.9%
Industry-academic collaboration	59.6%	5.3%	0%	2.1%	21.7%
Partner network size	39.6%	26.3%	44.1%	72.3%	49.0%
Internationality of partners	40.4%	63.2%	73.5%	21.3%	44.7%
Specialised research equipment access/development	43.4%	31.6%	8.8%	29.8%	30.1%
Dissemination/IP	26.4%	10.5%	8.8%	4.3%	13.7%
Bureaucracy	45.3%	42.1%	36.4%	55.3%	46.1%
Fairness/transparency	19.2%	31.6%	30.3%	34.0%	27.8%

As for the EUROSTARS programme, the Impact Report highlights that the top motivation for application was new product/service development (87% of the total), followed by money (74%) and added value from cooperation (60%). Tackling trans-national issues was a fairly weak motivation (33%), as was risk sharing (23%) and accessing otherwise unavailable facilities/infrastructures (18%).

Generally, both funded and non-funded applicants did not report having troubles with application-related matters. EUROSTARS funding rules, preparing a consortium agreement, and application preparation times were problematic for only around a third of survey respondents. Eligibility criteria, contract preparation, and access to information about EUROSTARS were problematic for only around a fifth of respondents. The aspect more closely related to the JOREP investigation is difficulty in 'finding a partner in another country', but this was an issue only for 16% of applicants.

Surprisingly enough, enhanced reputation/image was the major expectation, even more than increased technological know-how. This result is particularly interesting considering that SMEs and large firms represent the bulk of participants. It is also worth noting that the beneficiaries (the funded applicants) saw both reputation and technological development as expected advantages originating from the programme.

Another important expectation concerned new long-term partnerships – rated 'high' by 49% of respondents, but taking only third place in the top five expectations shown below:

- Enhanced reputation/image – 'high' for 58%;
- Increased technological know-how – 'high' for 56%;
- New long-term partnerships – 'high' for 49%;
- Increased scientific know-how – 'high' for 46%;
- Accessing new markets – 'high' for 46%.

It can be concluded that each programme type provides specific signals and expectations to its beneficiaries, which depend on the aims and objectives declared as well as on the conditions for application. Besides the mentioned differences, and also looking at what the interviews indicate, there seems to be a good degree of coherence between provided and perceived opportunities.

Data concerning the perceived opportunities by programme are presented in JOREP deliverable D9 'Analysis Report'.

6.2.2. Mobilised opportunities after the programme

As far as mobilised opportunities are concerned (see TABLE 12), the evidence collected shows that the funding amount provided is considered sufficient to meet the set research objectives, and there is limited variation across the various types of programmes in this regard. Funding duration is also considered sufficient by the vast majority of beneficiaries, although positive judgements are more numerous for the integrated and collaborative programmes that for the coordinated ones. Quick availability of funding was not reported by 50% of respondents in the case of integrated programmes, while it was reported by most respondents in relation to coordinated, collaborative, and open programmes.

Bureaucracy levels were almost universally seen as acceptable, with integrated programmes displaying the lowest values of acceptability. Beneficiaries of collaborative programmes reported the lowest levels of high-risk and new research field/market activities, which might be ascribed to a conservative behaviour adopted to deal with the characteristics of selection rules.

For the three types of joint programmes (Integrated, Coordinated and Collaborative), almost all beneficiaries report having used the project funding to perform trans-national or cross-boundary activities; the initiation of new industry-academic collaborations is prevalent in integrated programmes and less widespread in the other types. Beneficiaries report having been able to train new PhDs/young researchers thanks to their funded projects, although this aspect is not as strong for what concerns integrated programmes.

Table 12. Mobilised opportunities AFTER the programmes (% Yes answers)

Programmes typology / Opportunities	Integrated	Coordinated	Collaborative	Open	Total
Sufficiency of funding amount	73.1%	73.7%	88.2%	80.9%	78.9%
Sufficiency of funding duration	82.7%	63.2%	94.1%	55.3%	74.3%
Pace of funding release	42.3%	73.7%	82.4%	97.9%	72.4%
Acceptability of bureaucracy levels	62.7%	78.9%	94.1%	100%	83.4%
High risk research/technology development	44.2%	63.2%	29.4%	68.1%	50.7%
Use of funding to do cross-boundary activity (trans-national or cross-disciplinary)	96.2%	100%	97.1%	89.4%	94.8%
Use of funding to train new PhDs/young researchers	54.9%	84.2%	73.5%	93.6%	74.8%
Use of funding to start new industry-academic collaborations	88.7%	26.3%	3.0%	4.3%	36.2%
Use of funding to move into a new field/market	73.6%	52.6%	38.2%	59.6%	58.8%

Collaborative programmes provided opportunities for bottom-up, non-thematic and not politically oriented research. The LAA and the ORA have very different aims. The former represents a simplified and efficient funding scheme for already existing trans-national research collaborations, whereas the latter focuses on building new collaboration rules and schemes in the social sciences, to significantly enhance international research. Nevertheless, while the former has consolidated rules and practices, the collaboration rules of the latter are not clearly defined, and the opportunities provided to beneficiaries are offset by the lack of established selection and evaluation criteria. Indeed, the ORA is still evolving and the final result is largely unpredictable.

Regarding what the literature outlines as the ideal benefits deriving from joint and open programming, cost reduction does not seem to be a major achievement. Access to public research support by the industry was widespread in EUROSTARS-EUREKA and JTI ARTEMIS, but this is not a surprising result, since it was the aim of the mentioned programmes. Collaborative programmes (i.e. the LAA and ORA) achieved reductions in management costs by delegating some functions to an agency from one of the participating countries (the so-called lead agency), which deals with most of the management activities, reducing duplication and fragmentation.

Improving opportunities for public-private collaborations was an aim of integrated programmes, while joint public-private research characterises JTI integrated programmes and bilateral ones with non-European countries. Innovation rent was an objective realised by the integrated programmes aimed at improving applied research and at developing new products and services (EUROSTARS-EUREKA), but it did not emerge in the ARTEMIS JTI. Promoting scientific excellence was a common aim of some of the analysed programmes (TRI, EMIDA, ORA, SINERGIA). For SINERGIA, risk-taking activities are reported as having actually been performed using programme funding, which was released quickly and also helped to train new PhDs/young researchers. Improving coverage and initiating research in new fields are aspects that mostly characterise the benefits of trans-national research.

