iPCTN23

Inquérito ao Potencial Científico e Tecnológico Nacional INSTITUIÇÕES

Government, Higher Education and Private Non-Profit institutions sectors

"National Statistical System Survey (under Law n. º 22/2008 of 13 May 2008) of compulsory response, registered at INE under n. º 10562, valid until 31 December 2024."

The Directorate-General for Education and Science Statistics (DGEEC) is the Statistical Authority responsible for collecting and processing data from the National Scientific and Technological Potential Survey (IPCTN), through a delegation of competences from the National Statistics Institute (INE).

IPCTN is the official instrument for collecting information on the human and financial resources allocated to Research and Development (R&D) activities in Portugal.

This survey is addressed to all potential R&D performing Institutions, with 2023 as the reference year for this statistical operation

The results of this statistical operation enable the construction of indicators to characterise and develop the national scientific and technological system and integrate the national (MCTES and INE) and international (Eurostat, OECD, among others)official statistical series.

Before completing the survey please read the concepts and additional information associated with the various sections. Please fill these survey, with your credentials, in https://ipctn.dgeec.mec.pt/ipctn23i . You can obtain a copy of the information you provide by selecting the "Report" option, which is available in the bottom right corner of the platform.

For any clarification, contact us by phone (213 949 298/311/368/369/370) or e-mails:

::::::: Hospitals: ipctnh@dgeec.medu.pt

::::::: Other institutions (Government, Higher Education and Private Non-Profit sectors): ipctni@dgeec.medu.pt

Legislation

The DGEEC is the INE delegated agency for the statistical area of Science and Technology, integrating the National Statistical System (SEN). As such, it is subject to the legislation (Law n. º 22/2008, of 13 May 2008) wich stipulates the functioning of the SEN.

Mandatory response

It is mandatory to provide the information requested by DGEEC, as the SEN entity responsible for the direct collection of statistical information.

Statistical confidentialy

The DGEEC is obliged to safeguard the individual statistical information of individual and collective persons collected by it. The collection, processing and dissemination of statistical data is made according to SEN Law, in particular article 6.º, wich establishes the application of the principle of statistical confidentiality to all information that allows individualized statistical units, as well as the manuals for the application of this principle by the statistical authorities.

All data are kept in a secure technological environment, in a DGEEC server located in Portugal, with access restricted to DGEEC staff members responsible for data management and maintenance. The results of personal data processing are always disclosed in aggregated form, never revealing the identity of the data subjects. Breach of statistical confidentiality is punishable not only as a disciplinary offence, but also as a criminal offence, according to article 32 of the SEN Law.

Privacy

For questions exclusively concerning the privacy of your personal data, please contact the Data Protection Officer in writing at: dpo@dgeec.medu.pt

In situations of doubt or conflict, regarding the use of your personal data, not resolved by the respective Data Controller or Data Protection Officer, you may lodge a complaint or request clarification from the competent authority:

If you have any questions you should use the form accessible at: https://www.cnpd.pt/cidadaos/pedidos-de-informacao/ and in case of conflict you should use the form accessible at: https://www.cnpd.pt/cidadaos/participacoes/

Section I – Unit identification

1. Person responsible for completing the questionnaire:

1.1. Name

1.2. Function

1.3. Phone number

1.4. E-mail address

2. Name of the Unit in 2023

2.1. **Unit's organic framework in 2023**

Units that have more then one organic framework must indicate them

2.2. **Fiscal Identification Number (NIPC) in 2023**

If your Unit doesnt have fiscal identification number of it own you may indicate the one from the organic dependence/framework

3. Location

3.1. Address

3.2. Postcode

3.3. City

3.4. District - County

3.5. Phone number

3.6. E-mail address

3.7. Website (www)

Section II – Research and Development (R&D) activities

[It is suggested to read the Annex I]

1. **Unit's R&D activities in 2023:**
   [This question can be multiple responses, for the first three options.]

   ☐ Developed intramural R&D activities
   [Required to answer Sections III, IV and VI and Individual form; must also fill Additional information and finish the survey please.]

   ☐ Hired R&D services to other institutions or enterprises
   [Required to answer Section V; must also fill Additional information and finish the survey please.]

   ☐ Financed R&D activities of other institutions, enterprises and/or individuals
   [Required to answer Section V; must also fill Additional information and finish the survey please.]

   ☐ Did not develop, hire or finance R&D activities
   [Required to answer Additional information and finish the survey please.]

