

RISIS



RESEARCH INFRASTRUCTURE FOR SCIENCE
AND INNOVATION POLICY STUDIES

DOCUMENTATION OF RISIS DATASETS *EUPRO*

B. Heller-Schuh (AIT), M. Barber (AIT), T. Scherngell (AIT), G. Zahradnik (AIT)
28/06/2019



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 824091



Outline

1	Basic Characteristics.....	2
2	Database content.....	2
2.1	Definition and description of observations.....	2
2.2	Data acquisition and processing (e.g. data cleaning).....	4
2.3	Information on all variables/indicators.....	5
2.3.1	FP 8.3.1.....	5
2.3.2	EUREKA 2.1.....	8
2.3.3	JTI 1.0.....	10
2.3.4	COST 1.0.....	11
2.4	Sectorial, temporal and geographical coverage.....	12
2.5	Quality and accuracy of data.....	17
3	Technical Specifications.....	20
3.1	Information on the data base system.....	20
3.2	Technical variable definition.....	20
3.3	Description of the Entity Relationship Model.....	22
3.4	Interfaces for access and to other infrastructures.....	24
4	Scientific use cases and main references.....	25
	Appendix.....	0

1 Basic Characteristics

Name and short description of the infrastructure

The development of the EUPRO database has been started by AIT back in 2005 comprising information on R&D projects and all participating organizations funded by the European Framework Programmes (FP). Within RISIS I, EUPRO has been extended significantly by including data of other European funding initiatives.

Currently EUPRO consists of the following four programme modules:

- data on FP projects (1984-2016), including H2020 as the main update to the prae-RISIS version of EUPRO,
- data on R&D projects funded by EUREKA (1985-2016), an intergovernmental network supporting market-oriented R&D and innovation projects across all technological sectors,
- data on R&D projects funded through the Joint Technology Initiatives ARTEMIS, ENIAC and ECSEL (JTI) (2008-2014), long-term public-private partnerships, which support large-scale multinational research activities in areas of major interest to European industrial competitiveness and issues of high societal relevance, and
- data on R&D actions funded by the European Cooperation in Science and Technology (COST) (1971-2014), a pan-European networking initiative supporting transnational cooperation among researchers, engineers and scholars across Europe.

Aim of the database

The EUPRO database is a significant asset of the Center for Innovation Systems & Policy of AIT used for basic oriented research projects and contract research for national and international customers, such as the European Commission. It facilitates the analysis of participation patterns of organisations in and across different European funding initiatives and the investigation of collaborative network structures, including their evolution over time and the development of the European Research Area (ERA).

Legal name of operating organization

The database is operated and maintained by AIT Austrian Institute of Technology GmbH, located at Giefinggasse 4, 1210 Vienna, Austria.

2 Database content

2.1 Definition and description of observations

Units and definition of observations

Basically, EUPRO 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 **participants** (standardized name of the participating organisation, organisation type, and geographical location).

According to different funding principles, the four individual EUPRO programme modules differ slightly in structure and content and comprise the following information:

1. FP

- *programmes*: start and end date, previous and successor programmes, programme funding and objectives
- *projects*: project objectives and achievements, project costs, total funding, start and end date, contract type, information on the call
- *organisations*: names of the participating organisations, organization type and legal seat
- *participations*: address of the participation entity of the organisation, and geographical location, project funding on the participants level
- *project output*: title, year, authors and URLs of report summaries, results in brief and (open access) publications

2. EUREKA

- *projects*: title, objectives, technology and market area, start and end date, duration, project costs
- *participations*: name, organisation type, role in project, address, website
- *funding countries*: involvement in EUREKA, description of national EUREKA funding framework and conditions
- *national funding schemes*: instrument name, name of RFO, description of general procedures, funding eligibility, restrictions, share of funding by type of participating organisation

3. JTIs

- *programmes*: name and call of JTI, JoREP link (programme ID and call ID) for further information on JTI
- *projects*: project title, start date, duration, eligible project costs, European and national funding
- *participations*: name, country of origin, eligible costs, European and national funding on the participants level

4. COST

- *actions*: title and objective, science fields, start and end date
- *parties*: participating eligible countries and non COST institutions
- *management structure*: organisation name, title, address and type of membership in the management committee

Number of observations

EUPRO comprises information on **96,674 projects** and **526,564 participations**.

Table 1 disaggregates the units of observation by different FPs and other European funding initiatives.

Table 1: EUPRO database - number of projects and participations

Programme	Period	Projects	Participations
FP1	1984 - 1987	3,348	7,972
FP2	1987 - 1991	3,987	19,184
FP3	1990 - 1994	5,474	30,768
FP4	1994 - 1998	14,524	67,831
FP5	1998 - 2002	16,026	78,562
FP6	2002 - 2006	10,100	75,278
FP7	2007 - 2013	25,730	138,254
H2020*	2014 - 2016	11,476	49,704
EUREKA	1985 - 2016	4,853	20,778
JTIs**	2008 - 2014	133	2,612
COST	1971 - 2014	1,132	35,543
Total	1971 - 2016	96,674	526,564

Note: *until December 2016, **Including ARTEMIS (calls 2009-2013), ENIAC (calls 2008-2013), ECSEL (2014)

2.2 Data acquisition and processing (e.g. data cleaning)

Where the data are retrieved from

The data on FP projects, EUREKA, JTIs and COST actions are publicly available. We used a wrapper a type of web scraping program to extract and structure the information from the different programme websites in an automated way. In order to do this, the wrapper opens each project webpage and parses the HTML content. As each webpage follows the same structure it is easy to guide the wrapper to the relevant information, which is then stored in a relational form.

The core data sources for the construction of the four components of EUPRO are:

- CORDIS projects database (<http://cordis.europa.eu/>) for **FP** projects. Raw data of the current version (FP 8.3.1) was downloaded via web scraping in December 2016.
- Project level data for **EUREKA** has been retrieved from the EUREKA website (<http://www.eurekanetwork.org/eureka-projects>). Raw data of the current version (EUREKA 2.0) was downloaded via web scraping in January 2017.
- Project level data for the three **JTI** ARTEMIS, ENIAC and ECSEL has been retrieved from the respective programme websites (<https://www.artemis-ju.eu>; <http://www.eniac.eu>; <https://www.ecsel.eu>). Raw data of the current version (JTI 1.0) was available in PDF-format and was downloaded in May 2017.
- Project level data for **COST** actions has been retrieved from the COST website (<https://www.cost.eu>). Raw data of the current version (COST 1.0) was via web scraping in May 2014.

How the data are processed in terms of data cleaning

The quality of the raw data extracted from the different programmes websites is not generally sufficient for policy-relevant analyses. AIT has undertaken substantial efforts to improve quality and the level of standardisation of the data and to retrieve and add missing data. Data quality was improved by harmonizing different spelling and language variants of organization names and by extending, cleaning and harmonizing the type of participating organizations.

Data cleaning and standardisation includes three major steps:

- identification of unique organisation name,

- identification of unique organisation type, and
- regionalisation (i.e. geocoding of addresses and assignment to (adapted) European NUTS regions).

The harmonisation of organisation names and the integration of new data is ultimately manual, but supported by applying specific matching algorithms developed by AIT. These algorithms are based on statistical properties such as the frequency of adjacent characters in the organisation names and are used to identify similar organisation names that can be attributed to the same organisation. All algorithmically identified name matches are manually checked for accuracy.

For the data regionalisation we used RISIS developed geolocalisation tools, specifying their geographical locations by giving their latitude and longitude coordination. This facilitates all kind of spatial analyses of project based R&D networks, e.g. the investigation of the network at the level of functional urban areas. .