Data concerning the mobilised opportunities by programme are presented in JOREP deliverable D9 'Analysis Report'.

6.3. The impact

An analysis of the answers provided by those participating in the programmes shows a high level of coherence among provided opportunities, perceptions of the beneficiaries, and actual achievement. Nevertheless, to fully understand the impact of the programmes, a more in-depth investigation is needed. Intended and unintended results must be identified and it is important to determine which were expected and which were unexpected (Prospect 2). For this purpose we can refer to the matching between the beneficiaries'

perceived and realised opportunities, considering the former as outcomes of the provided opportunities representing, for the beneficiaries, the objectives to be achieved and the latter as what the beneficiaries actually achieved. Nevertheless, there might be some unexpected consequences, impossible to foresee in advance. Similarly, some results might not have been represented by the provided opportunities as intended, but can be expected as inconveniences deriving from some malfunctioning of the programmes, while some were not intended nor expected but nevertheless occurred.

The analysis focuses on four important impacts of the joint and open programmes: the development of risk-taking activities, the emergence of cross-boundary opportunities, the setting up of new industry-academic collaborations, and reasonable levels of bureaucracy (less complicated/bureaucratic research proposal preparation and submission). Since the beneficiary survey does not include the EUROSTARS-EUREKA programme, information about this programme was gathered through a specific survey developed for its assessment. The answers collected show that the expected impact generally occurred as it was intended for what concerns cross-boundary opportunities (as stated by about 70% of the respondents), while the situation is very different in the cases of new industry-academic collaborations and risk-taking activities, with respectively about 21% and 23% of the beneficiaries declaring that the opportunities were both perceived and realised. Also, the expected level of bureaucracy was the same as that intended for only 40% of the beneficiaries participating in the survey. Expected but not mobilised opportunities are less relevant in relation to most of the issues observed, which leads to the conclusion that the research community did not find it difficult to understand what the aims of the programmes were.

Moreover, their confidence in the fact that the programmes would lead to positive outcomes, which emerged from the interviews, is overall confirmed. Not expected-mobilised impacts were quite relevant for what concerns risk-taking activities (as reported by 29% of the beneficiaries) and levels of bureaucracy (45%), while the share of not expected-not mobilised opportunities was rather high in relation to risk-taking activities (45% of the cases) and industry-academic collaborations (60.4%). The above results are discussed according to programme types in the following paragraphs.

6.3.1. Integrated programmes

The analysis of integrated programmes presents a very clear situation. As far as cross-boundary opportunities and industry-academic collaborations are concerned, the beneficiaries are divided between those that expected to achieve these aims and actually did (58% of respondents, in relation to both matters) and those that did not expect to initiate cross-boundary research or to develop new industry-academic collaboration but these opportunities were actually mobilised when the funding was allocated. This can be interpreted as a case of long shots, i.e. events that were intended but it was impossible to predict with certainty if and when they would occur.

Table 13. Perceived/mobilised cross-boundary opportunities, by programme type

	Integrated	Coordinated	Collaborative	Open	Total
YY	29	13	27	35	104
	58.0%	72.2%	84.4%	74.5%	70.7%
NY	20	5	4	7	36
	40.0%	27.8%	12.5%	14.9%	24.5%
YN	1	0	0	4	5
	2.0%	0%	0%	8.5%	3.4%
NN	0	0	1	1	2
	0%	0%	3.1%	2.1%	1.4%
Total	50 (m=3)	18 (m=1)	32 (m=2)	47	147 (m=6)
	100.0%	100.0%	100.0%	100.0%	100.0%

Risk-taking displays a very different situation, since a high percentage of respondents (about 49%) did not perceive this opportunity and did not mobilise it. This result seems to be coherent with the provided opportunities, since integrated programmes focus on developing high-quality research and technological activities, creating a critical mass and complementarities among countries, but such aims do not necessarily include high-risk activities. In this regard, it is interesting to note that the opportunity was mobilised although not expected - but eventually intended for a percentage of about 30% of respondents. Nevertheless, the generative mechanism leading to this kind of result remains unclear.

Table 14. Perceived/mobilised risk-taking, by programme type

	Integrated	Coordinated	Collaborative	Open	Total
YY	8	5	5	13	31
	17.8%	27.8%	18.5%	29.5%	23.1%
NY	13	6	2	18	39
	28.9%	33.3%	7.4%	40.9%	29.1%
YN	2	0	2	0	4
	4.4%	0%	7.4%	0%	3.0%
NN	22	7	18	13	60
	48.9%	38.9%	66.7%	29.5%	44.8%
Total	45 (m=8)	18 (m=1)	27 (m=7)	44 (m=3)	134 (m=19)
	100.0%	100.0%	100.0%	100.0%	100.0%

The respondents' answers about bureaucracy are split between expected and non-expected opportunities. The non-expected-mobilised combination was reported by a large portion of beneficiaries, confirming that this is a critical issue, as already confirmed by the interviews. Despite some problems detected in programme management, the beneficiaries stated that less bureaucracy was the most important unexpected event, which helped improve management efficiency and positively influenced their perception of the programmes.

TABLE 15. Perceived/mobilised bureaucracy aspects, by programme type

	Integrated	Coordinated	Collaborative	Open	Total
YY	14	6	12	26	58
	29.2%	33.3%	38.7%	55.3%	40.3%
NY	17	9	18	21	65
	35.4%	50.0%	58.1%	44.7%	45.1%
YN	7	1	0	0	8
	14.6%	5.6%	0%	0%	5.6%
NN	10	2	1	0	13
	20.8%	11.1%	3.2%	0%	9.0%
Total	48 (m=5)	18 (m=1)	31 (m=3)	47	144 (m=9)
	100.0%	100.0%	100.0%	100.0%	100.0%

Finally, for what concerns motivation to apply before the programmes and actual experiences during the programmes, the beneficiaries of integrated programmes mostly indicated either trans-national research or cross-disciplinary research. It can be concluded that the programmes were effective in sending out the right signals, which could thus be easily recognised by the target beneficiaries.

As for EUROSTARS, applicants were asked about the distinctiveness of its funding in terms of the hypothetical (for the funded group) and actual (for the non-funded group) fate of their project proposals without EUROSTARS support.