Section III – Human resources in R&D activities, without tertiary education level

[It is suggested to read the Annex III]

1. Number of persons without tertiary education level who performed R&D or direct R&D support activities in the Unit in 2023, with expenditure borned by the Unit or its host Institution, with:

All individuals, paid by the Unit or its Host Institution, with a level of education corresponding to basic education, secondary education and non-higher post-secondary education (eg CET) must be considered. You must distinguish between technicians or other R&D support personnel, between men and women, and consider the percentage of time spent on R&D ativities, with reference to person/year.]

Percentage of time in R&D activities during the year 2023	**Technicians or equivalent** (HC)		**Other support staff** (HC)		Total
	Men	Women	Men	Woman	
1.1. Employment contract [e.g.: open-ended contract; fixed-term contract; tenures; mobility situation]					
up 5%					
6 to 10%					
11 to 20%					
21 to 30%					
31 to 40%					
41 to 50%					
51 to 60%					
61 to 70%					
71 to 80%					
81 to 90%					
91 to 100%					
Subtotal					
1.2. Grant holders [paid by the Unit or its Host Institution]					
up to 5%					
6 to 10%					
11 to 20%					
21 to 30%					
31 to 40%					
41 to 50%					
51 to 60%					
61 to 70%					
71 to 80%					
81 to 90%					
91 to 100%					
Subtotal					
1.3. Service provision contract [e.g.: service providers, single acts or other kind independent work] or another other type of compensation					
up to 5%					
6 to 10%					
11 to 20%					
21 to 30%					
31 to 40%					
41 to 50%					
51 to 60%					
61 to 70%					
71 to 80%					
81 to 90%					
91 to 100%					
Subtotal					
Total					

Note: HC - headcount

Section IV - Intramural R&D activities expenditures

[It is suggested to read the Annexes I, II, III, IV and V.]

1. R&D expenditures carried out in the Unit in 2023, regardless of the source of funds.

[Expenses incurred by the Unit or its host institution must be reported. Monetary values must be expressed in euros without indicating cents. It should not be considered deductible VAT, nor VAT refunded.]

1.1. Current expenditures on R&D activities in 2023:

>> R&D personnel expenses **borned by the unit or its host institution**:

€ **Employment contract** [e.g.: open-ended contract; fixed-term contract; tenure; mobility situation]

€ **Grant holders** [paid by the unit or its host institution]

€ **Service provision contract** [e.g.: service providers, single acts or other kind of independent work]

>> R&D personnel expenses borned by other institutions:

These expenses are calculated by DGEEC from the information reported in the individual forms, so you do not need to fill this item.

€ Grant holders paid directly by the FCT or by other institutions, teachers from other Higher Education institutions, employees from other public or private entities.

€ **Other current expenditure on R&D activities**

1.2. Capital or investment expenditures on R&D activities in 2023:

€ Land, buildings and facilities

€ Machinery and equipment

€ **Total (1.1 + 1.2)**

2. Funding of intramural expenditure on R&D activities carried out by the unit in 2023, by source of funds:

[Only the funds that were spent during the year 2023 should be considered, with reference to the expenses declared in the previous question. Revenues from the sale/provision of R&D services must be included in the respective headings listed below. When funds pass through several organisations, as in cases of R&D subcontracting, whenever possible, the original sources of R&D funds should be indicated. This can happen, for example, with funds coming from the EU. which are first transferred to a main contractor and subsequently distributed among the other participants (subcontractors).]

€ Goverment Funds: General revenue/income

€ Other goverment funds
[Includes funds from FCT, Portugal 2020 and 2030, funds managed by Compete and Regional Operational Programs, and other State funds for R&D.]

€ Income from national non-profit private institutions: provision of R&D services and/or other transfers to R&D

€ Income from national enterprises: provision of R&D services and/or other transfers to R&D

€ Income from national higher education institutions: provision of R&D services and/or other transfers to R&D

€ Funds from own revenue
[Includes interest, rents and revenues from services rendered, with the exception of R&D services.]

€ Scientific patronage funds
[Under Decree-Law nº 74/99, of March 16.]

€	European Union Funds
€	Funds from other international organizations
€	Revenues from foreign goverment institutions: provision of R&D services and/or other transfers to R&D
€	Income from foreign non-profit private institutions: provision of R&D services and/or other transfers to R&D
€	Income from foreign enterprises: provision of R&D services and/or other transfers to R&D
€	Income from foreign higher education institutions: provision of R&D services and/or other transfers to R&D
€	Other funds. Specify:
€	**Total** [Corresponds to the total stated in question 1.]

