RISIS

RESEARCH INFRASTRUCTURE FOR SCIENCE AND INNOVATION POLICY STUDIES

RISIS DATASET EUPRO

WP5/WP8/WP9
OVERALL PROGRESS REPORT
REPORTING PERIOD 1 (January 2019 – June 2020)

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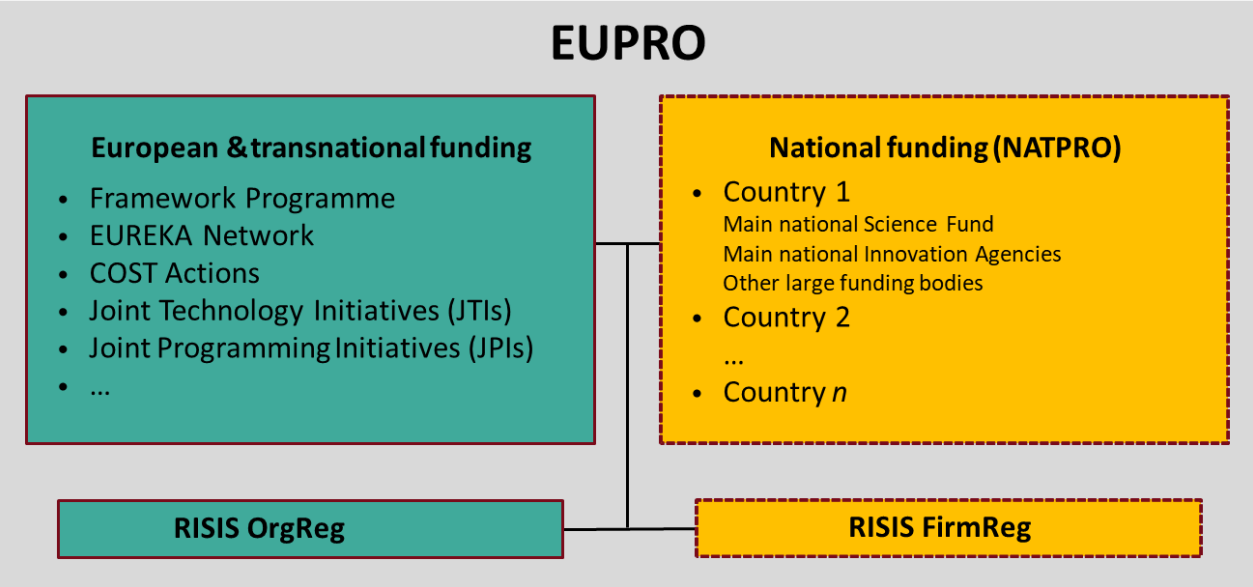
1. Introduction and overview

Nowadays, we can observe a strong consensus–that innovation is driven by knowledge creation in a web of collaborating organisations of different types, and at different geographical locations (see e.g., Powell and Giannella 2010, Cooke et al. 2011), often referred to as knowledge or R&D collaboration networks. Thus, the empirical investigation of such networks, in particular their dynamics, i.e. how they evolve over time, in technological and in geographical space, has attracted a great deal of attention in the past two decades from a scientific and a policy perspective (e.g. Scherngell 2013 for an overview). An important defining element in this context has been without doubt the development of large-scale, systematic datasets on R&D collaboration network. The EUPRO database has been designed from its very beginning back in 2005 to enable novel empirical research in this direction, and has meanwhile become a European standard for the empirical observation of publicly funded R&D collaboration networks of different type across Europe.

In essence, EUPRO comprises information on **R&D projects and all participating organisations** funded by different public R&D funding programmes, mainly the EU FP, but also COST, EUREKA and JTIs. EUPRO is maintained and regularly updated (annual additions of new information, see Section 2.1), and also constantly advanced by additional modules, most importantly the addition of national programmes next to European and transnational ones (see Section 2.2). Figure 1 provides a schematic illustration on the vision of EUPRO comprising an umbrella for systematic and cleaned information on project-based R&D projects and collaboration at different spatial levels.

Figure 1: EUPRO as an umbrella for datasets on project-based R&D collaboration in Europe



For the different funding programmes part of EUPRO, it basically covers information on:

- **projects** (such as project objectives and achievements, project costs, total funding, start and end date, contract type, information on the call), and
- **participations** (standardized name of the participating organization, contact person with contact details, organisation type, and geographical location)

With this information, EUPRO constitutes a window on the multi-faceted, and geographically dispersed R&D collaboration landscape. 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 the European Research Area (ERA) (see, e.g., Barber and Scherngell 2013, Hoekman et al. 2013, Scherngell and Lata 2013, Wanzenböck et al. 2014, Wanzenböck et al. 2015, Lata et al. 2015, Lepori et al. 2015, Wanzenböck and Piribauer 2016, Uhlbach et al. 2017, Villard et al. 2017). In a nutshell, these studies focus on the observation and modelling of integration processes in European R&D from different anchor points (e.g. geographical, technological, institutional, etc.), and the complex relationships of publicly funded R&D networks with (regional) knowledge creation and diffusion, as well as regional technological diversification tendencies.