The survey suggests that:

59% of funded applicants would have discontinued the project without EUROSTARS funding whereas 41% would have continued it; and

34% of non-funded applicants have continued without EUROSTARS support but 66% have abandoned their originally planned project.[3]

EUROSTARS stands out as a peculiar programme within the integrated ones, since they are specifically designed to fund applied research projects carried out by firms, possibly in collaboration with public research

[3] Some applicants funded themselves in order to remain within a EUROSTARS project after failing to receive funding, but apparently only 7% of EUROSTARS participants fall into this category.

organisations and/or other private bodies. Motivations largely concern innovation and funding, although the search for new partners is also important. It is not clear whether trans-disciplinarity of research is actually a relevant issue.

The non-funded applicants who continued their original project (34%) were asked what changes occurred after failing to receive EUROSTARS funding. Respondents said:

- The time to market was increased (42% of non-funded applicants continuing their projects);
- The time to return on investment was increased (42%);
- The proportion of private investment had to be increased (33%);
- The commercial risks were increased (28%); and
- More technology risk was taken (22%).

Respondents also indicated that:

- The consortium size was decreased (57%);
- The overall (56%) and R&D (53%) budgets were decreased;
- The number of countries to be involved was decreased (52%);
- The employment (45%) and IPR (33%) ambitions for the project were decreased; and
- The turnover impact expectations were decreased (44%).

Reduction in country involvement seems to be the most relevant aspect for JOREP. Additionally, results on technology risk-taking levels are unclear – 22% indicated more risk was taken without EUROSTARS funding but 25% stated the opposite (49% said 'no change'). The 'no change' responses ranged in general from 31% to 53% for the above questions, suggesting only a moderate impact for organisations continuing without EUROSTARS funding (however, this group represents only 34% of the non-funded people and 66% of respondents reportedly abandoned their original project).

6.3.2. Coordinated programmes

Coordinated programmes display non-homogeneous impact across the various funding schemes, which cannot be fully interpreted and understood using the programme typologies adopted here. This means that under the wide umbrella of coordination different logics are at play. Coordinated programmes present a similar impact only when trans-national/cross-boundary opportunities and perceived levels of bureaucracy are concerned.

As for trans-national/cross-boundary opportunities, the vast majority of respondents mobilised the expected opportunities (more than 72%) and the other respondents mobilised the opportunities even though they had not expected them. Hence, coordination seems to have been quite effective in achieving the intended impact. As for bureaucracy, half of the respondents did not expect it to be less complicated, but they actually found it to be so after receiving the funding; only 33% of the beneficiaries had expected this advantage. Thus, coordinated programmes provide clear signals in relation to trans-national and cross-boundary opportunities, but their signals for what concerns bureaucracy are not equally clear, despite the fact that, as indicated in the interviews, this was one of the most relevant intended impacts of these programmes. The results also show the existence of prior motivations and later experiences of trans-national and cross-disciplinary activities (TABLE 16).

Table 16. Perceived/mobilised industry-academic collaboration opportunities, by programme type

	Integrated	Coordinated	Collaborative	Open	Total
YY	28	1	0	0	29
	58.3%	5.6%	0%	0%	20.9%
NY	15	4	1	2	22
	31.3%	22.2%	3.6%	4.4%	15.8%
YN	3	0	0	1	4
	6.3%	0%	0%	2.2%	2.9%
NN	2	13	27	42	84
	4.2%	72.2%	96.4%	93.3%	60.4%
Total	48 (m=5)	18 (m=1)	28 (m=6)	45 (m=2)	139 (m=14)
	100.0%	100.0%	100.0%	100.0%	100.0%

In relation to risk-taking activities and new industry-academic collaborations, the impact of the programmes appears to be very inhomogeneous and cannot be understood using the logic of coordination. Rather, it seems to depend on the disciplinary spaces created by the communities of scholars and on the interaction between them and the research spaces, shaped by the functioning rules of the programmes and reasons for participation. This can be seen in the case of the ERA-NETs, where national participation in terms of funding is highly differentiated across countries. As underlined in the interviews, there are tensions between national decisions on funding and the needs of research teams, which might have a negative impact on country participation in the programmes.

6.3.3. Collaborative programmes

Collaborative programmes are evolving schemes. Therefore, it is difficult to detect their expected and unexpected impact, due to their great variability and the fact that they are sometimes closer to coordinated programmes because of very specific arrangements (e.g. delegation in the LAA).

Most respondents reported a positive impact in relation to only two aspects, which are very similar to those of the coordinated programmes. First, they largely considered the opportunities linked to trans-national and cross-boundary research expected and mobilised (84.4% of the cases); second, they did not expect but then actually mobilised the opportunities concerning less bureaucracy (58% of the cases). The other respondents (38.7%) both expected and mobilised the lower levels of bureaucracy of this type of programmes.

In the majority of cases, those who participated in collaborative programmes neither perceived nor mobilised the opportunity of developing new industry-academic collaborations (96.4%) – as can be expected at least in the case of the ORA, which focuses on the SSH field. High-risk research activities were perceived and mobilised only in a limited number of cases regarding the ORA (18.5%). Once again, there appears to be a high level of coherence between the beneficiaries' perceptions and the opportunities actually offered by the programmes, since the LAA is just another way to fund research, but with less innovative content than other national schemes. On the contrary, bilateral programmes within the ORA are perceived as more innovative and open to explore new research themes, thanks to the added value provided by trans-national collaborations.

6.3.4. Open programmes

When comparing the expected and realised opportunities of SINERGIA, our example of open programmes, we find that most beneficiaries expected and then realised trans-national and cross-boundary opportunities (74.5% of respondents); in a rather limited number of cases, these expectations were not realised (8.5%). For some participants, these opportunities were not expected but then realised as an additional effect of the programme (about 15% of the cases). This result is interesting since it reveals that the way in which the opportunities concerning trans-national or cross-boundary activities offered by the programme were presented allowed its beneficiaries to fully understand the uniqueness of this funding scheme.

As for expectation about less complicated/bureaucratic research proposal preparation and submission, the percentage of respondents who correctly perceived this opportunity is 55.3%, while the other beneficiaries did not expect the result but experienced it after the programme was started.

Coherently with the objective of the scheme, SINERGIA beneficiaries neither perceived nor mobilise new industry-academic collaborations (93% of the cases). A very interesting result emerges when perceived and mobilised opportunities regarding risk-taking research activities are considered; in this case, we notice that the percentage of respondents who perceived the opportunity and then mobilised it (29.5%) is the same as the percentage of respondents who neither expected nor mobilised this opportunity. The largest percentage (about 41%) did not expect to deal with risk-taking activities, but then actually mobilised this opportunity, which might be interpreted as a long shot impact whose occurrence was intended but not certain. Also in this case, a thorough understanding of the generative mechanism leading to this impact would require more research, considering that high-risk activities are the most suitable to produce very innovative outcomes.