2.3 Information on all variables/indicators

2.3.1 FP 8.3.1

Table 2: Description of variables providing information about programmes (FP)

Variable	Description
FP_ID	code (1-8) for the names of the specific framework programme types FP1 to FP7 and H2020 in which the subprogramme were funded
PrgShortName	subprogramme acronym in the framework programmes (e.g., FP7-Health)
ProgrammeLink	official website of the subprogramme
ProgrammeFullName	full name of the subprogramme areas in each of the framework programmes
DateFrom, DateTo	day, month and year of subprogramme start and end
PreviousProgramme	acronym of the predecessor subprogramme
SuccessorProgramme	acronym of the successor subprogramme
ProgrammeFunding_inMillion	financing contribution of the European Union to the complete subprogramme
OfficialJournalReference	reference to the Official Journal of the EU, the main source of the EUR-Lex content
OfficialJournalReference_Date	date of Reference
LegislativeReference	reference to EUR-Lex (eur-lex.europa.eu)
LegislativeReference_Date	date of Reference
Objective, Abstract, Subdivision, Implementation, Remarks	detailed description of the subprogramme, its objectives, subdivisions and implementation
Subjects	one or more of 69 standardized keywords characterizing the conceptual orientation of the subprogramme

Table 3: Description of variables providing information about projects (FP)

Variable	Description
RecCtrNr	unique identifier (record control number) for each project in the database, identical with unique identifier of all projects in the CORDIS projects database; corresponds with the entries in the field RecCtrNr in the participations table (Table 5)

ProjectReference	(not-unique) project index, for internal use in the European Commission (matches with Project Id in CORDA)
Title	Full title of the project
ProjAcr	(non-unique) project acronym or abbreviation of the project title
Start Date, End Date	day, month and year of project start and end
Duration	duration of the project in months (data provided by cordis)
TotalProjectCosts	official project costs as indicated in the project proposal
ProjectEUFunding	financing contribution of the European Union; since not all projects are financed completely, figures in Project Funding are equal to or smaller than figures in Project Cost.
TopicsCodes	topic identifier within H2020 subprogrammes
TopicsNames	name of topic within H2020 subprogramme
Call	call identifier from FP6 onwards
FundingSchemeCode	abbreviation of Funding Scheme
FundingSchemeName	different types of contracts which regulate size, financing and funding of the research projects (e.g., STREP - Specific Targeted Research Project, CA Coordination action)
Objective	conceptual orientation of the project
noParticipants	number of participants in each project; additional generated information, calculated with the help of table participants_FPI-7
Subjects	one or more of 69 standardized keywords; in the first three FPs distinct combinations of subject indices were allocated by the European Commission to projects of the same subprogram; after FP4 the allocation of subject indices to specific subprogrammes is more ambiguous; there are no subjects given for H2020 projects Caution: allocation of subject indices seems sometimes arbitrary check reliability of contents of this variable before usage
ProjectURL	official website of the project
LastUpdated	date of last update of project information

Table 4: Description of variables providing information about organisations (FP)

Variable	Description
OrgID	internal unique identifier for each organisation; corresponds with the entries in the field OrgID in the participations table (Table 5)
stApplicant	standardised EUPRO organisation name; the FP database currently covers a period of more than 30 years during which organisations have changed to mergers, acquisitions and divestitures. At the moment organisations are labeled by the name valid at the moment of the grant agreement
stOrgtyp	standardised EUPRO organisation type
stCtry-3_legalseat, stCtry-2_legalseat	standardised country codes of the legal seat of the organisation; country abbreviations are given as ISO 3166-1 Alpha-3 and ISO 3166-1 Alpha-2 country codes ¹
OrgReg_EntityID	unique identifier for public sector research organisations; corresponds with the entries in RISIS-OrgReg, the Register of European Public Research and Higher Education Actors
multinational	indicates that the organisation owns subsidiaries in more than one country

¹ <https://www.iso.org/obp/ui/#search/code/>

Table 5: Description of variables providing information about participations (FP)

Variable	Description
RecCtrNr	unique identifier (record control number) for each project in the database, identical with unique identifier of all projects in the CORDIS projects database; corresponds with the entries in the field RecCtrNr in the projects table (Table 3)
Cnr	unique identifier (control number) assigned internally by AIT, as project participants are not uniquely indexed in the CORDIS projects database; all project-relevant information is indicated with 1, prime contractor with 2, and remaining participants with 3, 4, etc.
Role	Role of participant in the project; differentiates between Coordinator and Participants in standard FP projects, and Principal investigator, Host institutions and Beneficiaries in ERC projects; note that for some projects in FP6-IST and FP7-ICT also the role Coordinator Contact is specified
OrgID	internal unique identifier for each organisation; corresponds with the entries in the field OrgID in the organisations table (Table 4)
stApplicant	standardised EUPRO organisation name; the FP database currently covers a period of more than 30 years during which organisations have changed to mergers, acquisitions and divestitures. At the moment organisations are labeled by the name valid at the moment of the grant agreement.
stOrgtyp	standardised EUPRO organisation type
sAddress, sPostcode, sCity	street level address information (as given)
sCountry	country name (as given)
EUcontribution	amount of EU funding on participant level
Comment	remark that participation ended before project end
stCtry	standardised country codes; country abbreviations are given as ISO 3166-1 Alpha-3 codes ²
stCtry-2	standardised country codes; country abbreviations are given as ISO 3166-1 Alpha-2 codes

Table 6: Description of variables providing information about localisation of participants (FP)

Variable	Description
RecCtrNr	unique identifier (record control number) for each project in the database, identical with unique identifier of all projects in the CORDIS projects database; corresponds with the entries in the field RecCtrNr in the participations table (Table 5)
Cnr	unique identifier (control number) assigned internally by AIT, as project participants are not uniquely indexed in the CORDIS projects database; all project-relevant information is indicated with 1, prime contractor with 2, and remaining participants with 3, 4, etc.; corresponds with the entries in field Cnr in the participations table (Table 5)
latitude, longitude	geocodes of sCity
stCtry-2	standardised country codes; country abbreviations are given as ISO 3166-1 Alpha-2 codes
Adapted NUTS	adapted regional classification including EUROSTAT metropolitan regions (based on the aggregation of NUTS3-level regions) and NUTS2 regions for the remaining areas

Table 7: Description of variables providing information about project output (FP)

Variable	Description
----------	-------------

² <https://www.iso.org/obp/ui/#search/code/>

RecCtrNr	unique identifier (record control number) for each project in the database, identical with unique identifier of all projects in the CORDIS projects database; corresponds with the entries in the field RecCtrNr in the projects table (Table 3)
DocType_std	standardised type of project output (open access publications, report summaries, results in brief, deliverables, etc.) ³
Title	title of project output
Authors, Publisher, Journal, Year, DOI	bibliographic information in the case of open access publications
Link	Link to the results page on CORDIS

2.3.2 EUREKA 2.1

Table 8: Description of variables providing information about projects (EUREKA)

Variable	Description
projectNr	unique identifier (record control number) for each project in the database; corresponds with the entries in the field projectNr in the participation table (Table 9)
projectType	type of funding instrument (EUREKA projects, umbrellas, clusters; Eurostars)
status, status_date	current status of the project (e.g., announced, finished, approved) given in the EUREKA projects database in January 2017
acronym	(non-unique) project acronym
title	Full title of the project
description_short, description_long	conceptual orientation of the project
technologyArea	thematic field of research (see Appendix Table 21 for the complete list of technology areas on three levels)
marketArea	target market area
startDate, endDate	day, month and year of project start and end
duration_months	duration of the project in months (data provided by EUREKA)
actualCost_m_euro	official project costs

Table 9: Description of variables providing information about participations (EUREKA)

Variable	Description
projectNr	unique identifier for each project in the database; corresponds with the entries in the field projectNr in the projects table (Table 8)
Cnr	unique identifier (control number) assigned internally by AIT, as project participants are not uniquely indexed in the EUREKA projects database; all project-relevant information is indicated with 1, prime contractor with 2, and remaining participants with 3, 4, etc.
Role	role of participant in the project (as given); differentiates between Partner, Interested, Main, Main under Reserve and Observer
stApplicant	standardised EUPRO organisation name

³ *Report Summaries* come from the publishable summaries of periodic and final reports submitted by the project participants and approved by the European Commission's project officer. *Results in Brief* are written by CORDIS science editors based on each Report Summary. Results in Brief provide a multilingual summary of each project's outcomes in a more accessible language and aimed at supporting the exploitation of the research results (CORDIS, Projects and results, available at https://cordis.europa.eu/guidance/about-projects_en.html, last accessed on 20 June 2019).

stOrgtyp_EUREKA	standardised EUREKA organisation type; distinguishes between Large company, SME, R&D Performing SME, Research Institute, University, Government and Other
stOrgtyp	standardised EUPRO organisation type
sAddress, sPostcode, sCity	street level address information (as given)
stCountry	standardised country name; correlates with the entries in field stCountry in countries table (Table 10)
stCtry	standardised country codes; country abbreviations are given as ISO 3166-1 Alpha-3 codes ⁴
Website	URL of participant

Table 10: Description of variables providing information about participating countries (EUREKA)

Variable	Description
stCountry_ID	unique identifier for each country in the database; corresponds with the entries in the field stCountry_ID in the funding source table (Table 11)
stCountry	standardised country name; correlates with the entries in field stCountry in participation table (Table 9)
affiliation_type	type of affiliation to EUREKA (member, associated country, etc.)
affiliation_year	year since type of affiliation is valid
ctry_description	description of the R&D activities of the country within EUREKA
funding_description	general description of the national funding principles

Table 11: Description of variables providing information about funding sources (EUREKA)