Summarizing the main fields of application for which EUPRO has been used (also substantial by users in RISIS), we can distinguish the following main directions:

- Observing and characterizing **structure and dynamics of knowledge creation** and networks, disaggregated across different topics and/or geographical spaces (e.g. for climate change, biodiversity, Nanoscience)
- Observing **FP participation patterns and networking of firms** in specific industries (e.g. pharmaceutical and chemical industries)
- Using EUPRO to quantify and model **impacts of publicly funded R&D networks** on knowledge creation and technological diversification
- Analysis of **country-specific participation patterns in the FP**, with a special focus on topical orientation and main partners
- Investigating **R&D processes at the organisational level**, e.g. concentration processes of organisations (observed by demographic changes), topical/spatial R&D hot spots, etc. (e.g. on marine biotechnology, done by researchers from the EMBRIC project)
- Using real-world network data to test **novel statistical models for dynamic network analysis**, and to test these models in concrete empirical applications
- Tracing and investigating **characteristics of universities in terms of FP funding**, e.g. relation of FP funding to other university characteristics, disciplinary background of funding, etc.

For information on metadata please refer to the information on the RISIS Core Facility (RCF, https://rcf.risis2.eu/dataset/4/metadata), and for all technical details to the EUPRO technical documentation (https://zenodo.org/record/3337982). A basic tutorial for users can be downloaded under https://zenodo.org/record/3381058.

2. Activities and Developments in the first reporting period

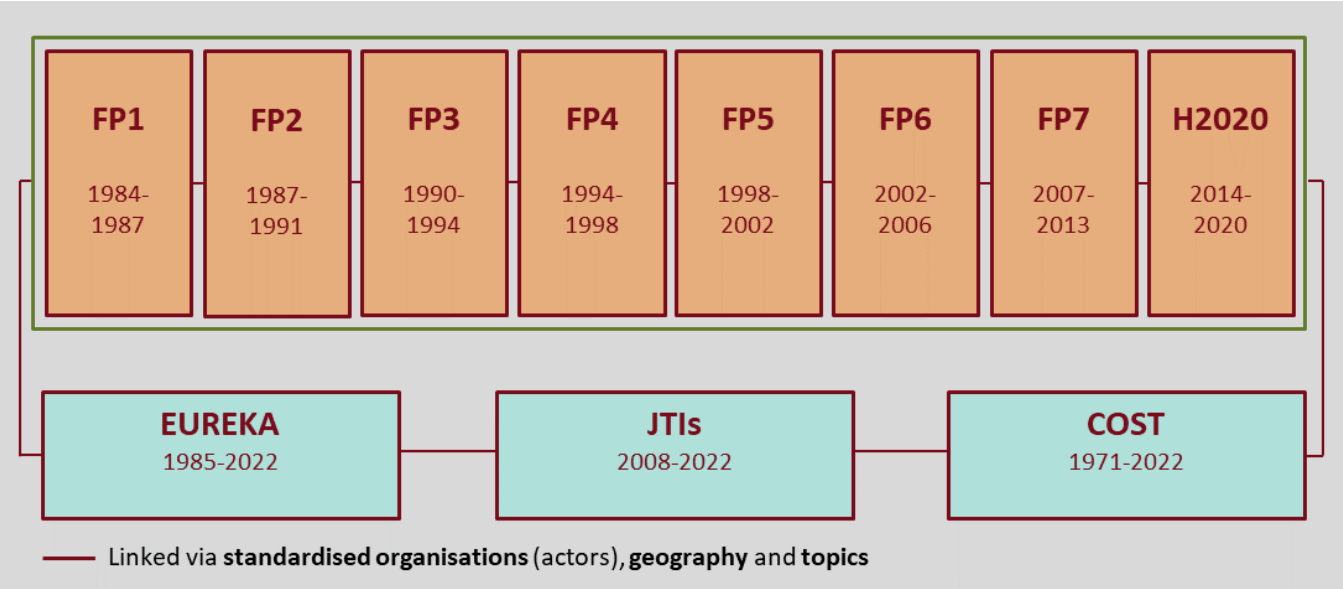
2.1. Maintenance

Core of EUPRO maintenance is the general update of the data foreseen at an annual basis, for some database modules bi-annual. Moreover, maintaining the updating of EUPRO in context of its standardisation with respect to the RISIS integrative dimensions (actors, geography, topics) has been

core of the maintenance activities in the first reporting period (see also Deliverable D5.2). Main maintenance activities accomplished until M18 include the following:

- The consolidated **documentation** for Access of EUPRO was provided in July 2019 (see https://zenodo.org/record/3337982)
- The **tutorial** for EUPRO was provided in August 2019 (https://zenodo.org/record/3381058)
- CORDIS **data extraction** for the newest batch of data on FP projects (data until 2018), cleaning, standardisation and harmonisation.
- **Annual update release** with new Framework programme (FP) data in June 2020 (featuring 8.755 new projects and 48.554 new participations).
- **Actors harmonization** (including the identification of unique organisation names, organisation types and demographic events) were sustained in order to be able maintain links with other datasets via RISIS OrgReg and FirmReg (for FP projects we standardize completely, i.e. beyond OrgReg and FirmReg).
- **Geocoding** has been sustained in order to be inter-operable with other datasets at different spatial levels of analysis. This means that updated projects and their participants were geocoded at the address level, using city to long-lat correspondence tables.
- **Topical annotation:** Core of new functionalities is the possibility to use EUPRO for topical analyses in a more robust and effective way, going beyond standard programme classification. Advancements of developed ontologies on KET and SGC in related projects (KNOWMAK) build an important starting point in this respect. First works in this direction have been done within RISIS-KNOWMAK, bringing rather acceptable results. However, to make it sustainable, in close cooperation with WP6 further robustness tests and evaluation of the assigned projects using ontologies were conducted in course of EUPRO maintenance.
- **Technical maintenance** has been assured, including updating of database systems, data base model etc. (see EUPRO documentation for details).

