

# RISIS



RESEARCH INFRASTRUCTURE FOR SCIENCE  
AND INNOVATION POLICY STUDIES

## DOCUMENTATION OF RISIS DATASETS EUPRO

*B. Heller-Schuh, M. Barber, Xh. Bilalli Shkodra,  
Th. Scherngell, G. Zahradnik (AIT)*  
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## 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 (1984-2019), including H2020 as the main update to the prae-RISIS version of EUPRO,
- data on R&D projects funded by EUREKA (1985-2019), 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:

#### 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
- *participations*: name and organization type of the participating organisations, link to OrgReg, address and geographical location of the participation entity of the organisation, project funding on the participant level
- *project output*: for FP7 and H2020, title, year, authors and DOI of publications as well as title, abstract and results of project reports are given. For H2020 only, title, description and type of deliverables are available.

#### EUREKA

- *projects*: title, description, technology and market area, start and end date, duration, project costs
- *participations*: organisation name, organisation type, role in project, address, website, costs

#### 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 participant level

#### 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 **112,038 projects** and **600,969 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	75,356
FP7	2007 - 2013	25,778	139,682
H2020*	2014 - 2019	25,604	117,226
EUREKA*	1985 - 2019	5,932	26,233
JTIs**	2008 - 2014	133	2,612
COST	1971 - 2014	1,132	35,543
<b>Total</b>	<b>1971 - 2019</b>	<b>112,038</b>	<b>600,969</b>

Note: \*including all projects starting before January 2020, \*\*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. Besides available downloadable open data for FP7 and H2020 as excel files, we used a wrapper – a kind of web scraping program – to extract and structure the information from the different XML-Files in an automated way. The program was written in Python, using the Beautiful Soup library which is used for parsing structured data. In order to do this, the wrapper opens each project pre-downloaded XML files and parses the XML content. As mostly of the files have 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. Basic raw data on FP7 and H2020 projects, participants, and project outcomes of the current version (FP\_2021) was downloaded in March 2020 in CSV-format.



Additional available data, like e.g., the Fields of Science categories assigned to FP projects, were extracted from the downloadable XML-files, available for FP7 and H2020, which hold the complete project information as accessible on the CORDIS project websites.

- Project level data for EUREKA has been retrieved from the **EUREKA** website (<http://www.eurekanetwork.org>). While raw data for projects starting between 1985 and 2014 were downloaded via web scraping in January 2017, raw data for projects after 2014 were derived from the interactive dashboard (<https://www.eurekanetwork.org/about-us/interactive-dashboard>) in April 2021.
- 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 downloaded 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 of data was improved by harmonizing different spelling and language variants of organization names and by extending, cleaning and harmonizing the type of participating organizations. Furthermore, organisation names have been linked to organisations listed in OrgReg, the Register of European Public Research and Higher Education Actors.

Data cleaning and standardisation includes four major steps:

- identification of unique organisation name (only for FP data),
- identification of unique organisation type (only for FP data),
- linking of organisation names to OrgReg entities, and
- regionalisation (i.e., assignment to European NUTS3 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. Similarly, the linking between EUPRO organisation names and the entities in OrgReg was conducted.

For the data regionalisation, we used a two-stage process. First, we used a mapping from postal codes to NUTS3 regions. Where that was unsuccessful, we made use of 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\_2021

#### Programme table

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

Variable	Description
prgId	internal unique identifier for FP subprogrammes <sup>2</sup>
prgType	code (1-8) for the names of the specific framework programme types FP1 to FP7 and H2020 in which the subprogrammes were funded <sup>1</sup>
prgName	full name of subprogramme areas in each of the framework programmes (e.g., FP7-HEALTH – Specific Programme “Cooperation”: Health) <sup>2</sup>
prgAcr	subprogramme acronym (e.g., FP7-HEALTH) <sup>1</sup>
prgURL	official website of the subprogramme <sup>1</sup>
prgStartDate, prgEndDate	day, month and year of subprogramme start and end <sup>1</sup>
prevPrg, succPrg	acronym of the predecesing and the succeeding subprogramme <sup>1</sup>
prgFundingMill	financing contribution of the European Union to the complete subprogramme in million Euros <sup>1</sup>
officialJournalReference	reference to the Official Journal of the EU, the main source of the EUR-Lex content <sup>1</sup>
officialJournalReferenceDate	date of reference <sup>1</sup>
legislativeReference	reference to EUR-Lex (eur-lex.europa.eu) <sup>1</sup>
legislativeReferenceDate	date of reference <sup>1</sup>
objective, abstract, subdivision, implementation, remarks	detailed description of the subprogramme, its objectives, subdivisions and implementation (only available for FP1-FP6) <sup>1</sup>

<sup>1</sup> provided by source data set (e.g. CORDIS, unchanged)

<sup>2</sup> introduced and/or processed by AIT

## Project tables

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

Variable	Description
rcn	unique identifier (record control number) for each project in the database, identical with unique identifier of all projects in the CORDIS projects database <sup>1</sup>
projectReference	(not-unique) project index, for internal use in the European Commission (matches with Project Id in CORDA) <sup>1</sup>
title	full title of the project <sup>1</sup>
projAcr	(non-unique) project acronym or abbreviation of the project title <sup>1</sup>
startDate, endDate	day, month and year of project start and end <sup>1</sup>
totalProjectCosts	official project costs as indicated in the project proposal <sup>1</sup>
projectECFunding	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". <sup>1</sup>
fundingSchemeld	funding scheme identifier (corresponding Funding Schemes see Table 4) <sup>2</sup>
call	call identifier from FP6 onwards <sup>1</sup>
objective	conceptual orientation of the project <sup>1</sup>
projectUrl	official website of the project <sup>1</sup>

**Table 4: Description of variables providing information about funding\_schemes (FP)**

Variable	Description
fundingSchemeld	internal unique funding scheme identifier <sup>2</sup>
fundingSchemeCode	abbreviation of funding schemes <sup>1</sup>
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) <sup>1</sup>

## Participation tables

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

Variable	Description
participID	internal unique identifier of each participation <sup>2</sup>
rcn	link to projects table (Table 3) <sup>1</sup>
role	role of participant in the project; differentiates between "coordinator", "participant" and "partner" (in MSC-Actions); note that for some projects in FP6-IST and FP7-ICT also the role "coordinator Contact" is specified <sup>1</sup>
orgld	link to organisations table (Table 6) <sup>2</sup>
acronym	abbreviation of the organisation name (available only for FP7 and H2020 projects) <sup>1</sup>

endOfParticipation	indicates that organisations left the projects, but also changes of organisations' names or addresses during project run-time <sup>1</sup>
geold	link to geography table (Table 8) <sup>2</sup>
address, postcode, city	street level address information <sup>1</sup>
ecContribution	amount of EC funding on participant level <sup>1</sup>
orgUrl	link to the organisation's website <sup>1</sup>
pic	9-digit Participant Identification Code used for all FP participants in EU programmes <sup>1</sup>
vatNumber	Value Added Tax Registration Number; unique number that identifies a taxable person (business) or non-taxable legal entity that is registered for VAT <sup>1</sup>
NUTS_assignment_id	Link to table defining strategy used to identify NUTS3 region for the participation (Table 9). <sup>2</sup>

**Table 6: 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) <sup>2</sup>
orgName	standardised EUPRO organisation name; the FP database currently covers a period of more than 30 years during which organisations have changed due to mergers, acquisitions and divestitures. Currently, organisations are labelled by the name valid at the moment of the grant agreement <sup>2</sup>
orgTypeId	link to organisation type (Table 7) <sup>2</sup>
orgRegId	link to RISIS-OrgReg, the Register of European Public Research and Higher Education Actors <sup>2</sup>

**Table 7: Description of variables providing information about the organisation type (FP)**

Variable	Description
orgTypeId	internal unique identifier for organisation types; corresponds with the entries in the field orgTypeId in the organisations table <sup>2</sup>
orgType	standardised EUPRO organisation type <sup>2</sup>
orgTypeDescription	explanation of organisation types <sup>2</sup>

## Geography

**Table 8: Description of variables providing information about the geography of participations (FP)**

Variable	Description
geold	internal unique identifier for each geographical location of the participants <sup>2</sup>
ctryID	link to ctry table (Table 10) <sup>2</sup>
NUTS3	Regional EUROSTAT classification using the 2021 NUTS definitions <sup>2</sup>

**Table 9: Description of variables providing information about the method used to assign NUTS3 regions to participations (FP)**

Variable	Description
NUTS_assignment_id	internal unique identifier for strategy used to assign a NUTS3 region to a participation <sup>2</sup>
description	Explanation of strategy used to assign a NUTS3 region <sup>2</sup>

