

## **Deliverable 22.4 (WP22)**

# **Policy brief on EUPRO based indicators on the different institutional dynamics of ERA construction**

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## ***Policy Brief***

# **Collaboration patterns in different European Funding Frames: The case of the European Framework Programme (FP) and EUREKA**

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### **Executive Summary**

The investigation of the evolution of the European Research Area (ERA) has attracted burst of attention in the recent past, not only in the scientific, but also in a policy context. From a policy perspective, it is of great relevance to account for the manifold structure of European and transnational research funding frames and their characteristics. As an interesting example, this policy brief focuses – based on advancements of the EUPRO databases within the RISIS project – on the comparison of characteristics and collaboration patterns of two funding frames in order to get some clue on the complementarity between integrated (FP) and coordinated instruments (EUREKA).

### **1 Introduction**

The investigation of the evolution of the European Research Area (ERA) has attracted burst of attention in the recent past, not only in the scientific, but also in a policy context. This research stream focuses on the characterisation of cohesion vs. fragmentation processes in European research, also referred to as Europeanisation, from different anchor points, and along different dimensions, e.g. geographical integration, technological integration or social and institutional integration (see, e.g., Breschi and Malerba 2009, Hoekman et al. 2013). From a policy perspective, it is of peculiar importance to account for the manifold structure of European and transnational research funding frames (like FP, EUREKA, COST, JTI, etc.) and their characteristics. In particular, the interplay and complementary orientation between different STI policy funding schemes is one of the highly debated policy issues, including questions on e.g. multiple or overlapping funding of projects/organisations, or effects of system-wide changes like Brexit across funding instruments. These are crucial issues partly addressed in this brief, bearing conclusions in the context of the future design and evaluation of such programmes.

However, at European level, harmonised data sources that enable the comparison of structures and dynamics emanating from different funding instruments are scarce. The extensions and advancements of the EUPRO database within RISIS have exactly been designed to address this gap, providing an information basis that enables researchers but also policy makers to take an integrated and comparative perspective on collaboration patterns in different European STI funding programmes. It provides novel possibilities for robust investigations, relevant for a range of policy questions, at the level of harmonised organisations – both in terms of organisation names, organisation types and geographical location – across different funding initiatives.

This policy brief will exemplify these advancements, focusing on the comparison of characteristics and collaboration patterns of the FP and EUREKA. In this context, we will first give a brief indication of the database advancements accomplished, pointing to further potentials for usage. Then we will highlight some basic collaboration patterns in the two programmes from a comparative perspective focusing on organisational type and spatial distribution. Finally, we will discuss overlapping issues between FP and EUREKA, disaggregated across organisation types, to get some clue on the complementarity between integrated (FP) and coordinated instruments (EUREKA).

### **2 Activities, Approaches and Results**

In this section, we discuss the main results of the different analyses comparing the two programmes. We reflect on basic collaboration patterns, and shed some light on differing organisation types participating in the two programmes, its differing spatial patterns, and on overlapping and complementarity issues.

#### **2.1 Comparing integrated with multi-country coordinated funding programmes**

In this policy brief, we focus on two specific modules from a comparative perspective, the FP as an example of an integrated instrument vs. the cross-country coordinated instrument EUREKA, showing the capability of EUPRO for the consistent comparison of differing funding frames, at the organisational level of analysis and consistent over long time periods. The collaborative funding within the FP particularly supports R&D with an emphasis on excellent science, industrial leadership and societal challenges, creating a pan-European network of actors performing joint R&D on

different thematic aspects and issues of the European scientific landscape. EUREKA is an intergovernmental network (41 member states) established in 1985 that supports market-oriented R&D and innovation projects by industry, research centres and universities across all technological sectors (bottom-up principle), organised by four different instruments (projects, umbrellas, clusters, Eurostars).

**The EUPRO database as empirical backbone to study ERA dynamics**

The empirical analyses presented in this brief are based on the EUPRO database, and its advancements within RISIS. EUPRO is a unique dataset providing systematic and standardised information on R&D projects, participants and resulting networks of the **EU-FP**, starting from FP1, and recently integrating H2020 (until 2016), but also extending to other European funding instruments, such as EUREKA, COST and selected Joint Technology initiatives (JTIs). It has been recently used intensively as a core facility in research activities that investigate the structure, dynamics and impacts of project-based R&D collaboration, in particular to grasp and understand the development of ERA. This is underlined by a number research articles published in international journals in recent years, and also by the 20+ transnational visits under the heading of RISIS (see RISIS WP16 Synthesis report for an overview).