Figure 2: EUPRO coverage on European and transnational programmes by spring 2020



Notes: Externally linked to RISIS OrgReg and RISIS FirmReg as illustrated by Figure 1. With the 2020 release of EUPRO, 8.755 new projects and 44.123new participations from H2020 have been added to the database; the figure does not include projects from nationally funded programmes that are given in Table 1.

2.2. Deepening

With its original focus on Europe, EUPRO has become one of the main assets of empirical research investigating structure and dynamics of publicly funded R&D collaboration networks across the European territory (see Scherngell 2019 for an overview). However, in a policy context we can observe a debate on the interplay between European and national funding endeavours and its impacts on observed collaboration structures at different spatial levels. Moreover, the question whether knowledge transmitted through European networks can be diffused within countries–leveraged by nationally funded collaborative R&D–is high on the research agenda.

Against this background, we have chosen to follow the demand both from policy and the scientific community to **advance EUPRO in a direction to integrate R&D projects funded by national R&D funding channels, the so-called NATPRO module**. Given that national R&D funding systems are well endowed, and in magnitude of funding usually exceed the amount of European funding, this is a very effortful exercise that can only be addressed using existing RISIS resources, e.g. in terms of name matching (with RISIS registers), geocoding or topical assignment.

As in EUPRO as a whole, the main approach of the NATPRO extension is to collect data from the publicly available data sources from the web. This requires identifying national research funding organisations (RFOs), to screen the public availability of project data, and to evaluate potential alternatives (e.g. data collection via national contact persons in RFOs or public authorities). During the first 18 months of the project, a *pilot phase* for the NATPRO extension including five countries, **Austria, Czech Republic, Estonia, Germany and Italy, was successfully completed.**

While the approach for data collection and standardisation within this NATPRO extension follows the established methodology of the EUPRO framework, a main achievement of the pilot phase was the definition of the conceptual framework for the NATPRO development. A first version of this adapted conceptual framework was established in Q2 2019 before the start of the data screening and collection. It was in course of the data collection for the pilot countries (Q3 2019 to Q2 2020) further refined, resulting in a **working paper on the conceptual framework for NATPRO** (https://zenodo.org/record/3907421).

Another focus of the first 18 months was the analysis of the R&D policies in new Member States (NMS) in terms of a characterization of the changing policy landscape of R&D policies and the identification and description of research funding structures and organizations. This analysis resulted in a **working paper on R&D policies in NMS** (https://zenodo.org/record/3906234), summarizing the governance of R&D policy, the R&D funding structure (national funds, structural funds, international funding) and data availability for each NMS. The first version of this working paper (Q2 2019) was a main input for definition of pilot countries from the NMS and the final version will also be the systematic base for the data collection in additional NMS from Q3 2020 onwards.

The identification of main RFOs and the investigation of data availability and quality country-by-country for the defined pilot countries was another major achievement of the first project period. This included the systematic assessment of public data availability, access conditions, included variables, data format and coverage and was performed in Q1and Q2 2019. The results of this data assessment were collected in a **data report** providing the base for the actual data collection and summarizing data coverage on a country by country base. The findings of this data assessment were also of crucial importance for the development of the conceptual framework as mentioned above, e.g. in terms of the variables included into NATPRO.

We concluded, that the set of core variables needed for the defined aims of NATPRO can be collected for all pilot countries and that additional variables will be collected, if available, for the respective country. In terms of the actual data collection process (for pilot countries from Q3 2019 to Q2 2020),

we differentiate not only between different modes of access (download vs. web-scraping) but also between countries with a national research information system (NRIS), e.g. Czech Republic and Estonia, and without (other pilot countries) such a database. Both, different access conditions and the existence of NRIS in turn implies different strategies not only for data collection but also the transformation of unchanged raw data into the NATPRO database structure and variables (separated tables for projects, participations and programmes). The process of data collection and transformation was followed for each source dataset by a process of data cleaning (e.g. organization names) and semi-automated name matching to OrgReg (Q4 2019 onwards). In course of this process, the established tools and processes of EUPRO were successfully adapted to the needs of NATPRO. All findings from the actual data collection and the transformations performed were systematically documented country-by-country in the data report.

The status and outcome of data collection, followed by cleaning, standardisation and glocalization of project-based information for the pilot counties processing is summarized in Table 1. A major major achievement constitutes the collection of 150k+ participations of R&D projects funded by DFG in Germany via web scraping techniques.

Table 1: NATPRO pilot phase

Country	Status of data collection	Number of Projects	Number of Participations	Overlap with OrgReg*	Time Coverage
Austria	Matched to OrgReg	17,331	24,581	16,395 (69%)	1995-2020 (FWF), 2015-2020 (FFG)
Czech Republic	Matched to OrgReg	37,848	62,214	44,041 (71%)	2000-2020
Estonia	Matched to OrgReg	3,583	4,156	3,704 (89%)	2000-2020
Germany	Matched to OrgReg	124,590	151,521	tba	1999-2020
Italy	Data collected, cleaning and matching ongoing	690	tba	tba	2010-2015 (PRIN programme)