**Table 10: Description of variables providing information about the country of origin (FP)**

Variable	Description
ctryId	internal unique identifier for each participating country <sup>2</sup>
ctryCode	standardised country codes of the participating organisational units; abbreviations are given ISO 3166-1 Alpha-2 country codes <sup>3</sup> ; in the case of multinational organisations the participating national branches are listed <sup>2</sup>
ctryName	official name of countries <sup>2</sup>
ctryTypeId	link to ctryTypes table <sup>2</sup>

**Table 11: Description of variables providing information about the country type (FP)**

Variable	Description
ctryTypeId	internal unique identifier for each participating country <sup>2</sup>
ctryType	differentiation between EU member states, associated countries and third countries (including subcategories) – abbreviations <sup>2</sup>
ctryTypeDesc	differentiation between EU member states, associated countries and third countries (including subcategories) – full text <sup>2</sup>

## Project outputs

**Table 12: Description of variables providing information about H2020 deliverables (FP)**

Variable	Description
delivId	internal unique identifier for each project deliverable <sup>2</sup>
rcn	link to projects table (Table 3) <sup>1</sup>
title	deliverable title <sup>1</sup>
description	short description of the content <sup>1</sup>
deliverableType	Documents, reports; open data; Websites, patent filings, videos etc. <sup>1</sup>
url	direct link to download the document <sup>1</sup>
lastUpdateDate	date of last update <sup>1</sup>

<sup>3</sup> <https://www.iso.org/obp/ui/#search/code/>

**Table 13: Description of variables providing information about FP7 & H2020 publications (FP)**

Variable	Description
publId	internal unique identifier for each project publication <sup>2</sup>
rcn	link to projects table (Table 3) <sup>1</sup>
title	publication title <sup>1</sup>
authors, journalTitle, journalNumber, publishedYear, publishedPages, issn, doi	bibliographic information in the case of open access publications <sup>1</sup>
url	direct link to download the document <sup>1</sup>
isPublished	type of publication (Peer reviewed articles, Conference proceedings, Thesis dissertations, etc.) <sup>1</sup>
lastUpdateDate	date of last update <sup>1</sup>

**Table 14: Description of variables providing information about FP7 & H2020 reports (FP)**

Variable	Description
reportId	internal unique identifier for each project report <sup>2</sup>
rcn	link to projects table (Table 3) <sup>1</sup>
title	report title <sup>1</sup>
teaser	short description of the report <sup>1</sup>
summary	extended description <sup>1</sup>
workPerformed	description of the main tasks in the project <sup>1</sup>
finalResults	description of the main achievements <sup>1</sup>
relatedFile	link to related illustrations, images, announcements, etc. <sup>1</sup>
url	link to the project website or further information <sup>1</sup>
lastUpdateDate	date of last update <sup>1</sup>

## Thematic classifications

**Table 15: Description of variables describing the thematic orientation (FoS) of FP7 & H2020 projects (FP)**

Variable	Description
fosCode	unique identifier of each Fields of Science (FoS) Term <sup>1</sup>
fosTerm	verbal representation of fosCode <sup>1</sup>
hierarchyCode	placement of fosCode in the FoS taxonomy <sup>4,1</sup>

<sup>4</sup> for a complete representation of the EuroSciVoc Taxonomy see Table A 1 in the Appendix

**Table 16: Description of variables providing information about the hierarchy of FoS (FP)**

Variable	Description
ancestorFosCode	fosCode of the superordinate Fos term <sup>1</sup>
fosCode	link to fosTerms table <sup>1</sup>
depth	number of hierarchy levels between ancestorFosCode and fosCode <sup>1</sup>

**Table 17: Description of variables providing information about FP2-H2020 topics (FP)**

Variable	Description
topicId	internal unique identifier for each topic <sup>2</sup>
prgId	link to programme table (Table 2)
topicCode	topic identifier within subprogrammes <sup>1</sup>
topicName	name of topic within subprogrammes <sup>1</sup>

**Table 18: Description of variables providing information about FP1-FP6 subjects (FP)**

Variable	Description
subjectId	internal unique identifier for each subject <sup>2</sup>
subjectName	one or more of 51 standardized keywords (see Table 29); 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 (only available for FP1-FP6) Caution: allocation of subject indices seems sometimes arbitrary – check reliability of contents of this variable before usage <sup>1</sup>

## 2.3.2 EUREKA\_2021

**Table 19: Description of variables providing information about projects (EUREKA)**

Variable	Description
projectId	unique identifier for each project in the database <sup>1</sup>
programme	name of the funding programme (cluster names, EUREKA, Eurostars, Globalstars, Network projects); only available for projects after 2014 <sup>1</sup>
programmeType	type of funding programme (clusters, EUREKA, Eurostars, Globalstars, Network projects) <sup>1</sup>
callId	call number within the programmes; only available for projects after 2014 <sup>1</sup>
acronym	(non-unique) project acronym <sup>1</sup>
title	full title of the project <sup>1</sup>

descriptionShort, descriptionLong	conceptual orientation of the project; descriptionShort is only available for projects before 2014 <sup>1</sup>
technologyAreaDetail	thematic field of research on level 3 (see Appendix Table A 3 for the complete list of technology areas on three levels) <sup>1</sup>
technologyAreaPrimary	thematic field of research on level 1 (see Appendix Table A 3 for the complete list of technology areas on three levels) <sup>1</sup>
technologyAreaSimple	simplified grouping of technologyArea_primary (Biotech, Energy, Environment, ICT, Industrial, Other) <sup>1</sup>
marketAreaDetail, marketAreaPrimary, marketAreaSimple	target market area similarly processed like technology areas; marketAreaSimple consists of Biotech / medical, Construction / building, Consumer / services, Energy, Environment, ICT, Industrial, Transportation <sup>1</sup>
fundingYear	year of funding agreement; only available for projects after 2014 <sup>1</sup>
startDate, endDate	day, month and year of project start and end <sup>1</sup>
durationMonths	duration of the projects in months <sup>1</sup>
projectWithdrawn	yes/no; only available for projects after 2014 <sup>1</sup>
actualCostMEuro	official project costs in million Euros <sup>1</sup>

**Table 20: Description of variables providing information about participations (EUREKA)**

Variable	Description
projectId	link to projects table (Table 19) <sup>1</sup>
cnr	unique identifier (control number) assigned for each participant in a project <sup>2</sup>
role	role of participant in the project (as given); differentiates between "Main", "Partner", "Observer", "Contact", "Interested", and "Withdrawn" <sup>1</sup>
participant	(not harmonised) organisation name <sup>1</sup>
participantId	internal EUREKA participant ID; caution: one participant might be represented by different participant IDs <sup>1</sup>
orgregId	link to RISIS-OrgReg, the Register of European Public Research and Higher Education Actors <sup>2</sup>
firmregId	link to RISIS-FirmReg, the reference database on private actors; not yet included
orgType	standardised EUREKA organisation type; distinguishes between Large company, SME, R&D Performing SME, Research Institute, University, Government and Other <sup>2</sup>
address, city	street level address information <sup>1</sup>
ctry	standardised country codes; country abbreviations are given as ISO 3166-1 Alpha-2 <sup>5</sup> codes <sup>2</sup>

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

Website	URL of participant <sup>1</sup>
participantCostMEuro	total costs on the participant level in million Euros <sup>1</sup>

**Table 21: Description of variables providing information about localisation of participants (EUREKA)**

Variable	Description
projectId	link to projects table (Table 19) <sup>1</sup>
cnr	unique identifier (control number) assigned for each participant in a project <sup>2</sup>
latitude_city, longitude_city	geographic coordinates of city <sup>2</sup>
NUTS3	regional EUROSTAT classification referencing the subdivisions of countries, where city is localised <sup>2</sup>

### 2.3.3 JTI 1.0

**Table 22: Description of variables providing information about programmes (JTI)**

Variable	Description
JU_name	unique JTI acronym (ARTEMIS, ENIAC, ECSEL) <sup>1</sup>
JU_call	call ID <sup>2</sup>
JoREP_prog_id	link to programme ID in JoREP database <sup>2</sup>
JoREP_call_id	link to call ID in JoREP database <sup>2</sup>
Proj_info_source	url, where project level data was retrieved <sup>2</sup>
Benefic_info_source	url, where beneficiary level data was retrieved <sup>2</sup>
Last accessed	date of data retrieval <sup>2</sup>
Comments	comments on missing or divergent data <sup>2</sup>