One essence of the EUPRO advancement within RISIS has been its extension to include further European funding frames relevant to study ERA dynamics, namely **EUREKA** (1985-2016), **Joint Technology Initiatives** (2008-2016) and **COST actions** (1971-2014). The most significant added value of EUPRO is that – in contrast to other sources (including non-public EC internal datasets) – it provides cleaned data, in terms of **harmonised organisation names**, **geocoded participating organisations** with geographical coordinates, and **traced demographic changes**.

This enables the flexible inter-linking at the organisational level of the different modules of EUPRO relating to different funding frames, and with other organisation-level datasets within RISIS, e.g. patents or publication databases. Figure 1 illustrates the cross-harmonised EUPRO modules (EUPRO v8, 02/18).

Figure 1: The EUPRO content (EUPRO v8)

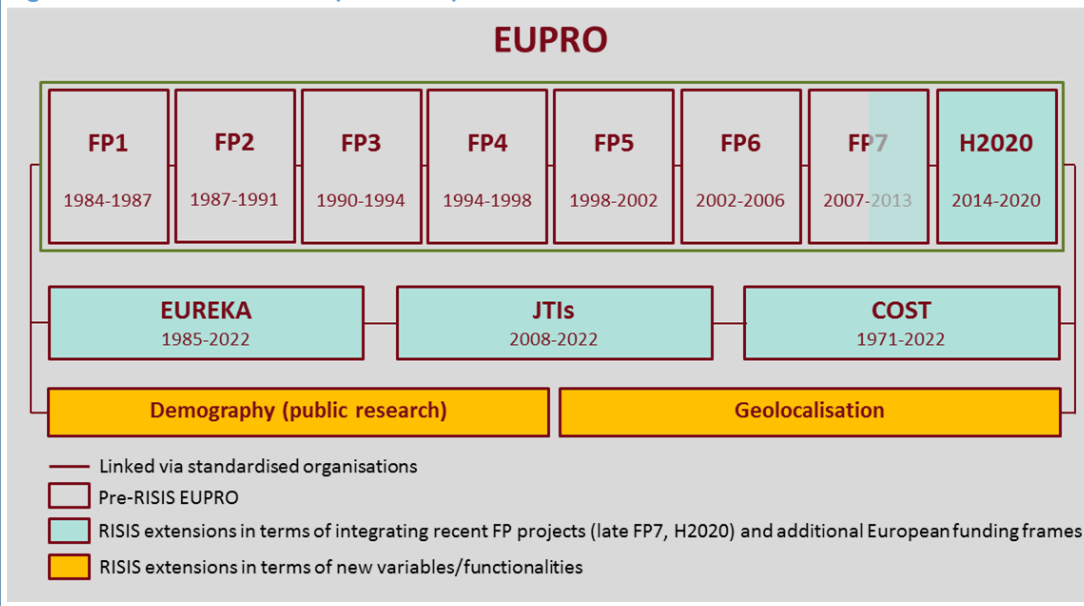
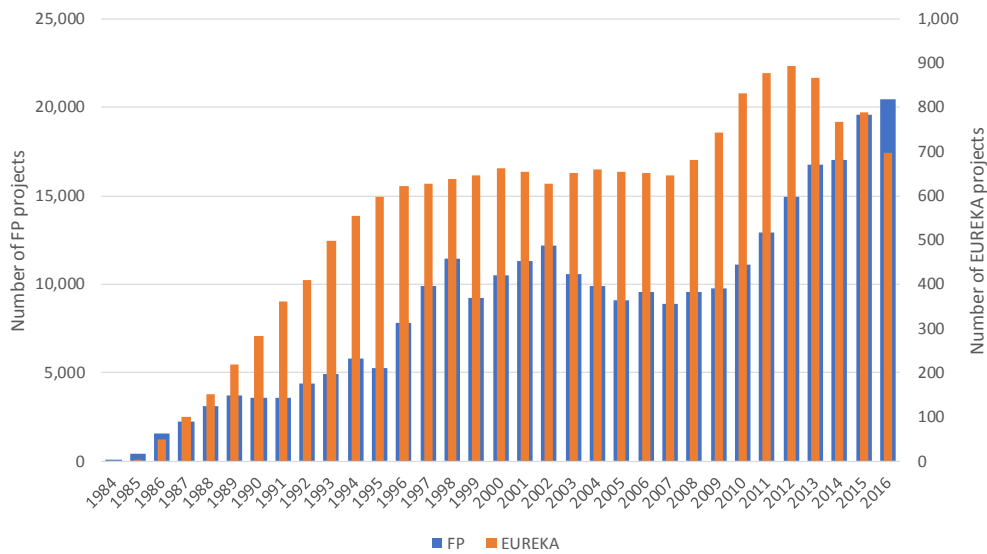