*participations covered by organisations included in OrgReg

2.3. Access and usages

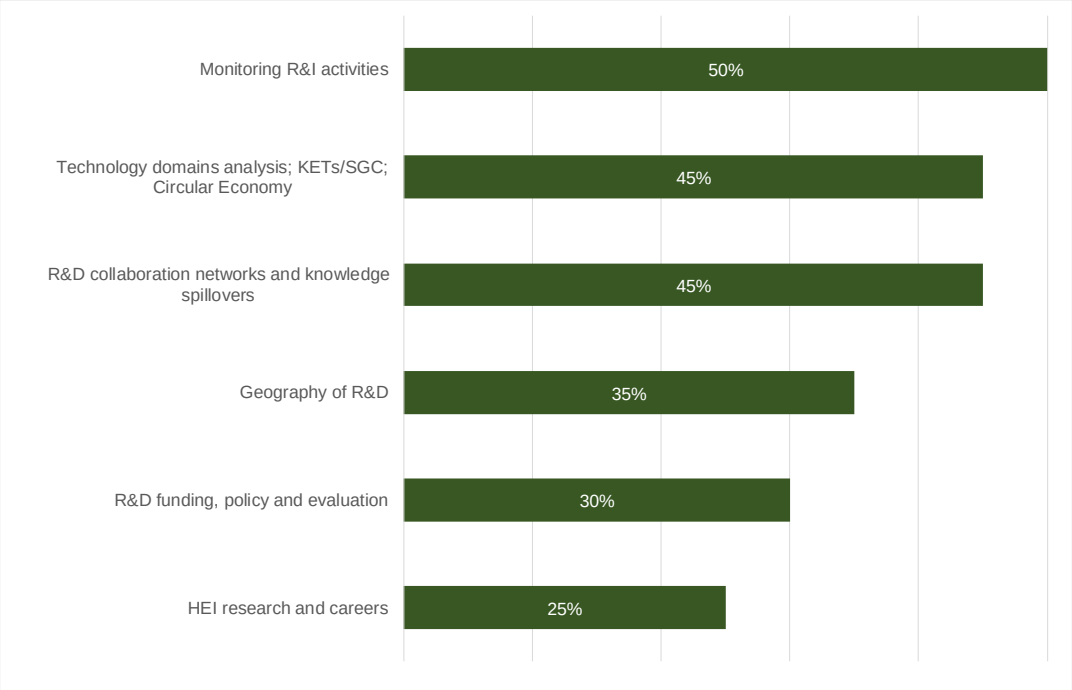
The advancements of EUPRO that have been pushed forward and implemented within RISIS as described in the previous sections have underpinned and consolidated its significance for studying dynamics of R&D collaboration networks across Europe. This has not least been demonstrated by an increased number of access requests and usages of the dataset in RISIS over the past 18 months, and by recent research endeavours from the dataset developers at AIT, many of them published in leading international journals and/or presented at international conferences (see references in this report for selected examples).

Over the past 18 months (January 2019 to June 2020), EUPRO has received in total **20 access requests**, where users ask to apply the database in different, quite comprehensive research projects (**see the list of access requests and respective research projects in the Appendix**). Reviewing these external usages, EUPRO has received access requests both by researchers from the scientific peer community in S&T studies, but also from related scientific communities, in particular economic geography and regional science. About a quarter of the access requests have been handled as physical visits (with the user being supported physically at AIT in accessing and using the data), while for the majority of the projects, data have been provided at distance.

The attractiveness of EUPRO–both as core facility as additional element–is demonstrated when considering the access requests by their manifold thematic foci. They are not only of high scientific originality, but also of great relevance in a European policy context. Figure 3 provides an overview on the thematic foci of the access requests to EUPRO so far.

It can be seen that most projects deal with **monitoring R&I activities**. Here we find classical regional or national innovations systems and policy analysis (where R&D collaborations are considered as central), such as one project on the state of research and innovation in Italy, or–in combination with the following category on technology domains–projects–focusing more on sectoral innovations systems. The second most usage of EUPRO falls in the category of **R&D collaboration and funding activities in specific technological domains**, among them most notably Key Enabling Technologies (KETs) and Societal Grand Challenges (SGGs), but also specify types of social or economic systems, such as circular economy. Interestingly, projects in this category are both applied at the system level of analysis, but also from the perspective of specific research organisations (e.g. the project on the identification of research performed at Aalto University around SGC and KET). Other projects deal with a systemic analysis of a specific technology in Europe, prominently represented bio- and pharma domains, energy and transport, specifically aerospace. Note that the essential pre-condition for addressing such topics is one important enrichment of EUPRO, namely the topical assignment of data record (R&D projects) to these topics by means of RISIS ontologies.

Figure 3: Thematic focus of access requests to EUPRO (as share of the 20 total requests; multiple assignments allowed)