Variable	Description
stCountry_ID	unique identifier for each country in the database; corresponds with the entries in the field stCountry_ID in the country table (Table 10) and the funding by type of organisation table (Table 12)
fs_id	unique identifier for each founding source in the database; corresponds with the entries in the field fs_id in the funding by type of organisation table (Table 12)
fs_name	name and type of national funding source
fc_institution	name of responsible agency or ministry
fc_adress, fc_postal code, fc_city	street level address information (as given)
fs_link	URL of national funding source
fs_description	description of the general procedure, restrictions, target groups, eligibility criteria, etc. of the funding source

Table 12: Description of variables providing information about funding by type of organisation (EUREKA)

Variable	Description
stCountry_ID	unique identifier for each country in the database; corresponds with the entries in the field stCountry_ID in the funding source table (Table 11)
fs_id	unique identifier for each founding source in the database; corresponds with the entries in the field fs_id in the funding by type of organisation table (Table 12)
elig_org_type	eligible organisation type
fund_elig_cost	funding rate for each organisation type
max_cost	maximal funding per organisation type

⁴ <https://www.iso.org/obp/ui/#search/code/>

add_infomation	additional information
----------------	------------------------

2.3.3 JTI 1.0

Table 13: Description of variables providing information about programmes (JTI)

Variable	Description
JU_name	unique JTI acronym (ARTEMIS, ENIAC, ECSEL); corresponds with entries in the field JU_name in the projects table (Table 14)
JU_call	call ID; corresponds with entries in the field JU_call in the projects table (Table 14)
JoREP_prog_id	link to programme ID in JoREP database
JoREP_call_id	link to call ID in JoREP database
Proj_info_source	URL, where project level data was retrieved
Benefic_info_source	URL, where beneficiary level data was retrieved
Last accessed	date of data retrieval
Comments	comments on missing or divergent data

Table 14: Description of variables providing information about projects (JTI)

Variable	Description
JU_name	unique JTI acronym (ARTEMIS, ENIAC, ECSEL); corresponds with entries in the field JU_name in the programme table (Table 13) and the beneficiaries table (Table 15)
JU_call	call ID; corresponds with entries in the field JU_call in the programme table (Table 13) and the beneficiaries table (Table 15)
Proj_acronym	(non-unique) project acronym or abbreviation of the project title; corresponds with entries in the field Proj_acronym in the beneficiaries table (Table 15)
Proj_title	Full title of the project
Proj_start date	day, month and year of project start
Duration	duration of the project in months (data provided by EC)
Proj_eligible_cost, Proj_eligible_cost_remarks	eligible project costs
Proj_JU_funding	JU project funding
Proj_national_funding, Proj_national_funding_flag	national project funding; flag indicates estimated data
Comment	Comments on data retrieval and the calculation of project costs and funding

Table 15: Description of variables providing information about beneficiaries (JTI)

Variable	Description
JU_name	unique JTI acronym (ARTEMIS, ENIAC, ECSEL); corresponds with entries in the field JU_name in the projects table (Table 14)
JU_call	call ID; corresponds with entries in the field JU_call projects table (Table 14)
Proj_acronym	(non-unique) project acronym or abbreviation of the project title; corresponds with entries in the field JU_call projects table (Table 14)
stApplicant	standardised EUPRO organisation name

benefic_country	standardised country codes given as ISO 3166-1 Alpha-2 country codes ⁵
benefic_eligible_cost, benefic_eligible_cost_remarks	eligible project costs on the beneficiary level
benefic_JU_funding	JU project funding on the beneficiary level
benefic_national_funding	national funding on the beneficiary level; flag indicates estimated data
Comment	Comments on data retrieval and the calculation of project costs and funding on the beneficiary level

2.3.4 COST 1.0

Table 16: Description of variables providing information about actions (COST)

Variable	Description
ActionNo	unique identifier for each project in the database, corresponds with the entries in the field ActionNo in the parties table (Table 17), the management structure table (Table 18)
Science Field	COST science fields
Title	Full title of the project
Description	conceptual orientation of the project
LastUpdated	date of last update of project information
Start Date, End Date	day, month and year of action start and end
mcChair, mcViceChair	name of management committee chair and vice chair

Table 17: Description of variables providing information about parties (COST)

Variable	Description
ActionNo	unique identifier for each project in the database, corresponds with the entries in the field ActionNo in the actions table (Table 16)
StartDate	start date of participation
Type	type of participation (COST or non COST countries, institutions, bodies, etc.)
Country	name of participating country
InstitutionName	Institution name (not standardised) in the case of COST Near Neighbour Countries, COST International Partner Countries or Non COST Institutions
OrganisationName	name of organisation in the case of Specific Organisations (e.g. public bodies)

Table 18: Description of variables providing information about management structure (COST)

Variable	Description
ActionNo	unique identifier for each project in the database, corresponds with the entries in the field ActionNo in the actions table (Table 16)
Type	type of participation (COST or non COST countries, institutions, bodies, etc.)
mcCountry, mcInstitution, mcOrganisation	name of participating country, institution or organisation
mcType	management committee member, observer or substitute
personInstitution, personStreetCity	Institution and address of the management committee member, observer or substitute

⁵ <https://www.iso.org/obp/ui/#search/code/>

2.4 Sectorial, temporal and geographical coverage

Information on the sectorial classifications used

Table 19: Organisation type⁶

stOrgtyp	Description
EDU	universities and other educational institutions
ROR	public and private research organisations
IND	industry
CON	consultants
GOV	governmental institutions
RH	research hospital
HSP	hospital
NCL	non-commercial/non-profit organisations
PNP	private-non-profit
OTH	special interest groups, like unions, chambers, inter-trade organisations, etc
N/A	not available

On a (no longer available) CORDIS website⁷ subject indices were assigned to different themes. Table 20 contains the list of 68 subject indices and the themes to which they were attributed.

Table 20: Subject Indices and Themes⁸

Subject Index	Theme
VETERINARY AND ANIMAL SCIENCES	Agriculture and food supply
AGRICULTURE	Agriculture and food supply
FOOD	Agriculture and food supply
AGRICULTURAL BIOTECHNOLOGY	Agriculture and food supply
RESOURCES OF THE SEA, FISHERIES	Agriculture and food supply
MEDICINE, HEALTH	Biology and medicine
BIOTECHNOLOGY	Biology and medicine
LIFE SCIENCES	Biology and medicine
HEALTHCARE DELIVERY/SERVICES	Biology and medicine
MEDICAL BIOTECHNOLOGY	Biology and medicine
NUCLEAR FISSION	Energy
NUCLEAR FUSION	Energy
FOSSIL FUELS	Energy
RENEWABLE SOURCES OF ENERGY	Energy
ENERGY STORAGE, ENERGY, TRANSPORT	Energy
ENERGY SAVING	Energy
BIOFUELS	Energy
HYDROGEN AND FUEL CELLS	Energy
OTHER ENERGY TOPICS	Energy

⁶ Used in FP and EUREKA

⁷ Thematic Navigation by Subject Index, http://cordis.europa.eu/themes/home_en.html#cloud (accessed: 13/08/2010)

⁸ Used in FP

CLEAN COAL TECHNOLOGIES	Energy
METEOROLOGY	Environment and climate
ENVIRONMENTAL PROTECTION	Environment and climate
RADIATION PROTECTION	Environment and climate
WASTE MANAGEMENT	Environment and climate
RADIOACTIVE WASTE	Environment and climate
SUSTAINABLE DEVELOPMENT	Environment and climate
EARTH SCIENCES	Environment and climate
CLIMATE CHANGE AND CARBON CYCLE RESEARCH	Environment and climate
WATER RESOURCE MANAGEMENT	Environment and climate
INDUSTRIAL MANUFACTURE	Industry and industrial technology
MATERIALS TECHNOLOGY	Industry and industrial technology
NANOTECHNOLOGY AND NANOSCIENCES	Industry and industrial technology
INDUSTRIAL BIOTECH	Industry and industrial technology
ELECTRONICS, MICROELECTRONICS	Information and Communication Technology
INFORMATION PROCESSING, INFORMATION SYSTEMS	Information and Communication Technology
TELECOMMUNICATIONS	Information and Communication Technology
AUTOMATION	Information and Communication Technology
ROBOTICS	Information and Communication Technology
ICT APPLICATIONS	Information and Communication Technology
NETWORK TECHNOLOGIES	Information and Communication Technology
MEASUREMENT METHODS	Research in practice
MATHEMATICS; STATISTICS	Research in practice
REFERENCE MATERIALS	Research in practice
SCIENTIFIC RESEARCH	Research in practice
PROJECT MANAGEMENT METHODOLOGIES	Research in practice
COORDINATION, COOPERATION	Research in practice
POLICIES	Research in practice
LEGISLATION, REGULATIONS	Research in practice
FORECASTING	Research in practice
RESEARCH ETHICS	Research in practice
EVALUATION	Research outputs
STANDARDS	Research outputs
INNOVATION, TECHNOLOGY TRANSFER	Research outputs
BUSINESS ASPECTS	Research outputs
INTELLECTUAL PROPERTY RIGHTS	Research outputs
SOCIAL ASPECTS	Social and Economic Concerns
EDUCATION, TRAINING	Social and Economic Concerns
INFORMATION, MEDIA	Social and Economic Concerns
ECONOMIC ASPECTS	Social and Economic Concerns
REGIONAL DEVELOPMENT	Social and Economic Concerns
EMPLOYMENT ISSUES	Social and Economic Concerns
SAFETY	Social and Economic Concerns
SECURITY	Social and Economic Concerns
CONSTRUCTION TECHNOLOGY	Transport and Construction
TRANSPORT	Transport and Construction
AEROSPACE TECHNOLOGY	Transport and Construction
SPACE AND SATELLITE RESEARCH	Transport and Construction