**Table 23: Description of variables providing information about projects (JTI)**

Variable	Description
JU_name	link to programmes table (Table 22) and beneficiaries table (Table 24) <sup>1</sup>
JU_call	link to programmes table (Table 22) and beneficiaries table (Table 24) <sup>2</sup>
Proj_acronym	(non-unique) project acronym or abbreviation of the project title <sup>1</sup>
Proj_title	full title of the project <sup>1</sup>
Proj_start date	day, month and year of project start <sup>1</sup>
Duration	duration of the project in months <sup>1</sup>
Proj_eligible_cost, Proj_eligible_cost_remarks	eligible project costs <sup>1</sup>
Proj_JU_funding	JU project funding <sup>1</sup>
Proj_national_funding, Proj_national_funding_flag	national project funding <sup>1</sup> ; flag indicates estimated data <sup>2</sup>

Comment	comments on data retrieval and the calculation of project costs and funding <sup>2</sup>
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**Table 24: Description of variables providing information about beneficiaries (JTI)**

Variable	Description
JU_name	link to projects table (Table 23) <sup>1</sup>
JU_call	link to projects table (Table 23) <sup>2</sup>
Proj_acronym	link to projects table (Table 23) <sup>1</sup>
stApplicant	standardised EUPRO organisation name <sup>2</sup>
benefic_country	standardised country codes given as ISO 3166-1 Alpha-2 country codes <sup>6,2</sup>
benefic_eligible_cost, benefic_eligible_cost_remarks	eligible project costs on the beneficiary level <sup>1</sup>
benefic_JU_funding	JU project funding on the beneficiary level <sup>1</sup>
benefic_national_funding	national funding on the beneficiary level <sup>1</sup> ; flag indicates estimated data <sup>2</sup>
Comment	Comments on data retrieval and the calculation of project costs and funding on the beneficiary level <sup>2</sup>

## 2.3.4 COST 1.0

**Table 25: Description of variables providing information about actions (COST)**

Variable	Description
ActionNo	unique identifier for each project in the database <sup>1</sup>
Science Field	COST science fields <sup>1</sup>
Title	Full title of the project <sup>1</sup>
Description	conceptual orientation of the project <sup>1</sup>
LastUpdated	date of last update of project information <sup>1</sup>
Start Date, End Date	day, month and year of action start and end <sup>1</sup>
mcChair, mcViceChair	name of management committee chair and vice chair <sup>1</sup>

**Table 26: Description of variables providing information about parties (COST)**

Variable	Description
ActionNo	link to actions table (Table 25) <sup>1</sup>
StartDate	start date of participation <sup>1</sup>
Type	type of participation (COST or non-COST countries, institutions, bodies, etc.) <sup>1</sup>

<sup>6</sup> <https://www.iso.org/obp/ui/#search/code/>

Country	name of participating country <sup>1</sup>
InstitutionName	Institution name (not standardised) in the case of COST Near Neighbour Countries, COST International Partner Countries or non-COST Institutions <sup>1</sup>
OrganisationName	name of organisation in the case of Specific Organisations (e.g. public bodies) <sup>1</sup>

**Table 27: Description of variables providing information about management structure (COST)**

Variable	Description
ActionNo	link to actions table (Table 25) <sup>1</sup>
Type	type of participation (COST or non COST countries, institutions, bodies, etc.) <sup>1</sup>
mcCountry, mcInstitution, mcOrganisation	name of participating country, institution or organisation <sup>1</sup>
mcType	management committee member, observer or substitute <sup>1</sup>
personInstitution, personStreetCity	Institution and address of the management committee member, observer or substitute <sup>1</sup>

## 2.4 Sectorial, temporal and geographical coverage

### Information on the sectorial classifications used

**Table 28: FP Organisation type**

OrgTypes	Description
EDU	universities and other educational institutions
ROR	public and private research organisations
IND	industry
GOV	governmental institutions
OTH	special interest groups, like unions, chambers, inter-trade organisations, etc

**Table 29: Subjects (FP1-FP6)**

Subjects
Aerospace Technology
Agriculture
Biotechnology
Business aspects
Construction Technology
Coordination and Cooperation
Earth Sciences
Economic Aspects
Education and Training
Electronics and Microelectronics



Energy Saving
Energy Storage and Energy Transport
Environmental Protection
Evaluation
Food
Forecasting
Fossil Fuels
Industrial Manufacture
Information and communication technology applications
Information and Media
Information Processing and Information Systems
Innovation and Technology Transfer
Intellectual property rights
Legislation and Regulations
Life Sciences
Materials Technology
Mathematics and Statistics
Measurement Methods
Medical biotechnology
Medicine and Health
Meteorology
Nuclear Fission
Nuclear Fusion
Other Energy Topics
Other Technology
Policies
Radiation Protection
Radioactive Waste
Reference Materials
Regional Development
Renewable Sources of Energy
Research ethics
Resources of the Sea and Fisheries
Safety
Scientific Research
Social sciences and humanities
Standards
Sustainable development
Telecommunications
Transport

Waste Management

**Table 30: Fields of Science (EuroSciVoc) taxonomy (FP7-H2020)<sup>7</sup>**

Level 0	Level 1	Level 2	
agricultural sciences	agricultural biotechnology	agricultural genetics	
		biomass	
		marker assisted selection	
	agriculture, forestry, and fisheries	agriculture	
		fisheries	
		forestry	
	animal and dairy science	animal husbandry	
		apiculture	
		dairy	
		pets	
other agricultural sciences			
veterinary science			
engineering and technology	chemical engineering	biochemical engineering	
		chemical engineering software	
		chemical process engineering	
	civil engineering	architecture engineering	
		construction engineering	
		structural engineering	
		transportation engineering	
	electrical engineering, electronic engineering, information engineering	electrical engineering	
		electronic engineering	
		information engineering	
	environmental biotechnology	bioremediation	
		biosensing	
	environmental engineering	energy and fuels	
		geological engineering	
		geotechnics	
		mining and mineral processing	
		natural resource management	
		remote sensing	
		waste management	
		water management	
		industrial biotechnology	biomaterials
			bioprocessing technologies
	metabolic engineering		
	materials engineering	ceramics	
		coating and films	
		colors	
		composites	

<sup>7</sup> for the complete 5-level table see Table A 1

		crystals	
		fibers	
		liquid crystal	
		metallurgy	
		nanocomposites	
		paper and wood	
		synthetic dyes	
		textiles	
	mechanical engineering	applied mechanics	
		manufacturing engineering	
		mechatronics	
		thermodynamic engineering	
		tribology	
		vehicle engineering	
	medical engineering	medical laboratory technology	
	nanotechnology	nano-materials	
		nano-processes	
nanoelectromechanical systems			
nanoelectronics			
nanophotonics			
other engineering and technologies	food and beverages		
	microtechnology		
humanities	arts	architectural design	
		art history	
		modern and contemporary art	
		performing arts	
		visual arts	
	history and archaeology	archaeology	
		history	
	languages and literature	languages - general	
		linguistics	
		literary genres	
		literature - general	
	other humanities		
	philosophy, ethics and religion	ethics	
		philosophy	
		religion	
	medical and health sciences	basic medicine	anatomy and morphology
			immunology
			medical genetics
			medicinal chemistry
neurology			
pathology			
pharmacology and pharmacy			
physiology			
toxicology			
clinical medicine		allergology	



		anaesthesiology
		andrology
		angiology
		cardiology
		clinical microbiology
		clinical neurology
		critical care medicine
		dentistry
		dermatology
		embryology
		emergency medicine
		endocrinology
		gastroenterology
		general medicine
		gerontology
		hematology
		hepatology
		integrative and complementary medicine
		internal medicine
		nephrology
		obstetrics and gynaecology
		odontology
		oncology
		ophthalmology
		orthopaedics
		otorhinolaryngology
		paediatrics
		physiotherapy
		pneumology
		psychiatry
		radiology
		rheumatology
		surgery
		transplantation
		urology
	health sciences	dietetics
		epidemiology
		health care sciences
		health care services
		infectious diseases
		inflammatory diseases
		medical ethics
		nursing
		nutrition
		parasitology
		public and environmental health

		social biomedical sciences
		sport and fitness sciences
		substance abuse
		tropical medicine
	medical biotechnology	cells technologies
		genetic engineering
		medical bioproducts
		nanomedicine
		prosthetics
	other medical sciences	tissue engineering
		forensic science
	natural sciences	biological sciences
biochemistry		
biodiversity conservation		
behavioural sciences biology		
biological morphology		
biology		
biophysics		
botany		
cell biology		
developmental biology		
ecology		
evolutionary biology		
freshwater biology		
genetics and heredity		
marine biology		
microbiology		
molecular biology		
morphology		
neurobiology		
reproductive biology		
synthetic biology		
zoology		
chemical sciences		analytical chemistry
		electrochemistry
		inorganic chemistry
		nuclear chemistry
		organic chemistry
		physical chemistry
computer and information sciences	polymer science	
	artificial intelligence	
	computational science	
	computer security	
	data science	
	databases	
internet		
software		

	earth and related environmental sciences	atmospheric sciences
		environmental sciences
		geochemistry
		geology
		geophysics
		hydrology
		oceanography
		palaeontology
		physical geography
	soil science	
	mathematics	applied mathematics
		pure mathematics
	other natural sciences	
	physical sciences	acoustics
		astronomy
		atomic physics
		classical mechanics
		condensed matter physics
		electromagnetism and electronics
		molecular and chemical physics
nuclear physics		
optics		
plasma physics		
quantum field theory		
quantum mechanics		
relativistic mechanics		
string theory		
theoretical physics		
thermodynamics		
social sciences	economics and business	business and management
		economics
	educational sciences	didactics
		inclusive education
		pedagogy
		special education
	law	admiralty law
		constitutional law
		criminology
		human rights
		international law
		law enforcement agencies
		penology
	media and communications	information science
		journalism
		library science
	other social sciences	social sciences interdisciplinary

	political science	government systems
		political communication
		public administration
		public policy
	psychology	behavioural psychology
		cognitive psychology
		psycholinguistics
		psychotherapy
		social psychology
	social and economic geography	cultural and economic geography
		transport
		sociology