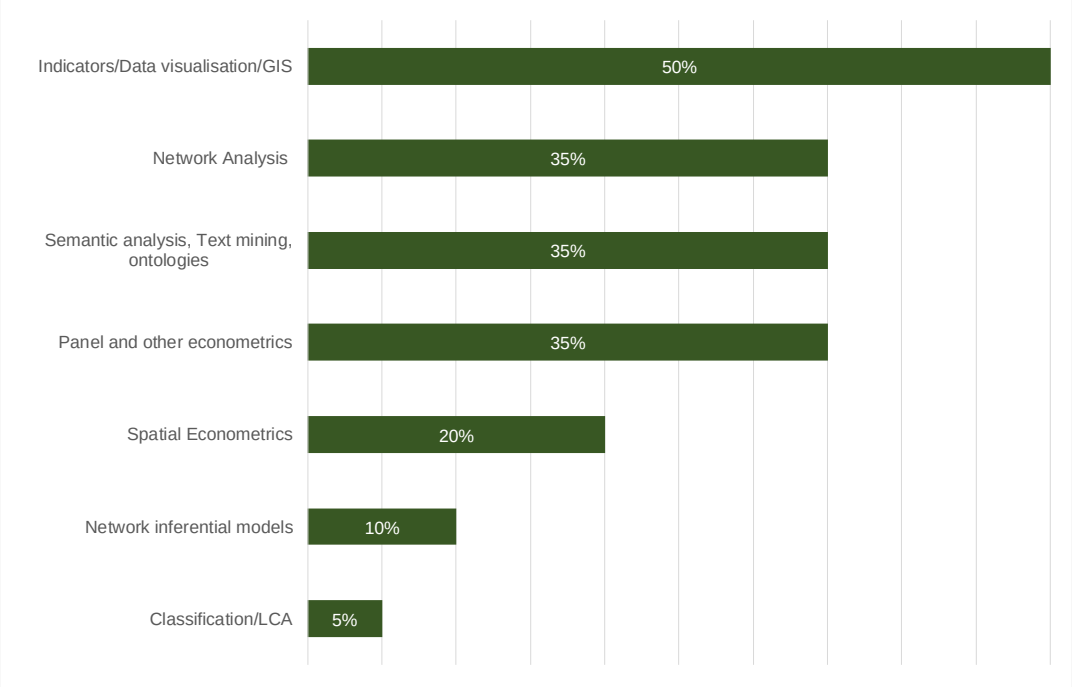


At a more specific and narrow level, we find a strong focus of the research projects using on **structures and dynamics of R&D collaboration networks**, and on the **geography of R&D**. Both entry points are highly related to advancements of EUPRO further triggered within RISIS, namely the standardisation of organisation names (as a pre-requisite for meaningful network analysis), and the geocoding of participants to the collaborative R&D projects. From a network perspective, we find on the one hand projects that aim to investigate the relation between observed network dynamics and–broadly speaking–the socio-economic development of regions or countries (e.g. one project about regional resilience and networks), and, on the other hand, projects that try to explain the drivers of the positioning of specific organisations in R&D collaboration networks (e.g. on project dealing with the role of reputational proximity in multi-scalar R&D networks). The projects with a geography of R&D

focus range from studies that want to investigate knowledge dynamics in Europe at regional level analysis to endeavours focusing on the geographical distribution of networks (as channel for knowledge flows), both its links (collaboration) and its nodes (research organisations). Finally, a smaller number of projects are located in the fields of **R&D funding analysis, policy and evaluation**, and in **higher education research** and careers.

Next to the thematic foci, it is interesting to look at the methods that are being used in these research studies. This is not only of content-wise interest, but also shows whether the setting of EUPRO (e.g. geographical and time coverage) and its quality makes it eligible for advanced quantitative methods to be employed. Figure 4 provides an overview on the different methodological directions followed in the projects. We can observe that EUPRO is heavily used for **indicators calculation and interpretation**, including data visualisation, in particular with geographical information systems (GIS). Then, we find naturally a strong focus on descriptive **network analytic techniques** (mainly from Social Network Analysis), but also on the usage of **text analytic techniques** to investigate specific thematic and or technological fields. In terms of explanatory methods, we can find a significant number of projects employing **panel or other econometric models** (underlying the importance of having sufficient time coverage), and **spatial econometric models** (underlying the importance of geocoding and assignment to discrete spatial units, e.g. metropolitan areas). Some projects also have used **network inferential models** and **latent class analysis** (LCA).

Figure 4: Methods used focus of access requests to EUPRO (as share of the 20 total requests; multiple assignments allowed)



Another element that have become specifically salient in these recent usages of EUPRO is the increase of **joint usages with other RISIS datasets** or external datasets of the user. Particularly important becomes the joint usage of EUPRO with other R&D output oriented datasets of RISIS, i.e. on patents and publications. About one quarter of all projects deal with such joint usages, most of them located in the field of R&I monitoring, where research and innovations systems are analysed combining information on R&D projects, patents and publication, e.g. one project on different types European regions in terms of their knowledge production characteristics. Some of these projects also focus on a specific technological domain, e.g. one project about the geography of interactions between science and corporate technology in the pharmaceuticals and chemical sector.

Some research highlights

To make the usages of EUPRO more tangible, we want to briefly present some highlights from these ongoing research studies. A first study deals with **determinants of R&D collaboration networks in KETs**, with a special focus on spatial separation and network structural effects. Results underline both, the significance of geographical barriers and network structural effects and confirm that network effects are able to compensate for geographical barriers–throughout all technologies investigated, although the effects differ in magnitude. However, when two regions are dissimilar in their network centrality, the potential to reduce negative geographical effects is relatively lower.

This example is illustrative insofar as it mobilizes several elements of EUPRO that have been implemented with the support of RISIS resources (geocoding, topical assignment to KETs), und uses these information for original empirical applications to be published in scholarly journals. Figure 5 shows one demonstrative element of this research visualizing the spatial distribution of the KET networks under consideration revealing the Paris region as dominating hub in all networks, showing the characteristic star-shaped backbone structure. Nevertheless, the R&D networks differ with respect to density, variance in number of collaborations, spatial scales and importance of certain regions (e.g. London in the case of Nanotechnology and Biotechnology; for further details on the approach, data and method: https://zenodo.org/record/3451860)

A second illustrative example is a research work investigating **the role of networks for exploitation and exploration of regional knowledge creation**. It lies in the vein of studies recognizing the beneficial effect of R&D networks on regional knowledge creation, but argues that the significance and strength of the effect differs for different modes of knowledge creation–exploitative and explorative–as well as for the quantity and quality of knowledge created. To explore these differences, the study estimates a set of spatial autoregressive (SAR) models for European regions with varying network effects that are based on a region's network centrality in the cross-region R&D network of the EU Framework Programme (FP). The results are very interesting in a policy context as they point consistently to a higher positive impact of regional network centralities on explorative than exploitative knowledge creation. Moreover, the quantity and quality of newly created knowledge is found to be conversely affected by the regional network centralities considered. Interestingly, a high number of links (degree centrality) has in relative terms higher positive effects on the quality, rather than the pure quantity of knowledge outputs, while an authoritative network position is more conducive for increasing the quantity than the quality of knowledge. Looking at agglomeration effects, it is shown that exploitation is driven by spatial spillovers from neighboring regions–though much more for quantity than quality of knowledge–while such agglomeration effects are not identified for knowledge exploration.