OTHER TECHNOLOGY	Transport and Construction
PHYSICAL ENGINEERING	Transport and Construction

Table 21: Concordance table Technology Areas (Level 1 and 2)⁹

Technology Area (Level 1)	Technology Area (Level 2)
1 ELECTRONICS, IT AND TELECOMS TECHNOLOGY	1.1 Information Processing, Information System
	1.2 Electronics, Microelectronics
	1.3 Telecommunications
	1.4 Multimedia
	1.5 IT and Telematics technology
2 INDUSTRIAL MANUFACTURING, MATERIAL AND TRANSPORT	2.1 Materials Technology
	2.2 Industrial Manufacture
	2.3 Construction Technology
	2.4 Transport and Shipping Technologies
	2.5 Transport Infrastructure
	2.6 Design and Modeling / Prototypes
	2.7 Process control and logistics
	2.8 Signal Processing
	2.9 Aerospace Technology
3 BIOLOGICAL SCIENCES / TECHNOLOGIES	3.1 Medical technology
	3.2 Biology / Biotechnology
	3.3 Micro- and Nanotechnology related to Biological sciences
	3.4 Genome Research
4 ENERGY TECHNOLOGY	4.1 Renewable Sources of Energy
	4.2 Rational use of energy
	4.3 Energy production, transmission and conversion
	4.4 Energy Storage and Transport
	4.5 Other Energy Topics
	4.6 Printing
	4.7 Fossil Energy Sources
	4.8 Mining Technologies
5 TECHNOLOGY FOR PROTECTING MAN AND THE ENVIRONMENT	5.1 Environment technology
	5.2 Waste Management technology
	5.3 Safety technology
6 OTHER INDUSTRIAL TECHNOLOGIES	6.1 Textiles Technology
	6.2 Chemical Technology and Engineering
	6.3 Other Industrial Technologies_subgroup
	6.4 Apparatus Engineering
	6.5 Footwear / Leather Technology
	6.6 Process Plant Engineering
	6.7 Sound Engineering/Technology
7 AGRICULTURE AND MARINE RESOURCES	7.1 Agricultural technology
	7.2 Animal Selection/Production / Husbandry technology
	7.3 Resources of the Sea, Fisheries
	7.4 Biocontrol

⁹ Used in EUREKA; for the complete 3 level table see Table A 2.

8 CHEMISTRY, PHYSICAL AND EXACT SCIENCES	8.1 Micro- and Nanotechnology related to physical and exact sciences
	8.2 Meteorology / Climatology
	8.3 Chemistry
	8.4 Membrane / Filtration technology
	8.5 Analytical Chemistry
	8.6 Mathematics, Statistics
	8.7 Earth Sciences
	8.8 Hydraulics
9 MEASUREMENTS AND STANDARDS	9.1 Measurement Tools
	9.2 Electronic measurement systems
	9.3 Reference Materials
	9.4 Standards
	9.5 Recording Devices
10 AGROFOOD TECHNOLOGY	10.1 Technologies for the food industry
	10.2 Food quality and safety
	10.3 Nutrition and Health

Table 22: Science Fields¹⁰

Science Field	Science Field Full Name
ICT	Information and Communication Technologies
MPNS	Materials, Physical and Nanosciences
ESSEM	Earth System Science and Environmental Management
TUD	Transport and Urban Development
FA	Food and Agriculture
ISCH	Individuals, Societies, Cultures and Health
BMBS	Biomedicine and Molecular Biosciences
CMST	Chemistry and Molecular Sciences and Technologies
FPS	Forests, their Products and Services

Information on the temporal coverage used

EUPRO module	First call year	Last call year
FP 8.3.1	1984	2016
EUREKA 2.1	1985	2016
JTI 1.0	2008	2014
COST 1.0	1971	2014

Information on the geographical coverage and classifications used

Since we have information on the geographical location of the project participants in the EUPRO database, we can analyse their geographical distribution across Europe at the country-level as well as on the regional level by assigning organisation to European NUTS regions¹¹ using NUTS classification revision 2010¹².

¹⁰ Used in COST actions

¹¹ including the analogous territorial descriptions for Switzerland and Norway

¹² History of NUTS, http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/history_nuts (accessed: 24/04/2014)



EUPRO covers participations from the following countries:

- *EU 28 Member States*
- *Associated countries* (with science and technology cooperation agreements that involved contributing to the framework programme budget)¹³:
Switzerland; Israel; Norway, Iceland and Liechtenstein; Turkey, Croatia, the Former Yugoslav Republic of Macedonia and Serbia; Albania and Montenegro; Bosnia & Herzegovina; Faroe Islands; Republic of Moldova
- *Third Countries* (countries that are not Member States, nor associated countries)¹⁴
 - *International Cooperation Partner Countries* (ICPC)¹⁵: Countries eligible for EU funding from Africa, Asia, Caribbean, Pacific, Eastern Europa and Central Asia (EECA), Latin America, Mediterranean Partner Countries (MPC) and Western Balkan Countries (WBC) (for the total list see Annex, Table A 1)
 - *High-income countries* (normally not eligible for EU funding): United States of America, Canada, Japan, the Republic of Korea, Singapore, Australia and New Zealand, Taiwan, Hong Kong and Macao, Vatican, San Marino, Monaco and Andorra.

¹³ FP7 Third Country Agreements, http://ec.europa.eu/research/participants/data/ref/fp7/116018/fp7-third-country-agreements_en.pdf (accessed: 24/04/2014)

¹⁴ Cooperation with Third Country Participants in an EC funded FP7 multi-partner research project, http://ec.europa.eu/research/participants/data/ref/fp7/90400/guideline-third-country-participants_en.pdf

¹⁵ List of International Cooperation Partner Countries (ICPC) - Annex 1 of Work Programme 2013 Cooperation, http://ec.europa.eu/research/participants/data/ref/fp7/206006/wp-2013-annex-1-icpc-list_en.pdf, (accessed: 24/04/2014)

Information on the number of missing values¹⁶

Table 23: Number and ratio of missing values of FP project data

Variable	Missing values	
	Count	Ratio
RecCtrNr	-	
ProjectReference	-	
Title	1	0%
ProjAcr	3	0%
Start Date	2,173	2%
End Date	3,006	3%
Duration	3,715	4%
TotalProjectCosts	23,661	26%
ProjectEUFunding	22,625	25%
TopicsCodes	-	
TopicsNames	-	
Call	43,799	48%
FundingSchemeCode	5,386	6%
FundingSchemeName	5,386	6%
Objective	9,483	10%
noParticipants	-	
Subjects	36,520	40%
ProjectURL	80,387	89%

Table 24: Number and ratio of missing values of FP participation data

Variable	Missing values	
	Count	Ratio
RecCtrNr	-	
Cnr	-	
Role	-	
OrgID	-	
stApplicant	3,748	1%
stOrgtyp	6,537	1%
sAddress	28,972	6%
sPostcode	89,087	19%
sCity	14,463	3%
sCountry	1,524	0%
EUcontribution	295,747	63%
stCtry	978	0%
stCtry-2	978	0%

¹⁶ This section covers information on the variables of the two main tables in each of the data sets, projects and participations. Information on variables of the remaining tables can be provided upon request.