Figure 2 initially shows the perimeter of the data from a longitudinal perspective (for which systematic information at project and participants level is available), simply plotting the number of projects for FP (left-hand axis, blue charts) and EUREKA (right-hand axis, orange charts) per year (referring to currently running projects for a specific year). The differing growths patterns are well observable, with – in particular for the FP – the respective instruments at work well reflected (e.g. lower number of projects in FP5 and FP6 not only because of less budget, but also large integrated instruments). EUREKA shows steady growth between 1995 and 2008, with a recent decline, also reflecting the establishment of larger instruments, in particular the EUREKA clusters.

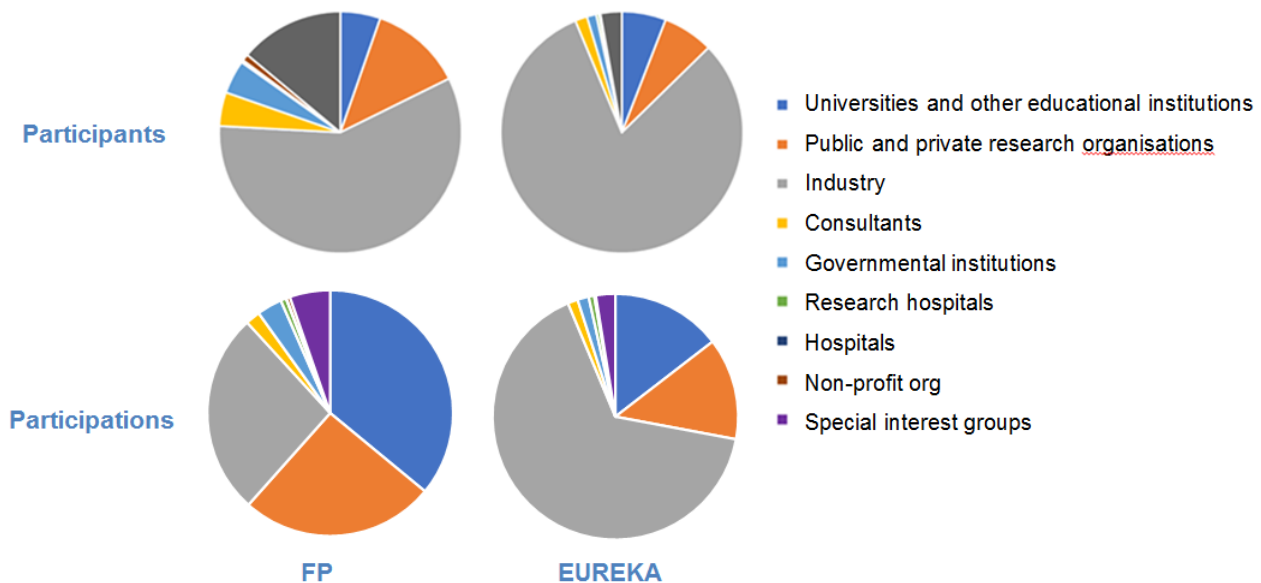
Figure 2: FP and EUREKA projects (total)



## 2.2 Differing participation patterns: Organisation type and geography

In what follows, we shift attention to FP vs. EUREKA participation patterns in terms of organisation type and geography. First, Figure 3 and Figure 4 illustrate the organisation type analyses, showing the differing participation patterns in terms of participation intensity of different organisation types (Figure 3) and networking (based on joint project participations) between countries (Figure 4).

Figure 3: Share of FP and EUREKA participants and participations by organisation type (total)