An exemplifying element of this second research work is illustrated in Figure 6. It shows the spatial distribution of the effect estimates of the spatial model, i.e. showing which regions have benefitted most in their knowledge production outputs from a specific central positioning in European FP networks in terms of the different categories considered, exploitation-quantity (share of patents), exploitation-quality (share of high quality patents), exploration-quantity (share of publications), exploration-quality (share of high impact publications). The most interesting insights are that lagging regions tend–in relative terms–to benefit more from a central positioning in European FP networks than leading regions. However, more regions are able to gain higher effects in terms of quantity, i.e. easier to increase quantity based on networks than quality (since for quality face-to-face is still very important). On a side note, UK regions are among the top benefitting regions of participating in FP networks, which bears of course important conclusions in context of Brexit (for further details on the approach, data and method: https://zenodo.org/record/3724562).

Figure 5: R&D networks in six KETs as identified from EUPRO (Neuländtner and Scherngell 2019)

(a) Nanotechnology

(b) Micro- and Nanoelectronics

(c) Photonics

(d) Advanced Materials

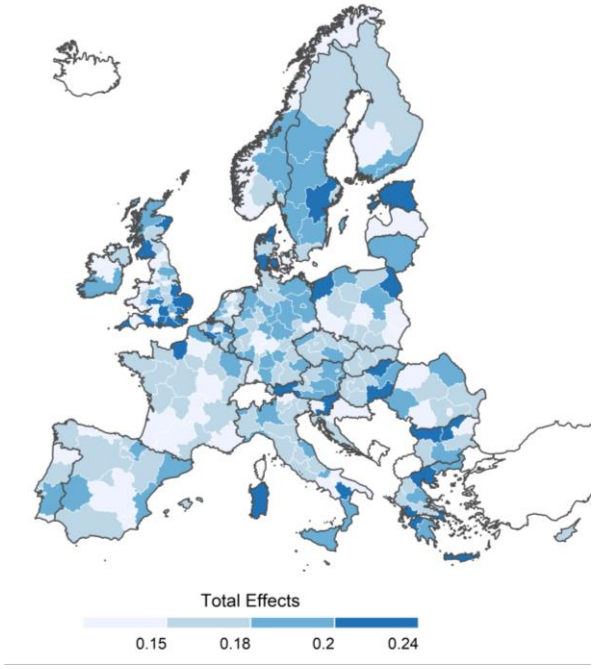
(e) Advanced Manufacturing Technology

(f) Industrial Biotechnology

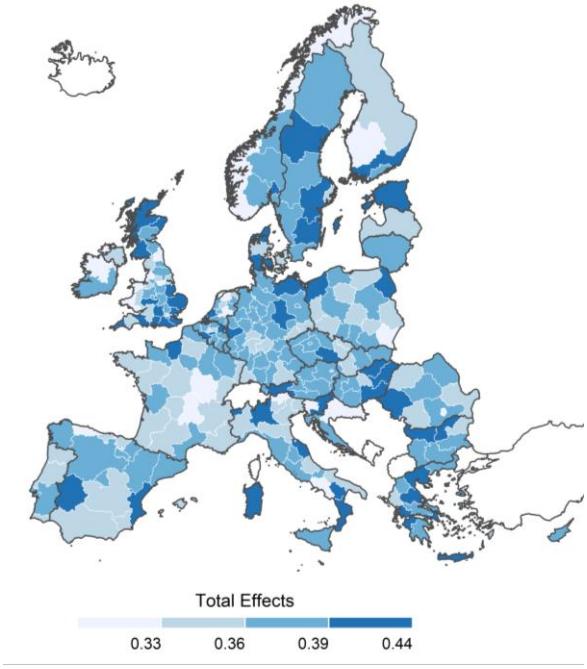
Note: Only top 95% of links in terms of collaboration frequency are displayed

Figure 6: Effects of participation in FP networks (degree centrality) on knowledge creation