Table 25: Number and ratio of missing values of EUREKA project data

Variable	Missing values	
	Count	Ratio
projectNr	-	
projectType	-	
status, status_date	-	
acronym	-	
title	-	
description_short, description_long	-	
technologyArea	1,779	37%
marketArea	2,157	44%
startDate, endDate	4	0%
duration_months	1	0%
actualCost_m_euro	34	1%

Table 26: Number and ratio of missing values of EUREKA participation data

Variable	Missing values	
	Count	Ratio
projectNr	-	
Cnr	-	
Role	7,483	36%
stApplicant	-	
stOrgtyp_EUREKA	16,906	81%
stOrgtyp	171	1%
sAddress	4,450	21%
sPostcode	17,907	86%
sCity	3,898	19%
stCountry	-	
stCtry	-	
Website	17,014	82%

Table 27: Number and ratio of missing values of JTI project data

Variable	Missing values	
	Count	Ratio
JU_name	-	
JU_call	-	
Proj_acronym	-	
Proj_title	1	1%
Proj_start date	-	
Duration	-	
Proj_eligible_cost	1	1%
Proj_JU_funding	1	1%
Proj_national_funding	25	19%

Table 28: Number and ratio of missing values of JTI beneficiaries data

Variable	Missing values	
	Count	Ratio
JU_name	-	
JU_call	-	
Proj_acronym	-	
stApplicant	119	4%
benefic_country	-	
benefic_eligible_cost	55	2%
benefic_JU_funding	39	1%
benefic_national_funding	549	19%

Table 29: Number and ratio of missing values of COST action data

Variable	Missing values	
	Count	Ratio
ActionNo	-	
Science Field	-	
Title	-	
Description	307	27%
LastUpdated	-	
Start Date, End Date	-	

Table 30: Number and ratio of missing values of COST parties data

Variable	Missing values	
	Count	Ratio
ActionNo	-	
StartDate	1572	7%
Type	-	
Country	50	0%
InstitutionName	-	
Organisation name	-	

Estimation of data quality issues with respect to data acquisition, reliability of retrieving system

In general, the original databases of the four funding instruments (FP, EUREKA, JTI, COST) constitute reliable resources on all R&D projects and participations. However, in some few cases information is incomplete or inconsistent, as for instance the address data, project costs, project funding and funding on the participants level, in particular for earlier FPs.

With regard to the data acquisition and retrieving system the data is sound and complete. The retrieving system used was a wrapper a type of web scraping program.

- *Soundness*: The raw data which is extracted from the websites is copied one-on-one and simply restructured in a relational form.
- *Completeness*: The wrapper parses the HTML content of all project webpages and is guided to the relevant information. Each webpage follows a given structure. Hence, each piece of information is located in the same place and information wont be missed by the wrapper.

3 Technical Specifications

3.1 Information on the data base system

Current data base system used

The four modules of the EUPRO database are realised as Microsoft Access 2016 database.

Planned future technical changes concerning data base system

None

3.2 Technical variable definition

Labelling and data type of all variables¹⁷

Table 31: Data type of variables providing information about projects (FP)

Variable	Data type
RecCtrNr	Number
ProjectReference	Text
Title	Text
ProjAcr	Text
Start Date, End Date	Date
Duration	Number
TotalProjectCosts	Number
ProjectEUFunding	Number
TopicsCodes	Text
TopicsNames	Memo
Call	Text
FundingSchemeCode	Text
FundingSchemeName	Text
Objective	Memo
noParticipants	Number
Subjects	Text
ProjectStatus	Text
ProjectURL	Text

Table 32: Data type of variables providing information about participations (FP)

Variable	Data type
RecCtrNr	Number
Cnr	Number
Role	Text
OrgID	Number
stApplicant	Text
stOrgtyp	Text
sAddress, sPostcode, sCity	Text
sCountry	Text
EUcontribution	Number

¹⁷ This section covers information on the variables of the two main tables in each of the data sets, projects and participations. Information on variables of the remaining tables can be provided upon request.

Comment	Text
stCtry	Text
stCtry-2	Text

Table 33: Data type of variables providing information about projects (EUREKA)

Variable	Data type
projectNr	Number
projectType	Text
status	Text
status_date	Date
acronym	Text
title	Text
description_short, description_long	Memo
technologyArea	Text
marketArea	Text
startDate, endDate	Date
duration_months	Number
actualCost_m_euro	Number

Table 34: Data type of variables providing information about participations (EUREKA)

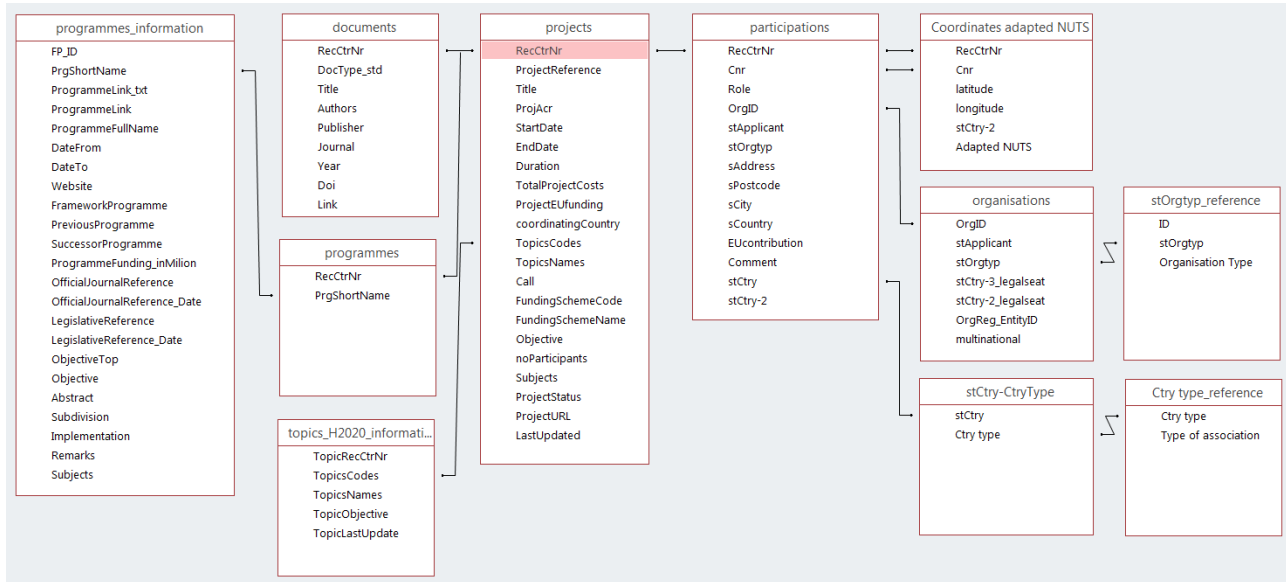
Variable	Data type
projectNr	Number
Cnr	Number
Role	Text
stApplicant	Text
stOrgtyp_EUREKA	Text
stOrgtyp	Text
sAddress, sPostcode, sCity	Text
stCountry	Text
stCtry	Text
Website	Text

Table 35: Data type of variables providing information about projects (JTI)

Variable	Data type
JU_name	Text
JU_call	Text
Proj_acronym	Text
Proj_title	Text
Proj_start date	Date
Duration	Number
Proj_eligible_cost, Proj_eligible_cost_remarks	Number
Proj_JU_funding	Number
Proj_national_funding,	Number
Proj_national_funding_flag	Text
Comment	Memo

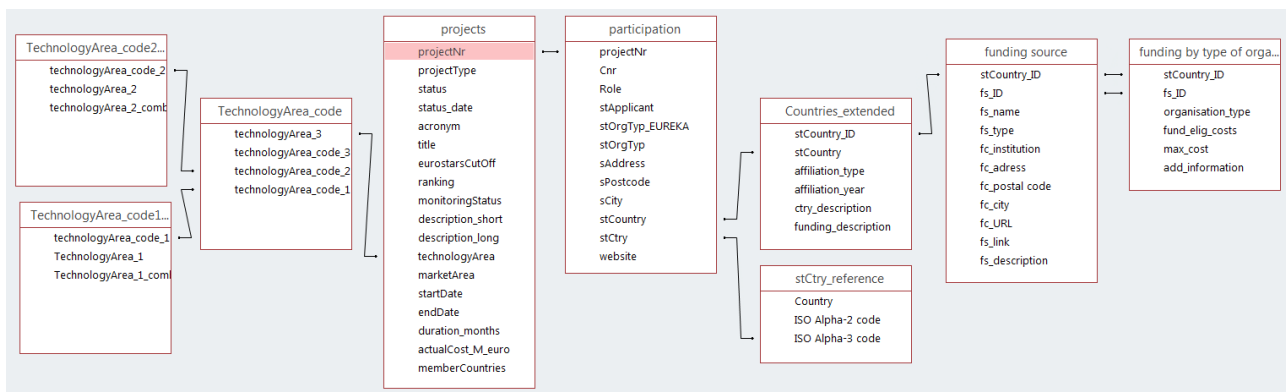
country (multinational). The three remaining tables explain abbreviations used in the respective variables.