Finally, it emerges that respondents had prior motivations and later experiences more in relation to cross-disciplinary activities (63.3%) than for what concerns trans-national research. Hence, the programme provided an opportunity, albeit not a unique one, for opening. The evidence collected does not allow us to determine whether the involvement of non-national partners occurred due to specific scientific motivations or whether it was an opportunistic behaviour (e.g. aimed at excluding national competitive partners).

Data concerning the impact by programme are presented in JOREP deliverable D9 'Analysis Report'.

7. CONCLUSIONS AND RECOMMENDATIONS

This chapter summarises the results emerging from the JOREP experience and introduces recommendations on how long-term data collection on joint programmes can be organised, specifically addressing the role of official statistics as well as the relationships with data collection launched by Eurostat on transnationally-coordinated programmes.

Recommendations concerning the analysis of motivations and impact of joint and open programmes are also presented.

7.1. Conclusions

One way to conceptualise the internationalisation processes, and more specifically the processes of internationalisation of research, is to consider science as shaped by the relationships between research spaces and research fields (Nedeva, 2012). Research spaces "are funding and policy environments within which the rules of knowledge production, knowledge legitimacy and knowledge use are negotiated". Research fields "are empirically outlined by three inter-connected elements, namely relatively converging knowledge communities, coherent bodies of knowledge and research organizations". Joint research programmes reveal the dynamics between research fields and research spaces as well as the roles played by the different actors involved (both national and supra-national).

7.1.1. Joint programmes

The analysis performed in JOREP provides empirical evidence concerning the characteristics and temporal dynamics of joint programmes and reveals a number of general patterns, which can be interpreted in terms of the relation between the characteristics of (national and European) research spaces and of the different research fields covered by the programmes. These lead to the emergence of a small number of programme types associated with specific policy settings, as well as underlying characteristics of the covered research fields.

In quantitative terms, the roughly 100 joint programmes identified by JOREP accounted for 3.4% of the public research funding in the considered countries, but only 0.9% excluding the European Space Agency. While the budget for joint programmes strongly increased in the 2000-2009 period, they still represent quite a limited share of public research funding in the considered countries and, in terms of funding volume, are much smaller than other transnational initiatives like the European Framework Programmes (excluding ESA, the total budget of joint programmes was about 10% of the FP budget in 2009). As a matter of fact, most joint programmes are quite small, and often of symbolic value, or they involve limited forms of cooperation, while most of the budget is allocated to few programmes: besides ESA, these include Eureka and COST, 2 Joint Technology Initiatives (ARTEMIS and ENIAC), 2 Art. 185 Initiatives (AAL and EUROSTARS), 4 ERA-NETs, and 3 bilateral programmes. Time series confirm that the joint programme environment is highly selective and that growth in terms of funding volume is concentrated in a small number of programmes. About half of the programmes are European-level initiatives, while the rest are mostly bilateral programmes, but the former group covers most of the budget (with few exceptions, bilateral programmes are quite small).

In terms of organisational characteristics, some relevant features emerge. Most programmes are characterised by light modes of coordination based on joint committees, but the few programmes which have established a supranational agency make up most of the budget. Using a national pot (funding remains at the national level and is allocated to national performers) is by far the prevalent mode of funding, but most larger programmes – those with a supranational agency – are characterised by a substantial share of additional European funding. As a matter of fact, programmes with a supranational agency and EU additional funding are exactly those which display the most significant growth in their budget. Further, joint programmes can be broadly divided into three groups in terms of their research topic: technological programmes (EUREKA, JTIs), programmes oriented towards specific policy domains (most ERA-NETs), and science-oriented and general-purpose programmes, supporting research collaboration in most scientific domains.

These patterns lead to the identification of a small number of organisational types of programmes, which in turn can be related to underlying representations of how to manage European integration and to specific constellations of actors.

Integrated programmes are rooted in a notion of Europeanisation in which competences are moved from the national to the European level. In the case of research funding programmes, this implies transferring all the competences and functions needed to support a specific research domain to the European level through the creation of a supranational funding agency. In the JOREP dataset, 13 programmes belong to this group; they are all European-level initiatives with the exception of two regional initiatives (Nordic Initiative and Visegrad fund) Even excluding ESA, they covered about 2/3 of the total programme budget in 2009. While the ideal approach implies that funding is integrated as well, in reality most of these programmes are characterised by a national pot plus additional EU funding, indicating that National States are not willing to lose control of their national resources and that the nationality principle is still central when dealing with finances. At the same time, past experiences, such as that of the European Science Foundation, show that without EU funding this model is unstable. The emerging model of integrated joint programmes is then characterised by a supranational agency and EU funding - the underlying contract being that National States are willing to integrate functions if the EU provides additional resources. If integrated programmes manage both European and national funding, underlying differences in national research policies and research systems are likely to cause problems in the selection and funding of projects, especially in relation to balancing between quality and national distribution.

However, most of these programmes focus on technological and economic issues, which are common to all participating countries and independent of specific national settings. Hence, the homogeneity of the underlying research fields can help bring different national research spaces together (Nedeva 2012). Moreover, performing research in these areas is likely to require larger-scale research cooperation, to be achieved through European-level consortia, and thus bilateral agreements do not fulfil the needs of the research community. Also, the delegation of national participation to sectoral agencies in the corresponding fields creates greater homogeneity among the actors involved, which tend to share a similar agenda and orientation towards the solution of technological and economic problems.

Coordinated programmes involve lighter forms of integration. The key programme functions – mission, design of the calls, submission, evaluation and selection – are implemented through transient decision-making committees with the participation of national agencies. The underlying rationale is aligning the policies of various countries in relation to specific activities, but without transferring all the competences to supranational bodies. Almost all these programmes are characterised by a national pot. 42 programmes belong to this group, but they correspond to only about 20% of the total volume of joint programmes (excluding ESA); thus, they are on average much smaller than the integrated ones.