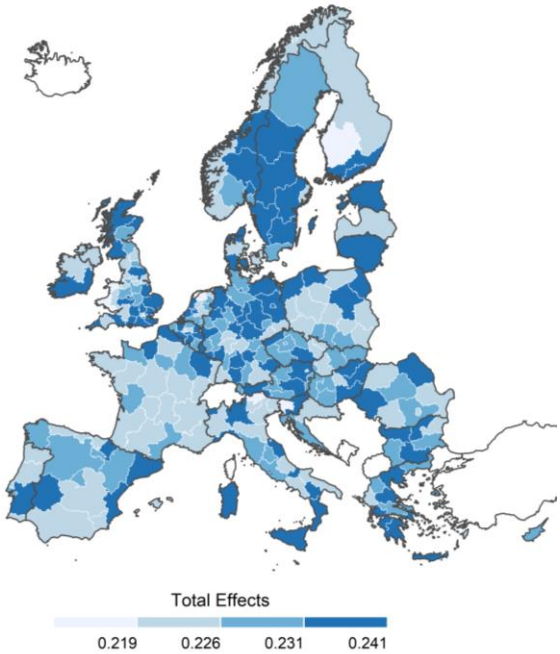
Exploitation - Quantity



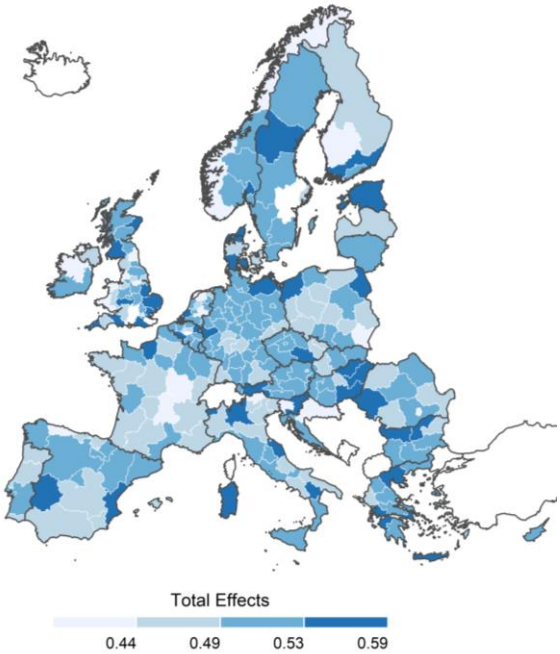
Exploitation - Quality



Exploration - Quantity



Exploration - Quality



Notes: Grouping of variables by means of natural breaks

3. Outlook and next steps

EUPRO will follow the path taken in maintenance and deepening as described in the respective consolidated workplans (see Deliverable D5.1 and Deliverable D5.2 for maintenance, and Deliverable D9.1 for deepening). Main elements in this respect is the further update with R&D projects of the European and transnational programmes (next release in Q2 2021 including updated FP and EUREKA data), and the extension with nationally funded projects (NATPRO).

In the latter context, the most important step will be the implementation of data collection processes of remaining European countries, based on the lessons learnt from the pilot phase that have been finalized in M18 of the project. In a scientific and policy context, the exploitation of this new database module will be a priority in future applications, e.g. on questions of complementarities and alignment between European and national funding in specific countries. This is intended to be illustrated by some policy briefs that should be disseminated to the policy community using the RISIS communication and dissemination channels.

As what concerns the integration in RCF, EUPRO considers itself as a test database to be used for testing functionalities in RCF, in particular data store and online user space including data extraction. In this sense, EUPRO is planned to be fully integrated in RCF as complete database, providing all the possible analytical and substantive dimensions to users.

4. List of milestones and Deliverables (WP5, WP9)

Deliverables

- EUPRO contribution to Deliverable D5.1: Consolidated work plan on Maintenance (submitted)
- EUPRO contribution to Deliverable D5.2: First interim report on Maintenance of RISIS core datasets (submitted)
- EUPRO contribution to Deliverable D9.1: Consolidated work plan on Maintenance (submitted)

Milestones

MS11: 1st Annual update of CWTS Pub, EUPRO & SIPER (accomplished in time, see Section 2.1)
MS25: NATPRO with pilot countries part of EUPRO (accomplished in time, see Section 2.2)

5. List of accesses

Applicant	Applicant institution	Project Title	Date
Özgür Kadir Özer	Middle East Technical Univ. (Ankara)	The Effect of Participating in EU Framework Programmes on The International Collaboration Pattern of Turkish Universities	06/2020
Giulio Marini	University College London	Gender differences along academic careers: achievement of external grants, scientific productivity and career progression	04/2020
Ludgero Glórias	ISEG (Lisbon)	Knowledge Spillover using a non-linear Spatial Lag Exponential Model	04/2020
Shamiram Abdulahad	TNO (Utrecht)	Collaboration in the Circular Economy in the Netherlands; A Proximity Approach	04/2020
Aliakbar Akbaritabar	DZHW (Berlin)	Determinants and Effects of Cooperation in Homogeneous and Heterogeneous Research Clusters	03/2020
Patricia Laurens	Université Gustave Eiffel (Paris)	The geography of interactions between Science and Corporate Technology: A case study on Pharmaceuticals and Chemical sectors	02/2020
Sonia Mena	CWTS/UL (Leiden)	How evaluation shapes ocean science. A multi-scale ethnography of fluid knowledge.	02/2020
Vladimir Cvijanović	EFIS Centre (Brussels)	High-level BSR value chain mapping exercise	01/2020
Denisa Naidin	Université Toulouse 1	Innovation management in the space sector	01/2020
Giuseppe Calignano	University of Vienna	The geography of reputation and the role of reputational proximity in multi-scalar R&D networks	12/2019
Antonio Zinilli	IRCRES (Rome)	The geography of European Universities collaborations at NUTS2 level: Patents, Publications, and Project Networks	11/2019
Massimiliano Guerini	Polimi (Milan)	An analysis of knowledge production in Europe	11/2019
Leena Huiku	Aalto University	The identification of research performed at Aalto University around Social Grand Challenges and Key Enabling Technology: Ontology-driven analysis	10/2019
Jason Roncancio	Vrije Universiteit Brussels	Innovation dynamics of developed and emerging economies: a comparative study between Europe and Latin america.	07/2019
Iris Wanzenböck	Utrecht University	Knowledge network dynamics in the presence of shocks: A network-based approach to regional resilience	06/2019
Marco Cavallaro	USI (Lugano)	Impact of national economic, political and institutional factors on European Framework Programmes participation	05/2019
Majd Allam	Sapienza (Rome)	Offshore renewable energy in the Mediterranean Sea	04/2019
Robert Magnuszewski	Sapienza (Rome)	European Aerospace Industry Analysis	03/2019
Allan Dahl Andersen	TIK (Olso)	European S&T funding and the direction of the Energy Transition: The case of electricity networks	03/2019
Antonio Zinilli	IRCRES (Rome)	Report on the state of research and innovation in Italy	02/2019