Figure 1: FP Entity Relationship Model



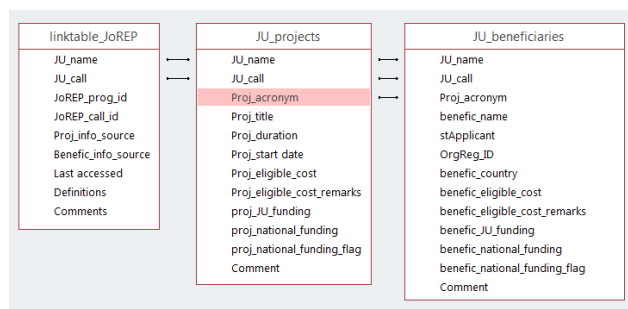
The logic of the **EUREKA** database structure is similar (Figure 2). Projects and participations are linked by projectNr. The table *TechnologyArea_code* structures the entities in technologyArea in the *projects* table in three different aggregation levels. Specific information about the EUREKA funding conditions and funding schemes in each country are linked to the *participation* table via stCountry.

Figure 2: EUREKA Entity Relationship Model



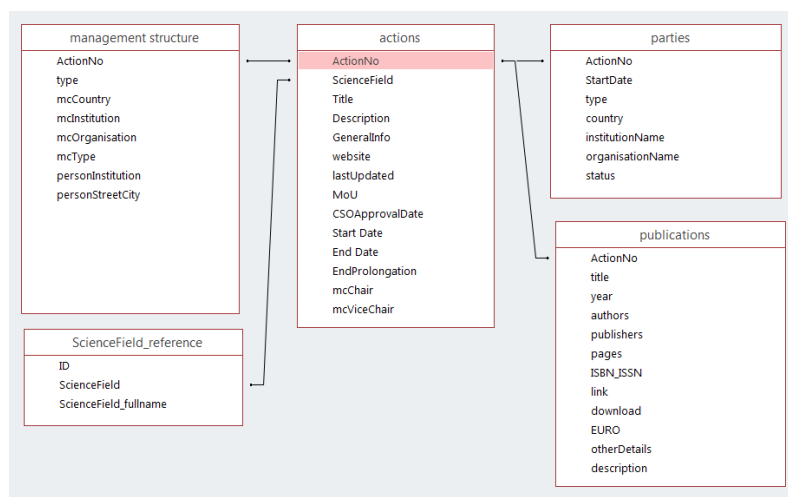
The structure of the **JTI** database is very simple (Figure 3). Data on programmes and the resulting projects are linked via JU_name (JTI name) and JU_call (specific call name). Beneficiaries are connected to their specific projects via Proj_acronym (project acronym).

Figure 3: JTI Entity Relationship Model



In the **COST** database (Figure 4) ActionNo connects the tables about the underlying management structure of the COST action, the participating parties and the resulting publications.

Figure 4: COST Entity Relationship Model



3.4 Interfaces for access and to other infrastructures

Technical information on interfaces with other infrastructures

Integration of EUPRO within RISIS has been core in order to increase the scientific value of EUPRO for cross-dataset empirical analyses, on the one hand, and to be able to gain from RISIS developed facilities, such as geolocalisation tools, for the further advancement of EUPRO, on the other hand. Inter-operability with other datasets is considered as a key element for the further establishment and sustainable attractiveness of EUPRO for new research endeavours, in particular those relating to the investigation of impacts of publicly funded R&D networks.

The following integration activities has been started in RISIS I and will be continued during RISIS II:

- The link to **RISIS-OrgReg** enables the direct inter-linking with other RISIS core datasets featuring public research organisation, in particular LeidenRank and RISIS-ETER. At the moment, stApplicants included in FP 8.3.1 are linked to RISIS-OrgReg via OrgReg_EntityID in the *organisations* table. During the further course of RISIS II, a comprehensive

organisations table comprising all organisations included in EUPRO will be created and linked to RISIS-OrgReg.

- With the application of the new geolocalisation tools developed in RISIS to EUPRO, we have been able to analyse the spatio-temporal development of FP networks in much more flexible manner, and integrate it in geographical terms with other RISIS datasets. One promising example in this context has been a combination of EUPRO with the **Nano S&T dataset**, investing Nanoscience and -technology networks in publications and patents (coming from Nano S&T dataset) with Nanoscience and technology FP networks (coming from EUPRO) (see Villard et al. 2017).
- EUPRO has been inter-linked directly at the organisational level with **RISIS-ETER** in order to analyse the relationships between several characteristics of European Higher Education Institutions (HEIs) coming from RISIS-ETER, and their participation patterns in the EU FP coming from EUPRO. First research endeavors in this direction have been conducted within in RISIS (see Lepori et al. 2015), further research projects in this direction are currently under way.
- **JoREP** has in contrast to EUPRO a programme perspective on joint transnational research programmes, i.e. it gathers systematic information on a series of transnational programmes from 2000 to 2014. In EUPRO we have established a direct link (programme identifier) of programmes available in EUPRO and also in JoREP. These are at the current stage EUREKA and JTIs, and enables the relational investigation of networks of performers in these programmes (coming from EUPRO), and programme characteristics (coming from JoREP).

Integration with RCF

The EUPRO version that is made available for access to researchers in RISIS is foreseen to be fully incorporated in RCF, under the condition of controlled access and that security of usage is given (i.e. access for selected users with a concrete research project to the parts of the dataset needed for the research). Note that underlying cleaning and standardisation data (e.g. name variants) will not be made available via RCF. Linking to other datasets in the RCF will be realized via the RISIS registers (providing the respective identifiers to the registers in EUPRO). Technical issues for incorporation of EUPRO into RCF (e.g. database system, how can a user access which parts of the dataset, etc.) are to be defined in close cooperation with WP4 beginning with autumn.

4 Scientific use cases and main references

Summarizing the research activities of external researchers accessing EUPRO via RISIS, we can distinguish the following main research directions for which EUPRO has been mobilized:

- 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; done by researchers from University of Coimbra, Université Paris-Est Marne-la-Vallée)
- Observing **FP participation patterns and networking of firms** in specific industries (e.g. pharmaceutical and chemical industries, done by researcher from Université Paris-Est Marne-la-Vallée based on the inter-linking of EUPRO with CIB)



- Using EUPRO to quantify and model **impacts of publicly funded R&D networks** on knowledge creation and technological diversification (e.g. done by researchers from Utrecht University, Université Paris-Est Marne-la-Vallée)
- Analysis of **country-specific participation patterns in the FP**, with a special focus on topical orientation and main partners (e.g. done for Israel by researchers from the Samuel Neaman Institute)
- Observing **R&D hot spots** and activities funded by FP projects, at an organizational level in specific topics and geographical locations across Europe (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 (done by researchers from University of Lugano)
- 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. (done by researchers from Vrije University Brussels)

Selected recent references to publications using EUPRO

- 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
- 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., Dønser, 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
- 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
- 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
- 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 Dønser, 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 Dänser, 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

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

Appendix

Table A 1: List of International Cooperation Partner Countries (ICPC) participating in EU FP

Country	Code	Type of Country
ANGOLA	AGO	ICPC - Africa
BENIN	BEN	ICPC - Africa
BOTSWANA	BWA	ICPC - Africa
BURKINA FASO	BFA	ICPC - Africa
BURUNDI	BDI	ICPC - Africa
CAMEROON	CMR	ICPC - Africa
CAPE VERDE	CPV	ICPC - Africa
CENTRAL AFRICAN REPUBLIC	CAF	ICPC - Africa
CHAD	TCD	ICPC - Africa
CONGO	COG	ICPC - Africa
CONGO, DEMOCRATIC REPUBLIC	COD	ICPC - Africa
EQUATORIAL GUINEA	GNQ	ICPC - Africa
ERITREA	ERI	ICPC - Africa
ETHIOPIA	ETH	ICPC - Africa
GABON	GAB	ICPC - Africa
GAMBIA	GMB	ICPC - Africa
GHANA	GHA	ICPC - Africa
GUINEA	GIN	ICPC - Africa
GUINEA-BISSAU	GNB	ICPC - Africa
KENYA	KEN	ICPC - Africa
LESOTHO	LSO	ICPC - Africa
LIBERIA	LBR	ICPC - Africa
MADAGASCAR	MDG	ICPC - Africa
MALAWI	MWI	ICPC - Africa
MALI	MLI	ICPC - Africa
MAURITANIA	MRT	ICPC - Africa
MAURITIUS	MUS	ICPC - Africa
MOZAMBIQUE	MOZ	ICPC - Africa
NAMIBIA	NAM	ICPC - Africa
NIGER	NER	ICPC - Africa
NIGERIA	NGA	ICPC - Africa
RWANDA	RWA	ICPC - Africa
SAO TOME AND PRINCIPE	STP	ICPC - Africa
SENEGAL	SEN	ICPC - Africa
SEYCHELLES	SYC	ICPC - Africa
SIERRA LEONE	SLE	ICPC - Africa
SOMALIA	SOM	ICPC - Africa
SOUTH AFRICA	ZAF	ICPC - Africa
SUDAN	SDN	ICPC - Africa