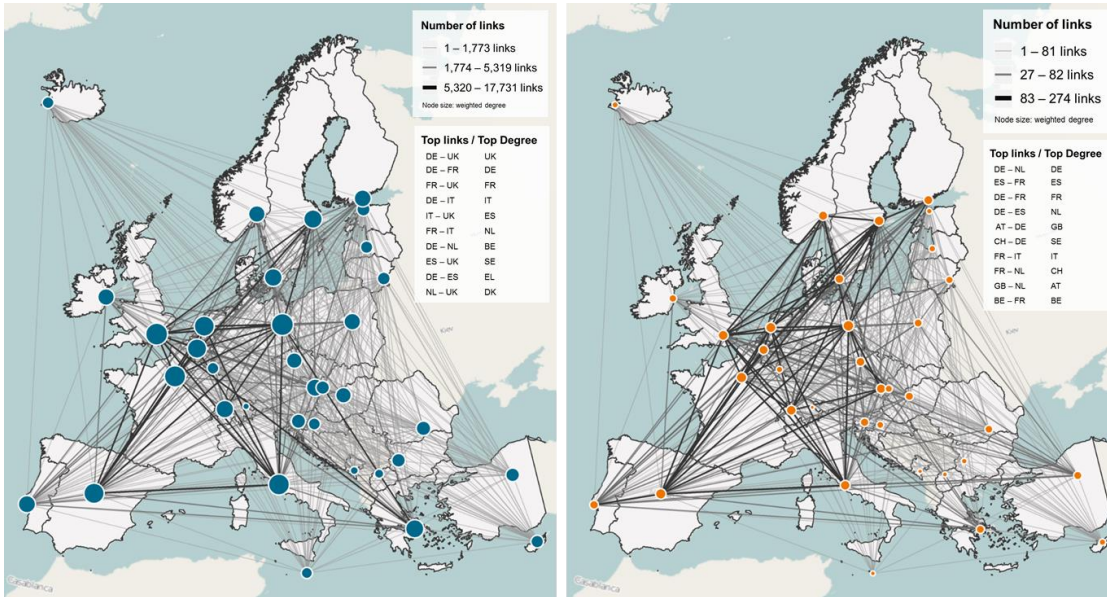


The analysis clearly picks up the different orientations of the two programmes. Most importantly, the industry sector plays a much more important role in EUREKA, in particular as what concerns the number of participants that account for about three quarters of all participants in EUREKA. Interestingly, universities and public research organisations participate quite equally intensively in terms of the share of participants, while outpace EUREKA significantly when looking at participations, i.e. in the FP they participate in many more projects, though the share of participating universities and public research organisations is not that much higher than in EUREKA.

From a geographical perspective (see Figure 4), the overall pattern seems quite similar for FP and EUREKA when looking at cross-country collaborations, but significant structural differences appear when zooming in or looking at the most active partner countries. For instance, in the FP, the link between Germany and the UK has the highest weight,

with UK being even the country with most inter-country collaborations (bearing e.g. severe implications in the context of Brexit, i.e. FP is affected much more in a Brexit context than EUREKA), while in EUREKA the UK plays a more minor role, and interestingly Germany and the Netherlands show the highest interaction intensity.

Figure 4: Collaboration in FP and EUREKA between countries



### 2.3 An organisational perspective on key players and complementarity

Taking an organisational perspective, we are able to reflect on central players in a harmonised way in FP and EUREKA (given the cross-programme harmonized names in EUPRO), and consider overlapping and complementarity between the two programmes.

Table 1: FP and EUREKA projects (total)

Ctry	FP participant	Type	w. Degree	Ctry	EUREKA participant	Type	w. Degree
FR	Centre National de la Recherche Scientifique - CNRS	ROR	50,890	DE	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V.	ROR	1,502
DE	Helmholtz-Gemeinschaft (HHG)	ROR	42,221	IT	Consiglio Nazionale delle Ricerche - CNR	ROR	1,034
DE	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V.	ROR	39,762	FR	Thales Group	IND	824
IT	Consiglio Nazionale delle Ricerche - CNR	ROR	31,279	FR	COMMISSARIAT A L'ENERGIE ATOMIQUE (CEA)	ROR	781
ES	CSIC - Consejo Superior de Investigaciones Cientificas	ROR	26,252	FR	Centre National de la Recherche Scientifique - CNRS	ROR	719
FR	COMMISSARIAT A L'ENERGIE ATOMIQUE (CEA)	ROR	24,731	FI	Nokia Corporation	IND	709
NL	TNO - Netherlands Organisation for Applied Scientific Research	ROR	22,286	FI	VTT Technical Research Centre of Finland	ROR	696
FI	VTT Technical Research Centre of Finland	ROR	20,105	ES	UPM Universidad Politécnica de Madrid/Madrid Polytechnical University	EDU	680
DE	Max-Planck-Gesellschaft zur Förderung der Wissenschaften eV (MPG)	ROR	18,102	NL	TNO - Netherlands Organisation for Applied Scientific Research	ROR	666
GB	Imperial College London - ImperialCL	EDU	17,686	FR	EADS European Aeronautic Defence and Space Company	IND	657
EL	National Technical University of Athens (NTUA)	EDU	17,360	IT	ENEA - Ente per le Nuove tecnologie, Energia e Ambiente	ROR	652
BE	Katholieke Universiteit Leuven	EDU	17,207	NL	Philips NV	IND	637
DK	Technical University of Denmark - Danmarks Tekniske Universitet (DTU)	EDU	16,793	DE	Helmholtz-Gemeinschaft (HHG)	ROR	627
NL	Wageningen UR	EDU	16,557	AT	Technische Universität Wien/ Technical University Vienna (TU Wien)	EDU	619
UK	University of Cambridge (CU)	EDU	15,732	DE	Robert Bosch GmbH	IND	616