3. Distribution of R&D activities of the unit in 2023, by type of R&D:

%	Basic research [Consists of experimental or theoretical work, developed with the main purpose of obtaining new knowledge about the fundamentals of phenomena and observable facts, without any specific objective of practical application.]
%	Applied research [Consists of original research work, developed with the aim of creating new knowledge, directed towards a predetermined application or objective.]
%	Experimental development [The systematic use of existing knowledge obtained through research and/or practical experience in order to manufacture new materials, products or devices; to install new processes, systems or services; or to improve existing ones substantially.]
100%	**Total**

4. Distribution of R&D activities of the unit in 2023, by socio-economic objective:

[According to the nomenclature for the analysis and comparison of scientific programs and programs - NABS2007, Eurostat. For a breakdown of each socio-economic objective see Annex IV].

%	1. Exploration and exploitation of the earth
%	2. Environment
%	3. Exploration and exploitation of space
%	4. Transport, telecommunication and other infrastructures
%	5.1. Energy - Energy efficiency
%	5.2. Energy - Fossil fuels: oil, gas and coal
%	5.3. Energy - Renewable energy sources
%	5.4. Energy - Nuclear fission and fusion
%	5.5. Energy - Hydrogen and fuel cells
%	5.6. Energy -Other power and storage technologies
%	5.7. Energy - Other cross-cutting technologies or research
%	5.8. Energy - Other energy domains
%	6. Industrial production and technology
%	7. Health
%	8. Agriculture

%	9. Education
%	10. Culture, recreation, religion and mass media
%	11. Political and social systems, structures and processes
%	12. General advancement of knowledge
%	13. Defense
100%	**Total**

5. Distribution of R&D activities of the unit in 2023, by national strategic priority:

[As defined in the National Strategy for Intelligent Specialization - ENEI 2030. For further information see Annex V]

%	1. Digital transition
%	2. Materials, systems and production technologies
%	3. Great natural assets: forest, sea and space
%	4. Green transition
%	5. Health, biotechnology and food
%	6. Society, creativity and heritage
%	7. Other priorities. Specify
100%	**Total**

Section V – Extramural R&D expenditures in 2023

[It is suggested to read the Annex II.]

1. Extramural expenditure on R&D activities, in 2023, by type of contracted and/or financed institution.

[Amount spent by the research Unit (institution or enterprise) on contracting R&D activities and funding/transfer of funds for R&D activities performed by other units.
Funds received by the research Unit (from foreign or national entities) that are transferred to other entities for external R&D execution (subcontracting) should be considered as extramural expenditure.]

1.1. R&D Contracting

[R&D service provision contract by an external entity, the results of which revert to the contracting Unit. The amounts to be declared should include the amounts paid directly by the unit or by its host institution. Deductible VAT must not be taken into account.]

In Portugal	Abroad	
€	€	Government institutions
€	€	Higher education institutions
€	€	Private non-profit institutions. Specify
€	€	Enterprises, technological centers/interface institutions with enterprises. Specify
€	€	Other institutions. Specify
€	€	**Total**

1.2. R&D Financing

[Transfer of funds for R&D to be developed by third parties, such as other public or private institutions or individuals (e.g. scholarships or R&D grants, prizes within the scope of R&D projects, etc.) without there being counterpart for the funding institution.]

In Portugal	Abroad	
€	€	Government institutions
€	€	Higher education institutions
€	€	Private non-profit institutions. Specify
€	€	Enterprises, technological centers/interface institutions with enterprises. Specify
€	€	Other institutions. Specify
€	€	**Total**

Section VI - Biotechnology R&D activities

1. Has the unit developed biotechnology R&D activities in 2023?

- ☐ No [Required to answer Additional information and finish the survey please.]
- ☐ Yes

2. Techniques used in biotechnology R&D activities in 2023:

☐	DNA/RNA	Genomics, pharmacogenomic testing, genetic probes, genetic engineering, DNA/RNA sequencing/synthesis/amplification, gene expression profiling, and use of antisense technology.
☐	Proteins and other molecules	Sequencing/synthesis/engineering of proteins and peptides, including large molecule hormones; improved delivery methods for large molecule drugs; proteomics, protein isolation and purification, signaling and cell receptor's identification.
☐	Cell and tissue culture and engineering	Cell/tissue culture, tissue engineering including *scaffolds* and biomedical engineering; cellular fusion; embryo manipulation.
☐	Process biotechnology techniques	Fermentation using bioreactors, bioprocessing, bioleaching, biopulping, biobleaching, biodesulphurisation, bioremediation, biofiltration and phytoremediation.
☐	Gene and RNA vectors	Gene therapy and viral vectors.
☐	Bioinformatics	Database construction of genomes, protein sequences; modelling of complex biological processes, including systems biology.
☐	Nanobiotechnology	Application of nano/microfabrication tools and processes to build devices to study biosystems and applications for drug delivery, diagnostics, etc.
☐	Other techniques	Specify:

3. Application areas of the Unit's biotechnology R&D activities in 2023:

☐	Human health	Large molecule therapeutics and monoclonal antibodies (MABs) produced using recombinant DNA (rDNA) technology. Other therapeutics, artificial substrates, diagnostics and drug delivery technologies, gene therapy.etc.
☐	Veterinary health	Animal health applications.
☐	Agriculture	New varieties of genetically modified (GM) plants (including fruit trees, flowers, horticultural crops, grains, etc.), animals and micro-organisms for use in agriculture (including bio pest control), aquaculture (fish) and silviculture (tree varieties for forestry) New varieties of non-GM plants (including fruit trees, flowers , horticultural crops, grains, etc.), animals and microorganisms for use in agriculture, aquaculture (fish) and forestry (tree varieties for forestry); bio pest control and diagnostics developed using biotechnology techniques (DNA markers, tissue culture, etc.).
☐	Food and beverages processing	Use of bioprocessing techniques or improved crop varieties to improve food quality and characteristics.
☐	Natural resources	Use of micro-organisms and other applications for mining, petroleum and energy extration.
☐	Environment	Diagnostics, soil bioremediation (including phytoremediation), water, air and industrial effluent treatment using microorganisms, clean production processes.
☐	Industrial processing	Bioreactors to produce new products (chemicals, food, ethanol, plastics, etc.), biotechnologies to transform inputs (bioleaching, biopulping, etc.).
☐	Bioinformatics	DNA/RNA/protein synthesis and databases for humans, plants, animals and microorganisms. Gene identification, gene constructs, etc.
☐	Non-specific applications	Research tools, etc.
☐	Other applications	Specify:

4. Percentage assumed by biotechnology in the Unit's R&D activitie s in 2023:

_____ %

Additional information

1. **Time spent on completing the questionnaire:**

   [You should account for the time spent gathering the information needed to answer the survey].

Hours	Minutes

2. **Comments / Suggestions:**

Individual form

Nº Registo INE: 10562

[Individual forms should be completed and/or updated for all individuals with a higher education degree who performed or suported R&D ativities in the Unit in 2023, all or part of the year, regardless of their affiliation with the institution, including grant holders and other individuals whose salary was paid by another institution. If they performed R&D activities in more than one institution, the respective individual form should also be filled in in those other units.]

1. Unit name in 2023:

2. Full name:

3.1. Identification type:

3.2. Identification number: [Check digit(s). Eg: 1ZY2]

4.1. Ciência ID: [Ex.: D71F-EA08-B2B5]

4.2. ORCID ID: [Ex.: 0000-0002-1825-0097]

5. Date of birth:

YYYY - MM - DD

6. Gender:

- Female
- Male

7. Country of nationality:

8. E-mail adress:

9. Level of education:

[Please indicate your highest level of education, and its scientific area, at the end of 2023.]

	Scientific area [See Annex VI]
Doctoral or equivalent level	
Master's or equivalent level	
Bachelor's or equivalent level	
Short-cycle tertiary education (TeSP)	

10. Situation regarding R&D activities at this Unit in 2023:

- Did not perform R&D activities or direct R&D support
  - Only performed other activities in this unit
  - Permanently left the Unit
  - Other reason. Specify:
- Perform R&D activities or direct R&D support

10.1. Percentage of time in R&D activities or direct support in this Unit during 2023:

[You should estimate the percentage of time spent on R&D activities in this Unit, using person/year as a reference. If you were assigned to R&D or other activities in another Unit, you should take these situations into account when estimating your time in R&D (we suggest consulting the examples presented in Annex III).]

- ☐ Up 5%
- ☐ 6 to 10%
- ☐ 11 to 20%
- ☐ 21 to 30%
- ☐ 31 to 40%
- ☐ 41 to 50%
- ☐ 51 to 60%
- ☐ 61 to 70%
- ☐ 71 to 80%
- ☐ 81 to 90%
- ☐ 91 to 100%

11. Please indicate your main field of R&D in this Unit in 2023:

[See Annex VI]

12. Please indicate your professional situation in this unit in 2023:

[If you had more than one professional situation in this unit, please select the most representative in 2023.]