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 824091

SWAZILAND	SWZ	ICPC - Africa
TANZANIA	TZA	ICPC - Africa
TOGO	TGO	ICPC - Africa
UGANDA	UGA	ICPC - Africa
ZAMBIA	ZMB	ICPC - Africa
ZIMBABWE	ZWE	ICPC - Africa
AFGHANISTAN	AFG	ICPC - Asia
BANGLADESH	BGD	ICPC - Asia
BHUTAN	BTN	ICPC - Asia
CAMBODIA	KHM	ICPC - Asia
CHINA	CHN	ICPC - Asia
INDIA	IND	ICPC - Asia
INDONESIA	IDN	ICPC - Asia
IRAN	IRN	ICPC - Asia
IRAQ	IRQ	ICPC - Asia
LAO PEOPLE'S DEMOCRATIC REPUBLIC	LAO	ICPC - Asia
MALAYSIA	MYS	ICPC - Asia
MALDIVES	MDV	ICPC - Asia
MONGOLIA	MNG	ICPC - Asia
MYANMAR	MMR	ICPC - Asia
NEPAL	NPL	ICPC - Asia
OMAN	OMN	ICPC - Asia
PAKISTAN	PAK	ICPC - Asia
PHILIPPINES	PHL	ICPC - Asia
SRI LANKA	LKA	ICPC - Asia
THAILAND	THA	ICPC - Asia
VIET NAM	VNM	ICPC - Asia
YEMEN	YEM	ICPC - Asia
BARBADOS	BRB	ICPC - Carribean
CUBA	CUB	ICPC - Carribean
DOMINICAN REPUBLIC	DOM	ICPC - Carribean
GUYANA	GUY	ICPC - Carribean
HAITI	HTI	ICPC - Carribean
JAMAICA	JAM	ICPC - Carribean
SAINT LUCIA	LCA	ICPC - Carribean
SURINAME	SUR	ICPC - Carribean
TRINIDAD AND TOBAGO	TTO	ICPC - Carribean
ARMENIA	ARM	ICPC - Eastern Europe and Central Asia (EECA)
AZERBAIJAN	AZE	ICPC - Eastern Europe and Central Asia (EECA)
BELARUS	BLR	ICPC - Eastern Europe and Central Asia (EECA)
GEORGIA	GEO	ICPC - Eastern Europe and Central Asia (EECA)
KAZAKHSTAN	KAZ	ICPC - Eastern Europe and Central Asia (EECA)
KYRGYZSTAN	KGZ	ICPC - Eastern Europe and Central Asia (EECA)
Russian Federation	RUS	ICPC - Eastern Europe and Central Asia (EECA)
TAJKISTAN	TJK	ICPC - Eastern Europe and Central Asia (EECA)

TURKMENISTAN	TKM	ICPC - Eastern Europe and Central Asia (EECA)
UKRAINE	UKR	ICPC - Eastern Europe and Central Asia (EECA)
UZBEKISTAN	UZB	ICPC - Eastern Europe and Central Asia (EECA)
ARGENTINA	ARG	ICPC - Latin America
BOLIVIA, PLURINATIONAL STATE OF	BOL	ICPC - Latin America
BRAZIL	BRA	ICPC - Latin America
CHILE	CHL	ICPC - Latin America
COLOMBIA	COL	ICPC - Latin America
COSTA RICA	CRI	ICPC - Latin America
ECUADOR	ECU	ICPC - Latin America
EL SALVADOR	SLV	ICPC - Latin America
GUATEMALA	GTM	ICPC - Latin America
HONDURAS	HND	ICPC - Latin America
MEXICO	MEX	ICPC - Latin America
NICARAGUA	NIC	ICPC - Latin America
PANAMA	PAN	ICPC - Latin America
PARAGUAY	PRY	ICPC - Latin America
PERU	PER	ICPC - Latin America
URUGUAY	URY	ICPC - Latin America
VENEZUELA, BOLIVARIAN REPUBLIC OF	VEN	ICPC - Latin America
ALGERIA	DZA	ICPC - Mediterranean Partner Countries (MPC)
EGYPT	EGY	ICPC - Mediterranean Partner Countries (MPC)
Jordan	JOR	ICPC - Mediterranean Partner Countries (MPC)
LEBANON	LBN	ICPC - Mediterranean Partner Countries (MPC)
Libya	LBY	ICPC - Mediterranean Partner Countries (MPC)
MOROCCO	MAR	ICPC - Mediterranean Partner Countries (MPC)
SYRIA	SYR	ICPC - Mediterranean Partner Countries (MPC)
TUNISIA	TUN	ICPC - Mediterranean Partner Countries (MPC)
FJI	FJI	ICPC - Pacific
PAPUA NEW GUINEA	PNG	ICPC - Pacific
SAMOA	WSM	ICPC - Pacific
SOLOMON ISLANDS	SLB	ICPC - Pacific
TONGA	TON	ICPC - Pacific
VANUATU	VUT	ICPC - Pacific

Table A 2: Concordance table Technology Areas (all levels)



Technology Area (level 1)	Technology Area (level 2)	Technology Area (level 3)
1 ELECTRONICS, IT AND TELECOMS TECHNOLOGY	1.1 Information Processing, Information System	Advanced Systems Architecture
		Archivistics/Documentation/Technical Documentation
		Artificial Intelligence (AI)
		Computer Games
		Computer Hardware technology
		Computer Software technology
		Computer Technology/Graphics, Meta Computing
		Data Processing / Data Interchange, Middleware
		Data Protection, Storage Technology, Cryptography, Data Security
		Databases, Database Management, Data Mining
		Electronic Commerce, Electronic Payment, Electronic Signature
		Human Interactive
		Imaging, Image Processing, Pattern Recognition
		Information Processing, Information System
		Information Technology/Informatics
		Internet Technologies
		Knowledge Management, Process Management
		Quantum Informatics
		Simulation
		Simulation, Simulation Engineering
	Speech Processing/Technology	
	User Interfaces, Usability	
	1.2 Electronics, Microelectronics	Automation, Robotics Control Systems
		Digital Systems, Digital Representation
		Electronic circuits, components and equipment
		Electronic engineering
		Electronics, Microelectronics
		Embedded Systems and Real Time Systems
		High Frequency Technology, Microwaves
		Magnetic and superconductor technology
		Micromachining
		Nanotechnologies related to electronics and microelectronics
		Optical Networks and Systems
		Peripherals Technologies (Mass Data Storage, Display Technologies)
		Printed circuits and integrated circuits
		Semiconductors
		Smart cards and access systems
	1.3 Telecommunications	Audiovisual Equipment and Communication technology
		Broadband Technologies
		Mobile Communications
		Narrow Band Technologies
		Network Technology, Network Security
		Satellite Technology / Systems / Positioning / Communication
		Telecommunications
	1.4 Multimedia	Cultural Heritage
		E-Learning
		E-Publishing, Digital Content
Human Language Technologies		
Information Filtering, Semantics, Statistics		
Multimedia		
1.5 IT and Telematics technology	Visualisation, Virtual Reality	
	Application Service Providing (ASP)	
	e-Government	
	Environment Management Systems	
	GIS Geographical Information Systems	
	IT and Telematics technology	
	Software for health	
	Software for tourism	
Software for transport, logistics and human resources (Enterprise Resource Planning - ERP)		