The ERA-NETs are the largest group of coordinated programmes. They are mainly experimental spaces in which to test the feasibility of integration, starting with low levels of commitment. Most of these initiatives are transitory (see the large number of ERA-NETs which never reached the stage of joint research funding), while few of them actually move towards greater integration, reaching an intermediary stage characterised by European funding.

Collaborative programmes rely on collaboration around specific activities but decisions are not delegated to a supranational entity (not even to simple coordinated committees). In practice, these programmes are mostly characterised by parallel submission to the agencies in the participating countries, where there is a joint committee negotiating which joint projects should be supported (in most cases after evaluation has been carried out on both sides). With few exceptions, these programmes are bilateral collaborations with non-ERA countries and have very small funding volumes; many of them are general-purpose collaborations and are managed directly by the national research ministries (rather than delegated to funding agencies).

When dealing with internationalisation outside the ERA, the issue of differences among national research spaces becomes even more relevant, as third-party countries (with the exception of North America) display very different characteristics in terms of organisation, culture, language, etc. While cooperation with emerging countries is clearly relevant, it leads to the adoption of lighter forms of collaboration, focusing on establishing connections among research teams rather than on achieving higher quality in research or critical mass.

Because of the way in which they are designed, these programmes are robust against national differences but do not grow large – their main function being to show researchers (and partner countries) that national policies recognise the importance of collaboration.

Finally, the JOREP data show that more and more joint programmes are being established by national research councils through bilateral or multilateral agreements. They are strongly science-oriented and some of them are based on joint decision-making committees (coordinated programmes). However, an emerging model is represented by delegation, i.e. agreements in which a lead agency is responsible for the whole process of evaluation and selection, whereas the other participating agencies accept the selection decisions and provide funds for national partners (e.g., the D-CH-A agreement).

These approaches can be interpreted as responses to the need for Europeanisation in support of basic science. There are deep differences among countries in how support to science is institutionalised (i.e. there are countries as Switzerland with science-oriented research councils or countries like Italy and Spain where ministries and PROs fulfill this function (Lepori 2011) and also the international reputation of national scientific system is widely different. Accordingly, internationalisation has not been pursued through integrated programmes, but a new approach, whereby research councils coordinate their policies through lead agency agreements, is emerging. Since this takes place outside the EU political space, there is no obligation to include all countries, but selective agreements are established among the largest and most prestigious agencies in the field.

Coordination takes place among the countries where research funding spaces are organised in similar ways. Thanks to greater homogeneity, trust and good reputation of the involved agencies, coordination can be achieved without strong institutionalisation and EU funding. Thus, when faced with the issue of matching research fields which are largely international with research spaces built around national systems, the involved actors creatively borrow and combine the available normative models to develop solutions tailored to their goals, as well as to the characteristics of the fields and spaces addressed by each programme. From a large number of past experiments a small set of stable types of joint programmes is clearly emerging.

Other conclusions can be drawn by looking at the role played between research fields and spaces by the different actors involved in joint programmes.

Joint programmes in which the European policy level acts as facilitator appear to be affected by the tensions between the local research space and the global disciplinary field. When the EU provides funding for joint programmes and mobilises a large amount of resources, the orientation function and the role played by national ministries in setting general objectives and providing funding are more prominent than when EU only acts as facilitator. The latter situation leads funding agencies and intermediaries to have a more important role also in the countries in which this function is played by research performing organisations. The available data and information show that several national actors are entrusted with different functions in joint programmes. Different combinations of functions can also be detected at the national level; as the evidence collected by JOREP shows, the distribution of functions among actors seems to be linked to how national coordination of funding is organised in the various countries.

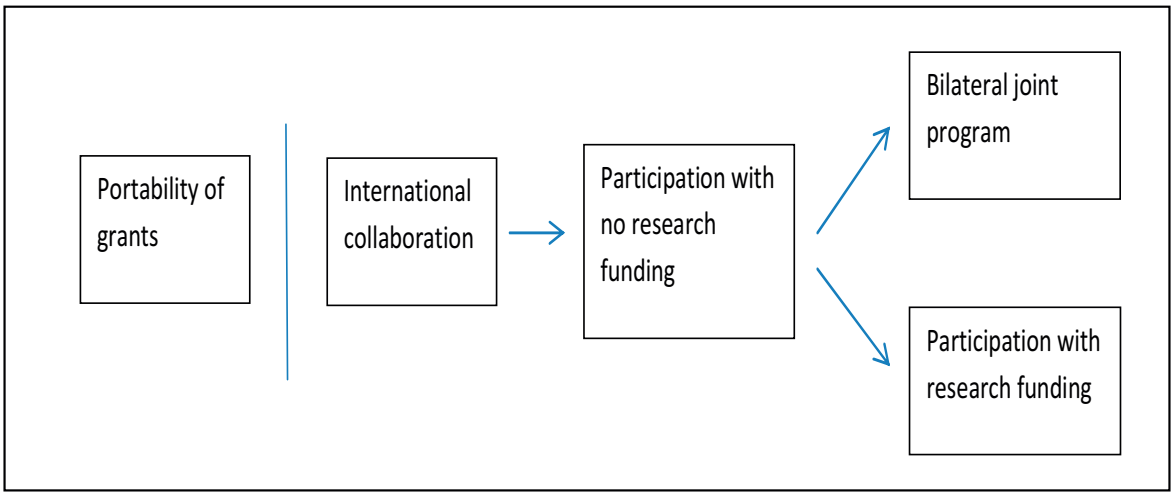
Finally, funding agencies are increasingly moving as independent actors within the supra-national policy space, contributing to the designing of joint programming and to the creation of links among countries. In this respect, research councils seem to play a key role. The presence of consolidated research funding practices and high levels of mutual trust allow countries to move towards trans-national research programming, adopting coordinated or integrated research funding schemes rather than building a joint supra-national funding agency (as in the case of the ESF). Overall, the evaluation and assessment of joint programmes should focus on analysing differences in participation among European countries in order to determine the reasons that lead to participation with or without funding.

7.1.2. The different facets of open programmes

The data about open programmes confirm the complexity and multidimensionality of the phenomenon. A narrow definition of open programmes (i.e. those in which foreign research organisations are eligible to receive research funding) has led to the identification of only 7 programmes in the countries analysed by JOREP, which might in turn lead to the conclusion that the phenomenon is relatively marginal and limited to specific cases.

On the contrary, a broader definition of opening which includes different dimensions –portability of grants when researchers move abroad, opportunities for international collaboration with complementary funding, project participation without research funding – leads to much more interesting results (FIGURE 23).