References

Barber, M., Guffarth, D. and Scherngell, T. (2015): Determinants of spatial distribution of European aerospace: contrasting R&D and supply. 55th Congress of the European Regional Science Association, 26-29 August, Lisbon, Portugal, 2015

Barber, Michael J., and Thomas Scherngell. "Is the European R&D network homogeneous? Distinguishing relevant network communities using graph theoretic and spatial interaction modelling approaches." Regional Studies 47.8 (2013): 1283-1298.

Cooke, P., Asheim, B., Boschma, R., Martin, R., Schwartz, D., & T_dtling, F. (Eds.). (2011). Handbook of regional innovation and growth. Edward Elgar Publishing.

Freitas, F. and Carrozza, C. (2017): Tracing research and development impacts using geographic data and a FP7 dataset. 2017 Annual Conference of the EU-SPRI Forum, June 7-9, Vienna Austria

Heller-Schuh, B., Dünser, M. and Lepori, B. (2017): Concentration processes and its effects on research performance: Evidence from European public sector research organisations. STI 2017, Paris, 6-8 September

Hoekman, J., Scherngell, T., Frenken, K., & Tijssen, R. (2013). Acquisition of European research funds and its effect on international scientific collaboration. Journal of economic geography, 13(1), 23-52.

Lata, R., Scherngell, T. and Brenner, T. (2015): Integration Processes in European R&D: A comparative spatial interaction approach using project based R&D networks, co-patent networks and co-publication networks, ***Geographical Analysis*** 47, 349-375

Lepori, B, Veglio, V., Heller-Schuh, B., Scherngell, T. and Barber, M. (2015): Participations to European Framework Programs of Higher Education Institutions and their association with organizational characteristics, ***Scientometrics*** 3, 2149-2178

Lepori, B., Heller-Schuh, B., Scherngell, T. and Barber, M. (2014): Understanding factors influencing participation in European programs of Higher Education Institutions. STI conference 2014, 3-5, September, Leiden, Netherlands

Robinson, D., Schoen, A., Laurens, P. and Laredo, P. (2017): Developing global and local STI indicators for profiling the territorial embedding of marine biotechnology research centres. STI 2017, Paris [Fr], 6-8 September

Powell, W. W., & Giannella, E. (2010). Collective invention and inventor networks. In Handbook of the Economics of Innovation (Vol. 1, pp. 575-605). North-Holland.

Scherngell, T. (2019): The geography of R&D collaboration networks. Fischer M.M. and Nijkmap P. (eds.) Handbook of Regional Science, Springer, Berlin forthcoming

Scherngell, T. (Ed.). (2013). The geography of networks and R&D collaborations. Berlin, Heidelberg/New York: Springer.

Scherngell, T., and Lata, R. (2013). Towards an integrated European Research Area? Findings from Eigenvector spatially filtered spatial interaction models using European Framework Programme data. Papers in Regional Science, 92(3), 555-577.

Wanzenböck, I., Scherngell, T. and Brenner, T. (2014): Embeddedness of regions in European knowledge networks. A comparative analysis of inter-regional R&D collaborations, co-patents and co- publications, ***The Annals of Regional Science*** 53, 337-368

Wanzenböck, I., Scherngell, T. and Lata, R. (2015): Embeddedness of European regions in EU funded R&D networks: A spatial econometric perspective, ***Regional Studies*** 49, 1685-1705

Wanzenböck, I. and Piribauer, P. (2017): R&D networks and regional knowledge production in Europe. Evidence from a space-time model. ***Papers in Regional Science*** [doi 10.1111/pirs.12236]

Wanzenböck, I., Scherngell, T. and Dünser, M. (2017): Impacts of EU funded R&D networks on the generation of Key Enabling Technologies: Empirical evidence from a regional perspective, EMAEE Conference 2017, Strasbourg [FR], 31 May 2017

Wanzenböck, I., Scherngell, T. and Dünser, M. (2017): RTI policy for co-creation activities and its effects on Key Enabling Technologies: Regional evidence from the 7th EU Framework Programme. 2017 Annual Conference of the EU-SPRI Forum, June 7-9, Vienna Austria

Uhlbach, W.-H., Balland, P.-A. and Scherngell, T. (2017): The effects of the European Union Framework Programmes on the technological diversification of European regions. 2017 Annual Conference of the EU-SPRI Forum, June 7-9, Vienna Austria

Uhlbach, W.-H., Balland, P.-A. and Scherngell, T. (2017): R&D Policy and Technological Trajectories of Regions: Evidence from the EU Framework Programmes. STI 2017, Paris [Fr], 6-8 September

Villard, L., Perruchas, F., Scherngell, T., Barber M. and Laredo, P. (2017): The role of European Programmes in the European distribution of knowledge, the case of nanoscience and technology. STI 2017, Paris [Fr], 6-8 September