2 INDUSTRIAL MANUFACTURING, MATERIAL AND TRANSPORT	2.1 Materials Technology	Adhesives
		Building materials
		Ceramic Materials and Powders
		Colours and varnish
		Composite materials
		Fine Chemicals, Dyes and Inks
		Glass
		Iron and Steel, Steelworks
		Materials Handling Technology (solids, fluids, gases)
		Materials Technology
		Metals and Alloys
		Optical Materials
		Paper technology
		Plastics, Polymers
		Properties of Materials, Corrosion/Degradation
	2.2 Industrial Manufacture	Cleaning (sandblasting, brushing)
		Coatings
		Drying
		Erosion, Removal (spark erosion, flame cutting, laser/plasma cutting, electrochemical erosion, waterjet cutting)
		Forming (rolling, forging, pressing, drawing)
		Hardening, heat treatment
		Industrial Manufacture
		Joining techniques (rivetting, screw driving, gluing)
		Joining (soldering, welding, sticking)
		Machine Tools technology
		Machining (turning, drilling, moulding, milling, planing, cutting)
		Machining, fine (grinding, lapping)
	Mixing (powder, etc.), separation (sorting, filtering)	
	Moulding, injection moulding, extrusion, sintering	
	Surface treatment (painting, galvano, polishing, CVD, PVD)	
2.3 Construction Technology	Building Materials, Components and Methods	
	Civil engineering	
	Construction Equipment	
	Construction Technology	
	Fire Resistance	
	Mechanical Engineering, Hydraulics, Vibration and Acoustic Engineering	
	Pipeline Technology	
	Pulp Technology related to construction technology	
	Sensory/Multisensory Technology, Instrumentation related to construction technology	
	Sound Insulation	
2.4 Transport and Shipping Technologies	Design of Vehicles	
	Hybrid and Electric Vehicles technology	
	Railway Vehicles technology	
	Road Vehicles technology	
	Shipbuilding technology	
	Traction/Propulsion Systems	
	Transport and Shipping Technologies	
2.5 Transport Infrastructure	Air Transport technology	
	Intermodal Transport technology	
	Logistics	
	Railway Transport technology	
	Road Transport technology	
	Traffic Engineering / Control Systems	
	Transport Infrastructure	
	Water Transport technology	
2.6 Design and Modeling / Prototypes	Design and Modeling / Prototypes	
2.7 Process control and logistics	Process control and logistics	
2.8 Signal Processing	Signal Processing	
	Aeronautical technology / Avionics	

	2.9 Aerospace Technology	Aerospace Technology Aircraft technology Helicopter technology				
3 BIOLOGICAL SCIENCES / TECHNOLOGIES	3.1 Medical technology	Clinical Research, Trials Cytology, Cancerology, Oncology Dentistry / Odontology, Stomatology Diagnostics, Diagnosis Environmental Medicine, Social Medicine, Sports Medicine technology Gene - DNA Therapy Heart and blood circulation illnesses Medical devices technology (instrumentation, medical imaging, radiology) Medical technology Neurology, Brain Research Pharmaceutical Products / Drugs Surgery Virus, Virology, Vaccines/ Antibiotics / Bacteriology				
		3.2 Biology / Biotechnology	Biochemistry / Biophysics Biology / Biotechnology Cellular and Molecular Biology Enzymology / Protein Engineering / Fermentation Genetic Engineering In vitro Testing, Trials Microbiology Molecular design Toxicology			
			3.3 Micro- and Nanotechnology related to Biological sciences	Micro- and Nanotechnology related to Biological sciences		
			3.4 Genome Research	Bioinformatics Gene Expression, Proteom Research Genome Research Population genetics		
			4 ENERGY TECHNOLOGY	4.1 Renewable Sources of Energy	Gaseous biomass Geothermal Energy Hydropower Liquid biomass Photovoltaics Renewable Sources of Energy Solar/Thermal energy Solid biomass Unconventional and Alternative Energies Waste incineration Wind energy	
					4.2 Rational use of energy	Energy management Lighting, illumination Process optimisation, waste heat utilisation Rational use of energy Thermal insulation, energy efficiency in buildings
		4.3 Energy production, transmission and conversion				Energy production, transmission and conversion Fuel cell, hydrogen production Furnace technology, construction of heating boilers Generators, electric engines and power converters Heat exchangers Heat pump, cooling technologies Heating, ventilation Turbines, fluid machinery, reciprocating engines, combined heat and power
						4.4 Energy Storage and Transport

		Transport and storage of gas and liquid fuels
		Transport and storage of hydrogen
	4.5 Other Energy Topics	Combustion, Flames
		Fuel Technology
		Other Energy Topics
	4.6 Printing	Flexography
		Printed Reel Material
		Printing
	4.7 Fossil Energy Sources	Coal and Hydrocarbons
		Fossil Energy Sources
		Gaseous fossil fuel
		Liquid fossil fuel
	4.8 Mining Technologies	Mining Technologies
5 TECHNOLOGY FOR PROTECTING MAN AND THE ENVIRONMENT	5.1 Environment technology	Air Pollution
		Ecology
		Environment technology
		Environmental Engineering / Technology
		Measurement and Detection of Pollution
		Natural Disasters
		Remote sensing technology
		Soil Pollution
		Water Pollution / Treatment
	5.2 Waste Management technology	Biotreatment / Compost / Bioconversion
		Incineration and Pyrolysis
		Land and Sea Disposal
		Radioactive Waste
		Recycling, Recovery
		Waste Management technology
5.3 Safety technology	Acoustic safety	
	Assessment of Risk	
	Fire Safety Technology	
	Hazardous Materials	
	Radiation Protection	
	Safety technology	
6 OTHER INDUSTRIAL TECHNOLOGIES	6.1 Textiles Technology	Dyeing related to Textiles Technology
		Finisher related to Textiles Technology
		Textiles Technology
		Thermoplastic textile fibres
		Weaving related to Textiles Technology
		Woven technical textiles for industrial applications
	6.2 Chemical Technology and Engineering	Agro chemicals
		Chemical Technology and Engineering
		Colours, dyes related to Chemical Technology and engineering
		Electrical Engineering and Technology / Electrical Equipment
		Man made fibres
		Organic Substances
		Pharmaceutics
		Plastics and Rubber related to Chemical Technology and engineering
		Rubber
		Soaps, detergents
	6.3 Other Industrial Technologies_subgroup	Cleaning Technology
Other Industrial Technologies_subgroup		
6.4 Apparatus Engineering	Apparatus Engineering	
6.5 Footwear / Leather Technology	Dry filling related to Footwear / Leather Technology	
	Footwear / Leather Technology	
	Tanned leather process related to Footwear / Leather Technology	
6.6 Process Plant Engineering	Plant Design and Maintenance	
	Process Plant Engineering	
6.7 Sound Engineering/Technology	Sound Engineering/Technology	
		Agricultural technology

7 AGRICULTURE AND MARINE RESOURCES	7.1 Agricultural technology	Agriculture Machinery / Technology	
		Crop Production technology	
		Horticulture technology	
		Pesticides	
		Plant selection/production technology	
		Precision agriculture technology	
	7.2 Animal Selection/Production / Husbandry technology	Veterinary Medicine	
		Animal Selection/Production / Husbandry technology	
	7.3 Resources of the Sea, Fisheries	Aquaculture technology	
		Fish / Fisheries / Fishing Technology	
		Marine Science	
	7.4 Biocontrol	Resources of the Sea, Fisheries	
Biocontrol			
Forest technology			
Sylviculture, Forestry			
		Wood technology	
8 CHEMISTRY, PHYSICAL AND EXACT SCIENCES	8.1 Micro- and Nanotechnology related to physical and exact sciences	Micro- and Nanotechnology related to physical and exact sciences	
	8.2 Meteorology / Climatology	Acoustics	
		Laser Technology	
		Meteorology / Climatology	
		Sensors/Multisensor Technology, Instrumentation	
			Thermodynamics
	8.3 Chemistry	Chemistry	
		Computational Chemistry and Modelling	
		Inorganic Chemistry	
		Organic Chemistry	
		Petrochemistry, Petroleum Engineering	
8.4 Membrane / Filtration technology	Membrane / Filtration technology		
8.5 Analytical Chemistry	Analytical Chemistry		
8.6 Mathematics, Statistics	Algorithms and Complexity		
	Mathematical modelling		
		Mathematics, Statistics	
8.7 Earth Sciences	Earth Sciences		
	Geology, Geological Engineering, Geotechnics		
	Tectonics, Seismology		
8.8 Hydraulics	Hydraulics		
9 MEASUREMENTS AND STANDARDS	9.1 Measurement Tools	Acoustic Technology related to measurements	
		Analyses / Test Facilities and Methods	
		Chemical material testing	
		Electrical Technology related to measurements	
		Measurement Tools	
		Mechanical Technology related to measurements	
		Optical material testing	
		Optical Technology related to measurements	
		Other Non Destructive Testing	
		Sensor Technology related to measurements	
	9.2 Electronic measurement systems	Electronic measurement systems	
	9.3 Reference Materials	Reference Materials	
	9.4 Standards	Standards	
		Technical Standards	
	9.5 Recording Devices	Recording Devices	
10 AGROFOOD TECHNOLOGY	10.1 Technologies for the food industry	Drink Technology	
		Food Additives / Ingredients	
		Food Processing	



		Food Technology
		Technologies for the food industry
	10.2 Food quality and safety	Detection and Analysis methods
		Food Microbiology / Toxicology / Quality Control
		Food Packaging / Handling technology
		Food quality and safety
		Safe production methods
		Tracability of food
	10.3 Nutrition and Health	Nutrition and Health
undefined	undefined	CO2net
		Laminate
		Packaging / Handling
		Packaging technology for materials
		Seed coating
		undefined