Figure 23. Dimensions and levels of opening of national programmes



The pilot undertaken by JOREP on three countries (France, Italy, Switzerland) shows that a certain degree of opening increasingly characterises the larger national research programmes, those constituting the bulk of national research funding, and thus the phenomenon represents a highly relevant evolution in the making of the European Research Area. There is also anecdotal evidence that opening is in most cases recent and rapidly developing.

Moreover, levels of opening are highly selective. International collaboration is encouraged and supported in many national programmes, whereas research funding to partners abroad is possible only under specific circumstances which are beneficial to the national research system (like acquiring specific competences) or to the pursuit of foreign policy goals (like development aid or cooperation with other countries). Another issue regards the matter of grants following researchers and principal investigators, which does not seem to be related to the openness of programmes but rather to the characteristics of national funding systems and to programme goals.

When research funding must be provided to partners abroad, the most common method adopted is to set up a bilateral joint programme through a specific agreement with the partner countries. This shows that (bilateral) joint programmes are at one end of a continuum which includes different forms of opening and are quite different from European joint initiatives.

A feature of open programmes and of the observed trend of opening of national R&D programmes is the added value provided by involving non-resident researchers and research organisations. Their involvement helps fill national knowledge and/or equipment gaps and increase national research capabilities. This also implies that the amount of funding flows to foreign countries does not represent a reliable measure of opening.

Hence, the degree of opening of national programmes and the size of open programmes are influenced by national R&D capabilities, the level of openness of national research systems, and the characteristics of national legal frameworks. This leads to varying degrees of opening for what concerns both the countries and the types of programmes: countries with a more internationalised research system tend to be more open, while science-oriented programmes are opening faster than economy-oriented programmes, as the notion of national interest is weaker and the level of internationalisation of the research community higher.

As for the data collection methodology to be used in the future, we strongly suggest adopting this broader and multidimensional approach to opening. Moreover, investigations should set as their priority to analyse the levels of opening of the larger national research funding programmes. The results of the JOREP pilot on opening are encouraging, confirm the feasibility of data collection, and provide guidance on how to implement definitions applicable in a comparable way across countries.

7.1.3. What messages from the motivations and impact analysis?

We have looked at programmes as funding mechanisms involving four kinds of opportunities, namely 'intended opportunities', 'provided opportunities', 'perceived opportunities', and 'mobilised opportunities'. The 'intended opportunities' are linked to policy rationales, which can be re-constructed either by reading the missions and objectives of the funding mechanisms or through a historical reconstruction of the 'conditions of origin' of the mechanisms.

A programme can be expected to achieve its 'intended' effects if there is a high level of congruence between 'intended' and 'provided' opportunities, i.e. if its tools are coherent with the results it tries to achieve. Moreover, the impact produced is linked to how correctly the beneficiaries perceive the opportunities provided by the programme, and what they actually achieve through their actions. This framework allows detecting any discrepancies between opportunities provided and perceived and provides information on the trade-off between beneficiaries' perceptions and results.

The analysis confirms that the programmes have generally met the participants' expectations as to perceived and mobilised benefits; a rather large share of respondents realised unexpected opportunities, while the number of beneficiaries whose expectations were not satisfied is relatively small.

The typologies of programmes provide useful indications regarding the mode of funding and the type of integration, as well as some common features of the intended opportunities. Nevertheless, the opportunities provided and the perceptions of the beneficiaries display great differentiation across the programmes, and both collateral effects and accidental results are detectable in all the types of programmes. Moreover, while collateral effects might be interpreted as emerging expected benefits, the occurrence of accidental effects remains rather difficult to explain. What is not clear is the extent to which accidental effects derive from the essential uncertainty affecting research endeavours or are the result of poor signalling or management of the programmes.

The available evaluation reports do not provide useful information in this regard. Two main negative aspects should be taken into account. With few exceptions (EUROSTARS, ERANETs), evaluation reports are publicly available but they are not distributed to and discussed with the relevant stakeholders. Moreover, the reports are aimed at understanding how the programmes are able to achieve the expected benefits, thus generating new and better results than before, but there is no interest in assessing to what extent the programmes allow their beneficiaries to carry out research activities in a better way, supplying new opportunities for change. The traditional approach has several limitations in the case of joint and open programmes, since in most cases – at least in all the cases of coordinated and collaborative schemes – the novelty of the programmes does not lie in the benefits pursued but rather in the opportunities the funding schemes supply for carrying out research activities in a better way, e.g. using trans-national collaboration, cross-boundary activities and openness as ways to implement changes.

Interestingly enough, the interviews with political authorities and programme officers and the survey of beneficiaries unanimously confirm the importance of the programmes and the need to maintain them. Many underline the need for changes to improve management and to better communicate what the programmes are, so that the effectiveness of results can also be improved, but the feeling of outcomes realised is generally good, or very good. Trans-national research per se is a dimension perceived as providing much added value, mainly linked to the ability to develop high-quality research within the global scientific community and across disciplinary boundaries, although the programmes might not actually be so different from the national ones. Moreover, rather than funding, it is integration of the submission procedures, selection and evaluation criteria that is considered a critical issue of joint and open programmes to make them different from other national schemes.

Besides the above-mentioned aspects, the attribution of results is still a problematic issue and the use of measures of impact is rather limited. Our exploration shows that these programmes are not strong enough and their signals are not unique enough to be able to bring about changes in the nature of knowledge and productivity through their grants. They are very useful as part of a set of policies, but have little influence individually. According to some recent exploratory studies, bibliometric analyses might provide some insights into the scientific impact of the programmes. By using the acknowledgments found in publications, it would be possible to collect data on the research programmes and funding agencies mentioned, but the methodology still needs to be fully tested and refined, and the ability to cover the whole range of impacts is limited (van den Besselaar et al., 2012).

Four key messages emerge from the above motivations and impact analysis:

1. Programmes do not supply distinctive signals: attributing empirical effects to specific conditions of the programmes is difficult even when we use typologies;
2. In terms of advocacy, the programmes are different voices joined together, which can influence the decision-making process and modify the effects of public policies and funding allocation;
3. Emphasis should be shifted from programme evaluation to whether the programmes are able to create the conditions for change; this investigation would provide useful knowledge for policy designing and implementation;
4. More research on generative mechanisms of opportunities is needed.