**Table 31: EUREKA concordance table Technology Areas (Level 1 and 2)<sup>8</sup>**

Level 1	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

<sup>8</sup> for the complete 3-level table see Table A 3.

	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
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 32: COST Science Fields**

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 2021	1984	2019
EUREKA 2.1	1985	2019
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 regions<sup>9</sup> using NUTS classification revision 2016<sup>10</sup>.

EUPRO covers participations from the following countries:

- *EU 27 Member States*
- *Associated countries* (with science and technology cooperation agreements that involved contributing to the framework programme budget)<sup>11</sup>:  
UK; 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)<sup>12</sup>
  - *International Cooperation Partner Countries (ICPC)*<sup>13</sup>: 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 2)

<sup>9</sup> including the analogous territorial descriptions for Switzerland and Norway

<sup>10</sup> History of NUTS, [http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts\\_nomenclature/history\\_nuts](http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/history_nuts) (accessed: 24/04/2014)

<sup>11</sup> FP7 Third Country Agreements, [http://ec.europa.eu/research/participants/data/ref/fp7/116018/fp7-third-country-agreements\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/fp7/116018/fp7-third-country-agreements_en.pdf) (accessed: 24/04/2014)

<sup>12</sup> 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](http://ec.europa.eu/research/participants/data/ref/fp7/90400/guideline-third-country-participants_en.pdf)

<sup>13</sup> 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](http://ec.europa.eu/research/participants/data/ref/fp7/206006/wp-2013-annex-1-icpc-list_en.pdf), (accessed: 24/04/2014)

- o *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.

## 2.5 Quality and accuracy of data

### Information on the number of missing values<sup>14</sup>

Table 33: Number and ratio of missing values of FP project data

Variable	Missing values	
	Count	Ratio
rcn	-	
projectReference	-	
title	1	0%
projAcr	1	0%
startDate	2,176	2%
endDate	2,999	3%
totalProjectCosts	24,167	23%
projectECFunding	22,626	22%
fundingSchemeld	5,209	5%
call	43,817	42%
objective	9,534	9%
projectUrl	80,510	77%

Table 34: Number and ratio of missing values of FP participation data

Variable	Missing values	
	Count	Ratio
participId	-	
rcn	-	
role	-	
orgId	3,904	1%
acronym	281,004	52%
endofParticipation	281,721	53%
geold	992	0.2%
NUTS3	19,840	4%
address	28,786	5%
postcode	88,691	17%

<sup>14</sup> 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.

city	14,440	3%
ecContribution	299,738	56%
orgUrl	338,320	63%
pic	280,385	52%
vatNumber	330,259	62%

**Table 35: Number and ratio of missing values of EUREKA project data**

Variable	Missing values	
	Count	Ratio
projectId	–	
programme*	4,094	69%
programmeType	–	
callId*	4,473	75%
acronym	–	
title	–	
descriptionShort**	1,838	31%
descriptionLong	1	0%
technologyAreaDetail	1,942	33%
technologyAreaPrimary	1,949	33%
technologyAreaSimple	1,744	29%
marketAreaDetail	2,429	41%
marketAreaPrimary	2,485	42%
marketAreaSimple	2,485	42%
fundingYear*	4,094	69%
startDate, endDate	–	
durationMonths	–	
projectWithdrawn	–	
actualCostMEuro	74	1%

Note:\* only available for projects after 2014; \*\* only available for projects before 2014

**Table 36: Number and ratio of missing values of EUREKA participation data**

Variable	Missing values	
	Count	Ratio
projectId	–	
role	5,757	22%
participant	–	
participantId*	18,473	70%
orgregId	20,634	79%
orgType	16,050	61%
address	4,263	16%
city	4,668	18%

ctry	-	
Website	23,893	91%

Note: \* only available for projects after 2014

**Table 37: 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 38: 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 39: 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	-	



management system (RDBMS) and a database server needs to be used. Therefore, a MySQL version for the four modules of the EUPRO database will be provided as well.

## 3.2 Technical variable definition

### Labelling and data type of all variables<sup>15</sup>

**Table 41: Data type of variables providing information about projects (FP)**

Variable	Data type
rcn	Number
projectReference	Text
title	Text
projAcr	Text
startDate	Date
endDate	Date
totalProjectCosts	Number
projectECFunding	Number
fundingSchemeld	Number
call	Text
objective	Long Text
projectUrl	Text

**Table 42: Data type of variables providing information about participations (FP)**

Variable	Data type
participID	Number
rcn	Number
role	Text
orgId	Number
acronym	Text
endofParticipation	Text
geold	Number
address	Text
postcode	Text
city	Text
ecContribution	Number
orgUrl	Text
pic	Number
vatNumber	Text

<sup>15</sup> 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 43: Data type of variables providing information about projects (EUREKA)**

Variable	Data type
projectId	Text
programme	Text
programmeType	Text
callId	Text
acronym	Text
title	Text
descriptionShort	Long Text
descriptionLong	Long Text
technologyAreaDetail	Text
technologyAreaPrimary	Text
technologyAreaSimple	Text
marketAreaDetail	Text
marketAreaPrimary	Text
marketAreaSimple	Text
fundingYear	Number
startDate, endDate	Date
durationMonths	Number
projectWithdrawn	Text
actualCostMEuro	Number

**Table 44: Data type of variables providing information about participations (EUREKA)**

Variable	Data type
projectId	Text
role	Text
participant	Text
participantId	Text
orgregId	Text
firmregId	Text
orgType	Text
address	Text
city	Text
ctry	Text
Website	Text

**Table 45: 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	Long Text

**Table 46: Data type of variables providing information about beneficiaries (JTI)**

Variable	Data type
JU_name	Text
JU_call	Text
Proj_acronym	Text
stApplicant	Text
benefic_country	Text
benefic_eligible_cost, benefic_eligible_cost_remarks	Number
benefic_JU_funding	Number
benefic_national_funding	Number
Comment	Long Text

**Table 47: Data type of variables providing information about actions (COST)**

Variable	Data type
ActionNo	Text
Science Field	Text
Title	Text
Description	Long Text
GeneralInfo	Long Text
LastUpdated	Date
Start Date, End Date	Date
mcChair, mcViceChair	Text