Table 1 records the Top 15 organisations in terms of their participations in the two programmes, with the coloured ones indicating appearance under the top in both. It can be seen that the FP ranking is highly dominated by large public research organisations, followed by a block of universities, and no firms. In EUREKA, large public research organisations also play an important role, though in a different order, while firms appear under the top in contrast to the FP. Only two universities are among the top 15 in EUREKA, also being different ones than coming in the top in the FP (UPM and TU Vienna). This points to interesting considerations in terms of overlapping and complementarity of the two programmes. Indeed, overlapping seems very small; only 6% of all FP participants are also participating in EUREKA, and 37% of EUREKA participants took part in FP. This becomes even more pronounced when looking at industry participants, with only 25% of firms participating in EUREKA also participate in the FP. The issue of multiply funded projects/organisations seems therefore not to be prevalent. In essence, the difference between FP and EUREKA lies not only in the participation intensity of different organisation types, but also within these types, the two programmes obviously address remarkably differing sets of organisations. The differing characteristics of these sets of organisation are indeed an interesting issue to be addressed in follow-up activities, given the possibility to inter-link with other datasets containing further organisational characteristics.

### 3 Conclusions

This policy brief has focused on a description of basic collaboration patterns in different European funding frames, comparing FP and EUREKA, positioned as illustrative example to point to the new potentials of the EUPRO database that records standardised project level information on a set of funding frames. The main conclusions are:

- The advancements of the EUPRO database on European R&D projects open up relevant new analytical possibilities in a policy context, in particular due to the intensive standardisation of organisations in terms of names, types and locations across funding frames and over a long-time period (from mid 1980s on).
- The illustrative analysis of the collaboration pattern between the FP and EUREKA underlines these potentials, bringing initial interesting results, while also pointing to important related questions.
- Considering participation patterns in terms of organisation type, the much stronger role of the industry sector in EUREKA is striking, both in terms of the number of participants and participation intensity. This is not surprising given the orientation of the programme, but evidenced for the first time in terms of number of distinct participants and participations in projects.
- From a geographical perspective, it is shown that UK-Germany is the most prominent link at country level in the FP, while it is Germany-Netherlands in EUREKA. Over the whole time period, UK is even the most central FP country in terms of cross-country collaboration intensity, bearing significant implications in the context of Brexit.
- Looking at overlapping and complementarity, interestingly overlapping between the two programmes in terms of which organisations are participating is quite minor, and even smaller for the industry sector.
- Thus, the differing orientations of the two programmes indeed manifest not only in terms of varying participation intensities of different organisation types; also within the same organisation type the sets of organisations addressed differ remarkably, pointing to some kind of functional complementarity between FP and EUREKA.

### 4 Implications

While the results presented in this brief are promising, it can be deepened in many ways to address further questions that appear. Main points in this context are:

- A deeper analysis of collaboration patterns across different instruments in terms of functional complementarity is crucial. This requires looking at collaboration networks at the organisational level, identifying 'gatekeepers' between the two programmes, as well as a typology of organisations participating in the two programmes, and of networks, e.g. industry-centric networks, scientific networks, hybrid networks, etc.
- The question of thematic and geographic overlapping complementarity increasingly arises, also in terms of the relation between European programmes and national ones. This requires the advancement of the datasets, e.g. by integrating national funding schemes, and in terms of thematic classifying, e.g. by topical classes related to Key Enabling Technologies or Societal Grand Challenges. The latter becomes specifically relevant in terms of recent debates legitimising RTI policy not mainly from an economic growth, but increasingly a societal challenge and transformative perspective (Weber and Rohracher 2012).
- The geography of the European research landscape in relation to different funding instruments is still underexplored, but an important question in terms of cohesion, integration and networking of new member states (see, e.g., Scherngell 2013). This requires further geocoding of participants information across different instruments, paving the way for more meaningful insights into geographical patterns at subnational level.

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[Note: Supplemental material on data collection and preparation available at AIT](#)