7.2. Recommendations for future data collections

While JOREP is a pilot project, the regular production of data and indicators on joint and open programmes is a major priority in the development of a monitoring system for the European Research Area, as indicated by the ERA monitoring expert group (European Commission 2009). Accordingly, the JOREP project provides recommendations for future data collection in this area, addressed to the European Commission and Eurostat. These recommendations specifically take into account the relationships between JOREP and the Eurostat pilot on transnational coordinated research, the OECD pilot project on public funding of R&D (OECD Directorate for Science, Technology and Industry 2010), as well as potential synergies between these data collections.

For a general discussion of the recommendations, refer to JOREP deliverable D8, 'Recommendations for future data collection'.

In terms of data to be collected, JOREP's recommendations deal with the three critical components of the dataset developed, namely the perimeter, the descriptors and, finally, data on funding flows.

a) Perimeter of joint programmes. The construction of a list of joint programmes is a central requirement for data collection, also including financial data. Like in JOREP, the list should be constructed by integrating the list of European Initiatives (provided centrally) with bilateral programmes identified by national experts; information on which countries participate in which European Initiatives is critical in order to reduce the burden of data collection at the national level.

Thus, JOREP recommends compiling a list of all European-level joint programmes including the following information: the name of the programme, the list of participating countries and, for each country, of participating agencies. As a second priority, national experts in each country should include the bi- and multilateral programmes they consider relevant.

This list should be adopted as official reference for all data collection activities at the European and national levels and be updated yearly.

b) Descriptors on organisational characteristics. As shown in chapter 3, the set of descriptors developed in the project proved to be very useful to analyse the landscape of joint programmes; moreover, developing closed lists of choices (integrated with remarks) has provided significant advantages in terms of comparability of data.

Hence, it is strongly advised to maintain and extend the set of descriptors to all joint programmes in the European Research Area; given the fact that organisational characteristics are rather stable in time, the descriptors could be updated every 2 or 3 years rather than yearly.

The experience of JOREP shows that, while there are no main problems in the collection of descriptors, collecting national-level information requires a well-designed organisational structure with a central unit – taking care of the European-level descriptors, of quality control, and of the merging of data into an integrated dataset– as well as national experts. Moreover, as for multi-annual data collection, issues regarding programmes demography need to be carefully taken into account and a suitable notation has to be introduced into the dataset.

c) Data on funding flows. JOREP has proven the feasibility of collecting data on the budgets of joint programmes, but it has also confirmed that, since budget decisions are often delegated to funding agencies, this information cannot be collected in a reliable manner from public budgets (the main data source for GBAORD statistics). It is hence recommended to collect this information from national funding agencies through a dedicated questionnaire, detailing for each agency the programmes in which it participates (based on the common programmes list).

Furthermore, data on European contributions should be collected directly by Eurostat. It is advised to provide a simple breakdown of public and private beneficiaries, as this is relevant to understand programme functions and easier to implement than a breakdown based on the Frascati sectors.

7.3. Organizational recommendations

The definition of a suitable organizational form and of procedures for regular data collection is made more complex by two characteristics: first, the fact that JOREP data include both expert-based descriptive information and statistical data on funding flows; second, the fact that data are owned by different subjects and at different institutional levels, including European agencies, the European Commission, the National States, and national funding agencies. To overcome these problems, JOREP proposes a structure built on two main components (see Figure24).

a) First, a European-level observatory on joint programmes should be set up, possibly integrated in existing structures like ERAWATCH or NETWATCH, with the following tasks:

- Defining the perimeter of joint programmes every year (including information on national participation and managing agencies), which should be validated by the European Commission.

- Updating the joint programme descriptors with changes and covering new programmes.

- Maintaining the dataset covering descriptors and programme-level funding data and providing a suitable interface for access by external users (e.g. a web interface to the programme database).

- Regularly producing analytical work on the mapping of joint programmes in Europe.

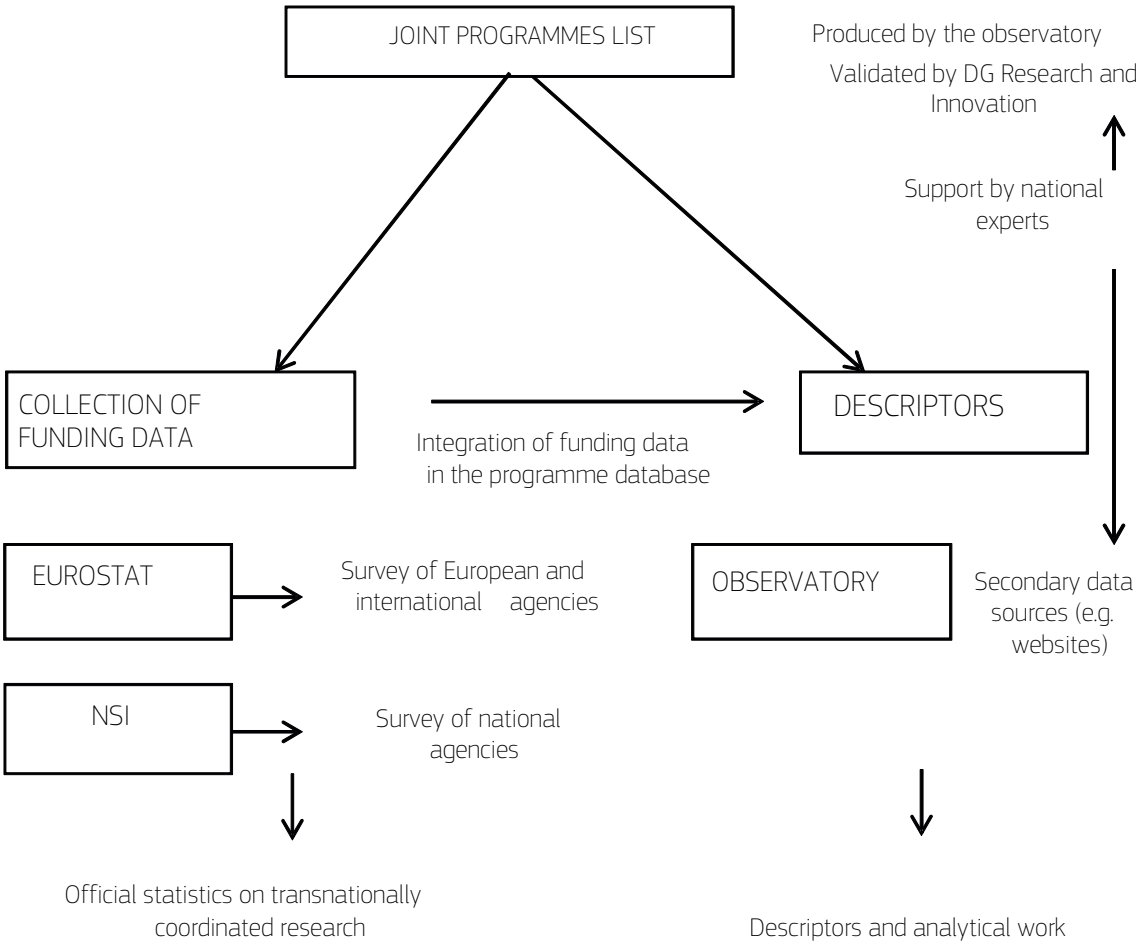
The JOREP experience shows that almost all of this information can be retrieved from official sources and programme websites (specific inquiries to managing agencies might be needed for specific cases). However, in order to be able to provide a reliable list and descriptors for bilateral programmes, the observatory needs to rely on a network of national experts with good knowledge of national research policies.