**Table 48: Data type of variables providing information about parties (COST)**

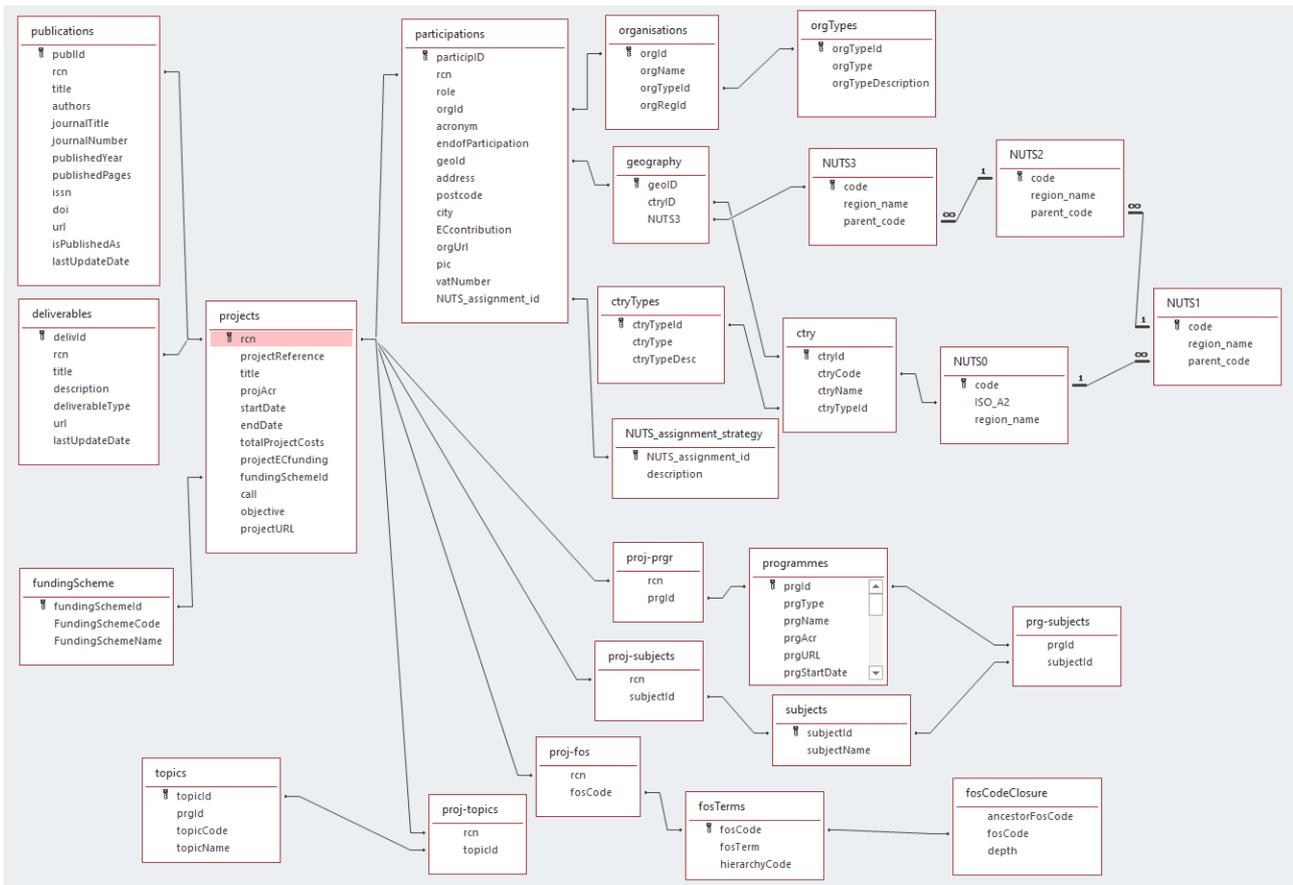
Variable	Data type
ActionNo	Text
StartDate	Date
Type	Text
Country	Text

InstitutionName	Text
OrganisationName	Text

### 3.3 Description of the Entity Relationship Model

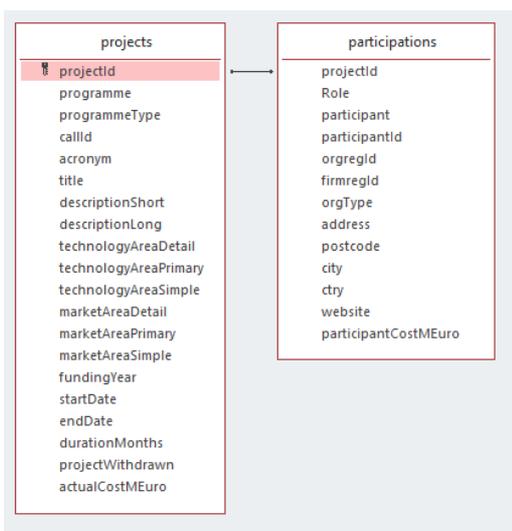
**FP 2021** currently consists of 22 tables (Figure 1). The relation between *projects*, *programmes*, *participations*, and project outputs (*reports*, *deliverables*, *publications*) and thematic classifications (*fosTerms*, *subjects*, *topics*) is realised via *rcn* (record control number), which is a unique identifier for each project in the database and identical to the unique identifier for the project in the CORDIS projects database. Thematic classifications (*subjects*) used for FP1-FP6 programmes and projects are given in the *subjects* table (linked by *subjectId* to *programmes* and *projects*). The thematic classification of FP7 and H2020 projects is provided in the *fosTerms* table, linked by *fosCode* to the *projects* table. further information on FP *topics* are linked by *topicId* to the *projects* table. The *participations* table is linked by *geold* to the *geography* table, which holds the geocoded data of the participants on city level and is linked (1) to the *regions* table, to provide the respective NUTS 3 code in which the city is located, and (2) to the *ctry* table, which holds the names of the country of origin. By the table *ctryTypes*, countries of origin are assigned to different country categories (EU27, associated countries and third countries). Every organisations is linked by *orgId* to the *organisations* table, which provides the link to RISIS-OrgReg, the Register of European Public Research and Higher Education Actors, and to the *orgTypes* table, which differentiates the organisations in universities, research organisations, governmental institutions, etc. Data of the scientific output of each project is comprised in *reports*, *deliverables*, and *publications*.

Figure 1: FP Entity Relationship Model



The logic of the **EUREKA** database structure is simple (Figure 2). Projects and participations are linked by projectId.

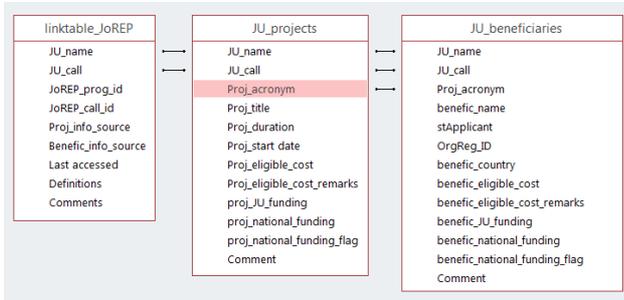
Figure 2: EUREKA Entity Relationship Model



The structure of the **JTI** database is also very simple (Figure 3). Data on programmes and the resulting projects are linked via JU\_name (JTI name) and

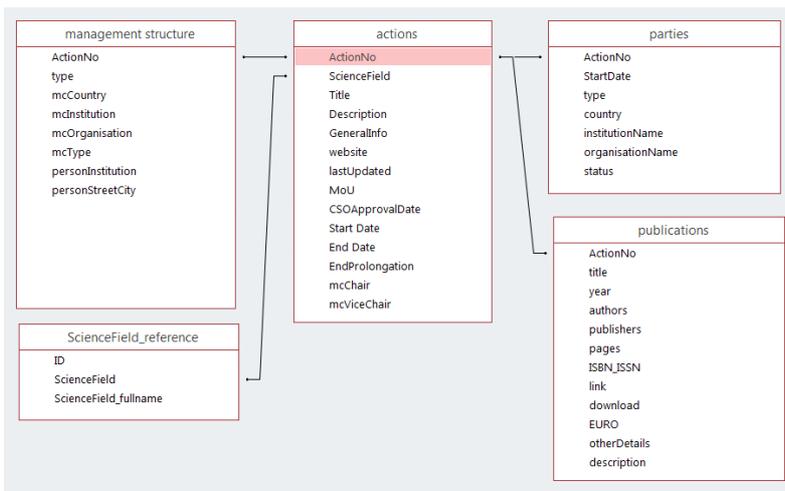
JU\_call (specific call name). Beneficiaries are connected to their specific projects via Proj\_acronym (project acronym).

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 conducted 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, organisations included in FP\_2021 are linked to RISIS-OrgReg by orgRegId in the *organisations* table. Accordingly, participants included in EUREKA\_2021 are linked to OrgReg by orgregId in the *participations* table. Likewise, the link to companies listed in **RISIS-FirmReg** will be established as soon as the first release of the register is available.
- 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).
- **RISIS-KNOWMAK** draws upon project data from the EUPRO FP module to compute and visual indicators of knowledge creation in the European Research Area (see Lepori et al. 2017). Projects are annotated<sup>16</sup> with topical

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<sup>16</sup> <https://gate.ac.uk/projects/knowmak>

classes relevant for Key Enabling Technologies (KET) and Societal Grand Challenges (SGC), include detailed subclasses. The link to RISIS-KNOWMAK has been further extended to include annotation of all projects based on their descriptions, including FP projects outside the scope of RISIS-KNOWMAK as well as EUREKA projects. With the full annotation, alternative indicator definitions may be used, and specific projects may be associated with KETs and SGCs.