b) Second, the collection of funding data and the production of statistical indicators should be managed by Eurostat together with the National Statistical Authorities. This represents an extension and systematisation of the current pilot on transnational-coordinated research and is a step towards the integration of joint programmes into official statistics. Production of financial data should be managed through a dedicated survey provided to national funding agencies. Moreover, Eurostat should analyse the European-level funding agencies to determine the level of EU additional contribution to joint programmes and the allocation to beneficiaries of the funds distributed by these agencies directly (either EU funding or real pot funding from national states).

These data would then be used by Eurostat to produce aggregated indicators on transnationally coordinated research funding and by the Observatory to produce analyses by integrating programme-level funding data into the joint programmes dataset.

Careful institutionalisation and definition of interfaces is required for reliable long-term data collection on joint programmes. JOREP has provided the main building blocks to attain this goal.

Figure 24. Proposed organization of joint programme data collection



7.4. Recommendations for motivation and impact analysis

The analysis of motivation and impact of joint and open programmes should be tackled considering that the opportunities attributed to programmes, as signals they provide, can often be multifaceted and difficult to interpret. Hence, being aware of the generative mechanisms at the basis of opportunities is a key issue to be considered. It allows distinguishing among the four categories of opportunities suggested by JOREP –mainly those expected and those unexpected – and analysing the impact attributable as a result of programme implementation (opportunities mobilised).

Furthermore, the opinions of policy actors must be integrated with the beneficiaries' perceptions about opportunities expected and achieved. This makes it possible to detect mismatches between the declared aims and objectives of the programmes and the opportunities actually offered, providing insights into the added value of programmes and the effects of their implementation.

The approach proposed by JOREP should focus on results reported and discussed, mostly ex-post, in programme evaluation reports and turn evaluation into an opportunity for beneficiaries and stakeholders to share views and opinions about programme organisations, expected goals, and advantages provided. Nonetheless, it is worth underling, as suggested by the evidence collected, that the main effect of the programmes perceived by beneficiaries is to do 'things better' rather than to do 'better things'.

The table below summarises the recommendations for each of the main issues emerging from the analysis.

Table 17. Recommendations for motivations and impact analysis

Issue	Recommendations	Action
Problem of attribution	Programmes do not supply unique signals: one must be aware of this when attributing empirical effects to specific conditions of the programmes.	More research on generative mechanisms of opportunities is needed in order to unpack the emergence of unexpected results.
Communication	Programmes pursuing expected impact with adequate practices and clear communication in order to allow correct interpretation and use.	Selection practices and accountability processes becoming key elements of programme organisation and assessment.
Beneficiaries	Take into account that different beneficiaries have different perceptions of programmes opportunities when programmes are designed and implemented (e.g. as to risk-taking activities, cross boundary and collaboration opportunities).	Beneficiary surveys and surveys involving key programme officers to be developed on a regular basis.
Evaluation	The emphasis of programme evaluation shall be on how much programmes are able to create the right conditions for change, thus whether they allow beneficiaries to do 'things better' rather than to do 'better things'.	Evaluation Reports should be largely distributed to beneficiaries and stakeholders in order to become "living documents" for future impact analyses. Differences among participation by European countries deserve more attention.
Open programmes	Policy shift from 'open programmes' to 'openness of programmes' as a signal of the country's strategy toward international networking of national research teams.	Participation of non-national partners is an opportunity that programmes must provide; misuse of the opportunity must be considered when programmes are designed.

For a general discussion of the recommendations on motivation and impact, refer to JOREP Deliverable D9

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The study "Investments in JOint and open R&D Programmes and analysis of their economic impact" (the JOREP study) has been launched by the Directorate General for Research and Innovation of the European Commission (Economic Analysis Unit) to quantify and analyse the coordination and opening-up of national public funding which constitute a fundamental development towards a more integrated European Research Area. This study is part of a set of projects providing key information for policy making in the perspective of contributing to growth in Europe through innovation policies.

The JOREP study adresses questions like: What is the EU member states' engagement in transnationally coordinated programmes? What is the openness of their public R&D programmes? What needs do joint and open R&D programmes mainly respond to? What are the main motivations driving the joint undertaking of research and the opening of R&D programmes? Are there differences between scientific domains?

The study aims at providing a sound quantitative basis for the monitoring of investments in joint and open research programmes in EU countries, as well as empirical evidence of the policy rationales and impacts of these programmes on the European Research Area. The project has carried out a comprehensive collection of data about joint and open programmes according to a set of standardised descriptors, and provided an analysis of motivations and impact of these programmes.

The study covers eleven European countries corresponding to about 85% of national public funding in Europe and displaying various situations within ERA: medium-size countries with a well-developed science basis, large countries, Mediterranean countries, and Central and Eastern European Member States. These countries are (in alphabetical order): the Czech Republic, Denmark, France, Germany, Italy, the Netherlands, Norway, Poland, Switzerland, Spain, and the United Kingdom.

This publication is the Final report of the study. It is accompanied by the study's methodological Handbook. These two publications, as well as a short Summary report of the study, the detailed Analytical Report and 11 Country reports are available at: http://www.ec.europa.eu/research/innovationunion/index_en.cfm?pg=other-studies

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