### 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). Most probably, as mentioned above in the planned future technical changes section, there will be an API (Application Programming Interface) developed for the transfer of the EUPRO data to the RCF Platform. Anyhow, the 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 more details 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)

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## Appendix

Table A 1: Taxonomy of the European Science Vocabulary (EuroSciVoc)<sup>17</sup>

level 0	level 1	level 2	level 3	level 4	level 5	
27	79 agricultural biotechnology	483 agricultural genetics	n.a. livestock cloning 1275 plant cloning			
		481 biomass				
	81 agriculture, forestry, and fisheries	30021 agriculture	487 marker assisted selection			
			493 agronomy		1287 fruit 1289 root crop	
			499 horticulture			1833 fodder 30065 oilseed rape 1831 oleaginous plant
			1281 plant breeding		1751 crops	
			491 plant protection 1279 sustainable agriculture 497 viticulture			
		489 fisheries				
		495 forestry	1285 dendrology 1283 silviculture	1755 dendrochronology n.a. coppicing		
	83 animal and dairy science	507 animal husbandry	1291 animal feed			
		505 apiculture				
		503 dairy 501 pets				
	85 other agricultural sciences					
87 veterinary science						
25	65 chemical engineering	415 biochemical engineering n.a. chemical engineering software 411 chemical process engineering				
		77 civil engineering	479 architecture engineering	1271 home automation 1269 smart city 1267 sustainable architecture	1749 sustainable building	
			477 construction engineering			
	473 structural engineering		1255 earthquake engineering 1253 hydraulic engineering 1257 structural health monitoring	1747 base isolation 1745 seismic loading		
	475 transportation engineering		1263 airport engineering 1259 highway engineering 1265 port and harbor engineering 1261 railroad engineering 457 automation and control systems 1211 control engineering			
	73 electrical engineering, electronic engineering, information engineering	451 electrical engineering	1209 power engineering		1703 electric power distribution 1707 electric power generation 1705 electric power transmission	1825 combined heat and power
			453 electronic engineering	1213 analogue electronics		
		449 computer hardware			1203 computer processor 1207 quantum computer 1205 supercomputer	
		1217 digital electronics				
		459 robotics			1229 autonomous robots 1233 cognitive robots 1231 soft robotics 1227 swarm robotics	1729 drones
		1215 signal processing			1709 compressed sensing 1223 mobile phone	
		30020 information engineering	455 telecommunications		1225 radio technology	1721 bluetooth 1725 cognitive radio 1719 microwave technology 1727 radar 1723 radio frequency 1717 satellite radio 1715 data network 1713 optical network 1827 fiber-optic ne 1711 5g
				1221 telecommunications network		
				1219 wireless		
	71 environmental biotechnology	443 bioremediation	1197 bioleaching 1195 bioreactor 1199 compost 1201 phytoremediation			
		447 biosensing				
	67 environmental engineering	425 energy and fuels	1159 biofuels 1161 electric energy 1171 energy conversion		1679 coal 1683 gas 1681 petroleum	
			1165 fossil energy			
			1173 fuel cell 1163 liquid fuels 1167 nuclear energy			
			1169 renewable energy		1693 geothermal energy 1687 hybrid energy	
					1689 hydroelectricity	1823 marine energy 1821 tidal energy 1819 wave power
					1691 hydrogen energy 1685 solar energy 1695 windpower	
		1175 synthetic fuels				
421 geological engineering						
427 geotechnics						
417 mining and mineral processing						
423 natural resource management		1157 desalination				
419 remote sensing						
429 waste management	1179 energy efficiency 1177 energy recovery 1181 recycling 1185 remanufacturing 1183 waste water					
431 water management	1187 irrigation					



level 0	level 1	level 2	level 3	level 4	level 5	
25	61 industrial biotechnology	383 biomaterials	1147 bioplastics	1677 polyhydroxyalkanoates n.a. polyhydroxyurethanes 1675 polylactic acid 1673 polyurethane		
		385 bioprocessing technologies	1149 biocatalysis 1151 fermentation			
		381 metabolic engineering				
		397 ceramics				
		391 coating and films				
		409 colors				
		387 composites	1155 biocomposites 1153 carbon fiber			
		401 crystals				
		393 fibers				
		403 liquid crystal				
	63 materials engineering	389 metallurgy				
		407 nanocomposites				
		395 paper and wood				
		405 synthetic dyes				
		399 textiles				
		n.a. applied mechanics				
		469 manufacturing engineering	1247 additive manufacturing 1245 product engineering 1249 subtractive manufacturing			
		467 mechatronics				
		471 thermodynamic engineering	1251 heat engineering 1243 lubrication			
		463 tribology	1241 surface roughness			
	75 mechanical engineering	461 vehicle engineering	1239 aerospace engineering 1235 automotive engineering 1237 naval engineering 1139 diagnostic technologies n.a. laboratory samples analysis	1741 aeronautical engineering 1737 aircraft 1739 satellite technology 1731 autonomous vehicle 1733 drive by wire 1735 sea vessels	1829 rotorcraft	
		57 medical engineering	375 medical laboratory technology	1193 bulk nanostructured materials 1189 nanocrystal 1191 two-dimensional nanostructures	1699 graphene 1697 silicene	
		69 nanotechnology	435 nano-materials			
			441 nano-processes			
			439 nanoelectromechanical systems 433 nanoelectronics 437 nanophotonics			
59 other engineering and technologies	377 food and beverages 379 microtechnology	1145 food packaging	1143 food safety			
31	109 arts	601 architectural design				
		597 art history	591 folklore	1403 musicology	1793 ethnomusicology 1791 popular music studies	
		595 modern and contemporary art	589 film 599 radio and television			
		593 performing arts	1405 dramaturgy			
		603 visual arts				
	113 history and archaeology	611 archaeology	1431 archaeometry 1425 bioarchaeology 1429 ethnoarchaeology 1427 underwater archaeology 30033 ancient history 30036 contemporary history 30034 medieval history 30035 modern history			
		613 history				
		107 languages and literature	583 languages - general	1399 phonetics 1401 phonology 1397 sign language		
			587 linguistics			
			581 literary genres 577 literature - general	1393 essay 585 literary theory	1789 science fiction 1395 literary criticism	
	n.a. other humanities	605 ethics	1407 ethical principles 30041 ethical theories 1415 epistemology	1795 justice	1837 human rights	
	111 philosophy, ethics and religion	609 philosophy	30040 history of philosophy	30040 history of philosophy 1423 ancient philosophy 1421 contemporary philosophy 1417 medieval philosophy 1413 modern philosophy 30060 ontology 1799 teleology		
			1419 metaphysics			
			30039 philosophy of language 1797 political philosophy 1409 christianity			
		607 religion	1411 islam	30058 history of islam 30056 muslim culture 30057 muslim society		
			30038 judaism			

<sup>17</sup> <https://op.europa.eu/en/web/eu-vocabularies/th-concept-scheme/-/resource/authority/euroscivoc/?target=Browse>



level 0	level 1	level 2	level 3	level 4	level 5	
21	medical and health sciences	35 basic medicine	151 anatomy and morphology	625 muscular system		
			155 immunology	643 immunotherapy		
			149 medical genetics	641 t cell		
			157 medicinal chemistry			
			153 neurology	633 alzheimer		
				637 amyotrophic lateral sclerosis		
				629 epilepsy		
				639 multiple sclerosis		
				631 muscular dystrophy	1433 duchenne muscular dystrophy	
				627 parkinson		
				635 stroke		
			145 pathology	651 adverse drug reactions		
			159 pharmacology and pharmacy	649 drug resistance	1437 antibiotic resistance	
				645 drug safety	1435 multidrug resistance	
				653 pharmaceutical drug		
				647 pharmacokinetics	1439 vaccines	
			161 physiology	30022 cytology		
				655 homeostasis	1441 intestinal homeostasis	
				30023 pathophysiology		
			147 toxicology			
			183 allergology	685 drug allergy		
				683 food allergy		
			185 anaesthesiology			
			199 andrology			
			243 angiology	743 vascular diseases	1477 cerebrovascular diseases	
		221 cardiology	713 cardiovascular diseases	1463 arteriosclerosis		
			711 paediatric cardiology			
		197 clinical microbiology				
		241 clinical neurology				
		181 critical care medicine				
		239 dentistry				
		211 dermatology	1801 melanoma			
		203 embryology				
		189 emergency medicine	687 graft versus host disease			
		179 endocrinology	681 diabetes	1447 diabetic nephropathy		
		177 gastroenterology	679 inflammatory bowel disease			
		229 general medicine				
		175 gerontology				
		219 hematology				
		30013 hepatology				
		209 integrative and complementary medicine				
		30012 internal medicine				
		231 nephrology	723 kidney diseases			
			725 renal dialysis			
			695 gynaecology			
		207 obstetrics and gynaecology	697 obstetrics	1457 childbirth		
				1459 fetal medicine		
				1461 postnatal		
		239 odontology	741 dental implantology			
			737 orthodontics			
	739 periodontics					
	225 oncology		1475 bladder cancer			
			1471 breast cancer			
			1469 colorectal cancer			
			30053 head and neck cancer			
			1467 liver cancer			
			1473 prostate cancer			
			1465 skin cancer	30063 basal cell		
			30064 squamous cell carcinoma			
	213 ophthalmology	719 leukemia				
		703 glaucoma				
		699 retinopathy				
		701 strabismus				
	187 orthopaedics					
	205 otorhinolaryngology					
	195 paediatrics					
	227 physiotherapy					
	217 pneumology	707 asthma				
		705 lung diseases				
		709 tuberculosis				
	235 psychiatry	733 anxiety disorders				
		727 obsessive-compulsive disorder				
		735 posttraumatic stress disorder				
		731 schizophrenia				
		729 sleep disorders				
	201 radiology	693 medical imaging	1449 computed tomography			
			1455 magnetic resonance imaging			
		691 nuclear medicine	1451 x-ray radiography			
	215 rheumatology					
	223 surgery	715 robotic surgery				
		30025 surgical procedure				
	237 transplantation					
	233 urology					
	125 dietetics					
	133 epidemiology					
	n.a. health care sciences					
	30011 health care services	623 ehealth				
		621 malaria				
	121 infectious diseases	n.a. RNA virus	n.a. coronavirus			
			n.a. ebola			
			619 hiv			
			n.a. influenza			
	123 inflammatory diseases					
	127 medical ethics					
	143 nursing					
	117 nutrition					
	135 parasitology					
	137 public and environmental health	n.a. epidemics prevention	n.a. immunisation			
			n.a. modeling of disease spread			
	119 social biomedical sciences	617 family planning				
	615 sexual health					
139 sport and fitness sciences						
141 substance abuse						
129 tropical medicine						
33	health sciences					



level 0	level 1	level 2	level 3	level 4	level 5		
21	medical and health sciences	37	medical biotechnology	163 cells technologies	657 stem cells		
				165 genetic engineering	659 gene therapy		
				169 medical bioproducts	675 heart valve		
				171 nanomedicine	677 implants		
				173 prosthetics			
		41	other medical sciences	167 tissue engineering	665 artificial bone	30050 closed-loop systems	
				249 forensic science	671 artificial pancreas	30052 continuous glucose monitors	
				247 history of medicine	663 bioartificial liver	30051 current studies	
23	natural sciences	49	biological sciences	315 biochemistry	999 biochemical research methods	1611 carbohydrates	
				323 biodiversity conservation	997 biomolecules	1617 enzymes	
				321 behavioural sciences biology	1001 behavioural ecology	1615 lipids	
				353 biological morphology	30027 ethology	n.a. nucleic acid	
				319 biology	1051 comparative morphology	1613 proteins	1815 proteomics
				329 biophysics	1049 functional morphology		
				311 botany			
				313 cell biology	993 cell metabolism		
				349 developmental biology	995 cell polarity		
				335 ecology	991 cell signaling		
		343 evolutionary biology	1009 ecosystems				
		347 freshwater biology	1011 invasive species				
			1013 landscape ecology				
		337 genetics and heredity	1023 chromosome				
			1015 dna				
			1025 genome				
			1027 heredity				
			1017 mutation				
			1019 nucleotide				
			1021 rna				
		317 marine biology					
		341	microbiology	1035 bacteriology		1621 ethnolichenology	
				1031 mycology		1619 ethnomycology	
				1029 phycology			
				1033 protozoology			
				325 virology			
		309	molecular biology	987 molecular evolution			
				989 molecular genetics			
				985 molecular neuroscience			
				983 structural biology			
		353 morphology					
		327 neurobiology	30028 neuroscience				
			1007 cognitive neuroscience				
			1005 computational neuroscience				
		333 reproductive biology					
		339 synthetic biology					
		345	zoology	1039 entomology		1623 apidology	
				1043 ichthyology			
				1037 invertebrate zoology			
				1045 mammalogy		1627 cetology	
				1041 ornithology		1625 primatology	
			1079 calorimetry				
		361	analytical chemistry	1657 inorganic qualitative analysis			
				1081 mass spectrometry			
				1083 quantitative analysis		1663 volumetric analysis	
				1077 spectroscopy			
				1133 bioelectrochemistry		1669 electrofusion	
		373	electrochemistry	1129 electric batteries		1667 electroporation	
				1135 electrocatalysis			
				1131 electrolysis			
1137 electrophoresis							
365	inorganic chemistry	1115 bioinorganic chemistry					
		1111 inorganic compounds					
		1113 metals					
371	nuclear chemistry	1123 nuclear reactions					
		1125 radiation chemistry					
		1127 radiochemistry					
363	organic chemistry	1103 alcohols					
		1101 aldehydes					
		1099 aliphatic compounds					
		1089 amines					
		1095 aromatic compounds					
		1109 heterocyclic compounds					
		1105 hydrocarbons					
		1097 ketones					
		1107 organic acids					
		1091 organic reactions					
		1087 organohalogen compounds					
		1085 organometallic chemistry					
		1093 volatile organic compounds					
		1117 photochemistry		1665 photocatalysis			
		367 physical chemistry	1121 quantum chemistry				
	1119 thermochemistry						
369 polymer science							



level 0	level 1	level 2	level 3	level 4	level 5			
23	47	computer and information sciences	297	929 computational creativity				
				931 computational intelligence				
				935 computer vision				
				927 expert systems				
				925 heuristic programming				
				933	1589 deep learning			
					1587 reinforcement learning			
					1595 supervised learning			
					1591 transfer learning			
					1591 unsupervised learning			
			937	937 pattern recognition				
				953 multiphysics				
			301	915 access control				
				917 cryptography				
			295	923 data protection				
				919 network security				
				951 big data				
				947 business intelligence				
				949 data analysis				
			299	945 data exchange				
				943 data mining				
				941 data processing				
				939 natural language processing				
				957 storage and preservation				
				971 internet access				
				967 internet of things				
			305	961 internet protocol				
				959 semantic web				
				963 transport layer				
				965 web development				
				969 world wide web	1597 web accessibility			
			307	979 application software	1603 graphic design			
					1607 simulation software			
					1605 video games			
				975 computer programming				
				977 malicious software				
				30031 software development	981 software architecture			
					1599 device drivers			
				973 system software	1601 operating systems			
				30018	30032	30032 climatology	30055 climatic changes	1813 arctic oscillation
								1809 el niño
						835 climatic zones	1811 north atlantic oscillation	
						837 dendroclimatology		
						847 atmospheric circulation	1553 atmospheric turbulence	
			281		843 atmospheric pressure			
					839 solar radiation			
					841 troposphere			
	831 ozone depletion							
	829 pollution							
	277	865 aqueous geochemistry						
		869 biogeochemistry						
		863 cosmochemistry						
		859 isotope geochemistry						
		867 organic geochemistry						
		867 geochronology						
	291	897 geomorphology	n.a. climatic geomorphology					
			1569 speleology					
		895 lithology						
		903 mineralogy	1577 crystallography					
			1579 optical mineralogy					
			1555 experimental petrology					
		891	891 petrology	n.a. igneous petrology				
				1559 metamorphic petrology				
				n.a. sedimentary petrology				
		905 sedimentology						
	901 seismology	1573 microseisms						
		1575 plate tectonics						
	899 volcanology	n.a. seismometry						
	30019	871 drainage basin						
		883 ecohydrology						
		877 hydrogeology						
		n.a. hydroinformatics						
		879 hydrometeorology						
		n.a. isotope hydrology						
		351 limnology						
		n.a. surface hydrology						
		n.a. geological oceanography						
		885 ocean chemistry						
	887 physical oceanography							
	287	827 biostratigraphy						
		819 paleobotany						
		823 paleoclimatology						
		815 paleoecology						
		n.a. paleozoology						
	275	821 palynology						
		911 cartography	1585 geographic information systems					
		907 glaciology	1581 cryosphere					
			1583 glacial geology					
	293	913 natural disaster						
		857 edaphology						
		855 land-based treatment						
		853 pedology						
		n.a. soil genesis						
	283	849 soil morphology						
	45	earth and related environmental sciences	30032	30032 climatology	30055 climatic changes	1813 arctic oscillation		
						1809 el niño		
					835 climatic zones	1811 north atlantic oscillation		
					837 dendroclimatology			
					847 atmospheric circulation	1553 atmospheric turbulence		
281				843 atmospheric pressure				
				839 solar radiation				
				841 troposphere				
				831 ozone depletion				
				829 pollution				
277			865 aqueous geochemistry					
			869 biogeochemistry					
			863 cosmochemistry					
			859 isotope geochemistry					
			867 organic geochemistry					
			867 geochronology					
291			897 geomorphology	n.a. climatic geomorphology				
				1569 speleology				
			895 lithology					
			903 mineralogy	1577 crystallography				
				1579 optical mineralogy				
				1555 experimental petrology				
			891	891 petrology	n.a. igneous petrology			
					1559 metamorphic petrology			
					n.a. sedimentary petrology			
			905 sedimentology					
901 seismology			1573 microseisms					
			1575 plate tectonics					
899 volcanology			n.a. seismometry					
30019			871 drainage basin					
			883 ecohydrology					
			877 hydrogeology					
			n.a. hydroinformatics					
			879 hydrometeorology					
			n.a. isotope hydrology					
			351 limnology					
			n.a. surface hydrology					
			n.a. geological oceanography					
			885 ocean chemistry					
887 physical oceanography								
287			827 biostratigraphy					
			819 paleobotany					
			823 paleoclimatology					
			815 paleoecology					
			n.a. paleozoology					
275			821 palynology					
			911 cartography	1585 geographic information systems				
			907 glaciology	1581 cryosphere				
				1583 glacial geology				
293			913 natural disaster					
			857 edaphology					
			855 land-based treatment					
			853 pedology					
			n.a. soil genesis					
283			849 soil morphology					



level 0	level 1	level 2	level 3	level 4	level 5									
23	natural sciences	51	mathematics	1055 dynamical systems										
				1057 game theory										
				1059 mathematical model										
				1053 mathematical physics										
				1061 numerical analysis										
				357 statistics and probability										
				355	applied mathematics	1073 algebra	1651 algebraic geometry							
							1653 commutative algebra							
							1655 linear algebra							
							1641 logarithm							
							1639 prime numbers							
							1629 graph theory							
						359	pure mathematics	1069 arithmetic						
								1063 discrete mathematics						
								1065 geometry						
								1067 mathematical analysis	1635 complex analysis					
					1637 differential equations			1817 partial differential equat						
					1633 fourier analysis									
					1631 functional equations									
					1645 algebraic topology									
					1647 computational topology									
					1649 knot theory									
				357 statistics and probability										
				n.a.	other natural sciences									
				43	physical sciences	23	natural sciences	273 acoustics	813 ultrasound					
								761 astrochemistry						
								759 astrophysics	1487 black hole					
									1489 dark matter					
								30030 extragalactic astronomy						
								763 galactic astronomy	1493 milky way					
									769 solar astronomy					
									30054 solar physics					
								773 history of astronomy						
								767	observational astronomy	1501 gamma-ray astronomy				
										1491 gravitational waves				
										1503 infrared astronomy				
										1499 optical astronomy				
										1495 radio astronomy				
										1497 x-ray astronomy				
										1517 big bang				
										1519 galaxy formation and evolution				
										1513 asteroids				
										807 celestial mechanics				
								1509 comets						
								1805 meteorites						
								1803 meteors						
								1515 planetary geology						
								771	planetary science	1511 planets		1807 exoplanetology		
										1507 satellites				
										1515 topography				
										765 space exploration				
										757	stellar astronomy	1479 asteroeismology		
												1481 neutron star		
												1483 supernova		
												1485 white dwarf		
										267 atomic physics	809 continuum mechanics			
										269	classical mechanics	811 fluid mechanics	1549 fluid dynamics	
								1547 fluid statics						
								30029 solid mechanics						
								805 statistical mechanics						
								801 bose-einstein condensates						
								797 mesoscopic physics						
								799 quantum gases						
								803 soft matter physics						
								795 solid-state physics						
								781 electrical conductivity	1523 semiconductor					
								785 electromagnetism						
								783 microelectronics						
								787 optoelectronics						
								777 semiconductor device						
								779 spintronics	1521 molecular spintronics					
								255 molecular and chemical physics						
								253	nuclear physics	753 nuclear decay				
										755 nuclear fission				
										751 nuclear fusion				
								747 cavity optomechanics						
								251	optics	749 fibre optics				
										745 laser physics				
								271 plasma physics						
								30017 quantum field theory	793 quantum physics	1545 quantum optics				
								30015 quantum mechanics						
								n.a. relativistic mechanics						
								789 string theory						
								261	theoretical physics	791 particles	1533 fermion			
											1535 gluons			
											1539 higgs boson			
											1543 leptons			
											1527 particle accelerator			
											1541 photons			
											1537 quarks			
											1531 w boson			
									1529 z boson					
								265 thermodynamics						



level 0	level 1	level 2	level 3	level 4	level 5		
29	social sciences	91 economics and business	523 business and management	1307 business model			
				1311 commerce	1759 e-commerce		
				1313 employment			
				1309 entrepreneurship			
				1295 biological economics			
		521 economics	1301 econometrics				
			1305 macroeconomics				
			1297 microeconomics				
			1293 monetary and finances				
			1299 production economics	1757 productivity			
		105 educational sciences	573 didactics				
				575 inclusive education			
				571 pedagogy	1391 active learning		
			569 special education	1389 inquiry based learning			
				1387 teaching			
	89 law	1837 human rights	n.a. concepts in human rights				
			n.a. history of human rights				
			30048 human rights law	n.a. national state of emergency	n.a. pandemic risk		
			1839 human rights violations	1841 human trafficking			
			30049 international protection of human rights	30061 political violence			
		103 media and communications	565 information science	30062 sexual violence			
				567 journalism			
				563 library science			
				519 international law			
				513 law enforcement agencies			
	95 other social sciences	535 social sciences interdisciplinary	509 penology				
			1385 archives				
			1383 public libraries				
			1327 sustainable development				
			1335 civil society				
	97 political science	543 government systems	1337 democracy				
			1333 e-governance				
			1331 nongovernmental organization				
			541 political communication				
			537 public administration	1329 bureaucracy			
	93 psychology	533 cognitive psychology	539 public policy				
			525 behavioural psychology				
			30043 mental processes	1319 attention			
			529 psycholinguistics	1325 emotion			
			527 psychotherapy	1323 learning			
	99 social and economic geography	547 transport	531 social psychology				
			545 cultural and economic				
			1343 electric vehicles				
			1349 freight transport				
			1351 navigation systems	1767 inertial navigation system	1835 global navigation satellit		
1765 satellite navigation system							
1347 public transport							
1341 social aspects of transport							
1345 sustainable transport			1763 intelligent transport system				
1339 transport planning			1761 air traffic management				
549 urban studies							
561 anthropology		1379 ethnology					
		1381 physical anthropology	1787 paleoanthropology				
		1377 social and cultural anthropology					
		1355 census					
		1357 fertility					
553 demography		1353 mortality					
		1361 family studies					
		1363 gender studies	1769 gender equality				
1369 globalization		n.a. women's studies					
101 sociology		559 governance	1375 crisis management	1781 flood risk management			
			1371 public services	1783 seismic risk management			
			1373 taxation				
			551 ideologies				
			555 industrial relations	1359 automation			
1367 social problems	1777 ageism						
	1779 corruption						
	1775 migration						
	1773 racism						
	1771 social inequality						
	1365 social work						

Table A 2: 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
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)
TAJIKISTAN	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)
FIJI	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





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 superconductive 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
		Visualisation, Virtual Reality
	1.5 IT and Telematics technology	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
	2.6 Design and Modeling / Prototypes	Water Transport technology
		Design and Modeling / Prototypes
	2.7 Process control and logistics	Process control and logistics
	2.8 Signal Processing	Signal Processing
	2.9 Aerospace Technology	Aeronautical technology / Avionics
		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
	Biology / Biotechnology	
	Cellular and Molecular Biology	
	Enzymology / Protein Engineering / Fermentation	
	Genetic Engineering	
	In vitro Testing, Trials	
	Microbiology	
	Molecular design	
3.3 Micro- and Nanotechnology related to Biological sciences	Toxicology	
	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	Energy Storage and Transport Heat storage Heat transport and supply, district heating Storage of electricity, batteries Transmission of electricity 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
					4.8 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
7 AGRICULTURE AND MARINE RESOURCES	7.1 Agricultural technology	Agricultural technology
		Agriculture Machinery / Technology
		Crop Production technology
		Horticulture technology
		Pesticides
		Plant selection/production technology
		Precision agriculture technology

		Veterinary Medicine
	7.2 Animal Selection/Production / Husbandry technology	Animal Selection/Production / Husbandry technology
	7.3 Resources of the Sea, Fisheries	Aquaculture technology Fish / Fisheries / Fishing Technology Marine Science Resources of the Sea, Fisheries
	7.4 Biocontrol	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
10.3 Nutrition and Health	Tracability of food	
	Nutrition and Health	
undefined	undefined	CO2net
		Laminate
		Packaging / Handling
		Packaging technology for materials
		Seed coating
	undefined	