- ☐ Employment contract paid by this unit or its host institution ((University/ College/ School/ Hospital, etc.)
  [E.g.: Permanently or temporarily employed worker; person who works for a fixed salary, wage or commission]
- ☐ Contract for the Provision of Services to this unit or its host institution (University/ College/ School/ Hospital, etc.)
  [E.g.: freelancers, contracts on a short-term basis, consultants, etc.]
- ☐ Grant holder
  [Individuals paid by this unit or its host institution, by the Foundation for Science and Technology or by another institution.]
- ☐ Other situation
  [Individuals paid by other institutions, such as teachers from other higher education establishments and workers from other public or private entities; pensioners; students and other unpaid individuals.]

12.1. Indicate your professional activity in 2023 according to the situation reported in the previous question:

Career or equivalent:	**Category or equivalent:**
☐ Teacher	
☐ Researcher	
☐ Physician	
☐ Senior technician	
☐ IT Personnel	
☐ Armed Forces Military	
☐ Nurse	
☐ Senior Health Technician	
☐ Technician of diagnosis and therapeutics	
☐ Pharmacist	
☐ Manager/Leadership position	
☐ Grant holder	
☐ Other situation. Specify:	

12.2. Is your professional activity on an exclusive basis?

Length of normal working hours

- ☐ Yes
  - ☐ up to 40h/week
  - ☐ more than 40h/week
- ☐ No

12.3. If you selected "Other situation" in question 12.1., please indicate your gross wage or other type of financial compensation earned in 2023:

	Gross wage (monthly average)	€		
	Financial compensation	Monthly amount €	or	Total amount €
	No wage/salary or other financial compensation			

13. Institution responsible for your wage / grant in 2023:

[You should answer to this question if you selected one of the following options in question 12: "Other situation" or "Grant holder".]

	This unit or its host institution (University/ College/ School/ Hospital, etc.)	
	Foundation for Science and Technology (FCT)	
	Other institution of the portuguese Government sector. Specify:	
	Foreign institution of the Government sector. Specify:	
	Portuguese Public Higher Education institution. Specify:	
	Portuguese Private Higher Education institution. Specify:	
	Foreign Higher Education institution. Specify:	
	Portuguese Private Non-Profit institution. Specify:	
	Foreign Private Non-Profit institution. Specify:	
	Portuguese enterprise. Specify:	
	Foreign enterprise. Specify:	

14. Indicate your main role in the R&D activities or supporting R&D activities of this unit in 2023:

Researcher

	Professionals working in the conception/design or creation of new knowledge; Research guidance, development and improvement of concepts, theories, models, instrumentation techniques, software or operational methods; Collection, processing, evaluation, analysis and interpretation of research data ; Evaluation of results of investigations and experiments; presentation of conclusions using different techniques and models; Application of principles, techniques and processes to develop or improve practical applications; Planning and management of the scientific and technical aspercts of R&D activities; Preparation of scientific articles and reports.

Technician and equivalent staff

	Their main mission requires technical knowledge and experience; Research and literature review or information gathering/collecting; Execution of laboratory activity (experiments, tests and analysis) and equipment maintenance and repair; Preparation of computer programs; Assistance in collecting, recording, analysing data and preparing reports; Application of questionnaires and interviews; Other technical assistance tasks and support to R&D activities.

Other supporting staff

	Administrative and secretarial tasks (including conferences and events organisation); Provision of legal and related services at an intermediate level; Law enforcement inspection and similar; Technical assistance in galleries, libraries, archives and museums; Performing skilled tasks in agriculture, forestry and fishing; Carrying out of plant and machine operation tasks and assembly work; Management of financial and human resources aspects and administration of general matters.

15. Time spent completing this individual form:

	Minutes

Annex I – Concepts and examples of R&D activities

R&D Concepts:

Research and Development (R&D):

Research and Development (R&D) activities are understood as all creative work carried out in a systematic way, with the aim of increasing knowledge - including knowledge of mankind, culture and society, and devising new applications resulting from that knowledge (Frascati Manual, 2015).

There are five cumulative basic criteria for identifying R&D activities:

- **Novelty/originality:**
  - R&D projects/activities always imply new discoveries for the unit and for the sector;
  - The potential novelty/originality of R&D projects results from comparison with the stock of knowledge existing in the sector;
- **Creativity:**
  - R&D projects/activities must aim at new concepts or ideas that increase existing knowledge;
  - Excludes routine process or product changes;
- **Uncertainty (multiple dimensions):**
  - Regarding the results/outputs;
  - Regarding the costs;
  - Regarding the time to allocate from the human resources involved;
- **Systematics:**
  - Activities have to be planned;
  - They have to be accounted for in terms of human and financial resources (costs and funding);
  - Procedures have to be defined and recorded;
  - The results have to be recorded (reports);
- **The knowledge is/must be transferable and/or reproducible**
  - The results of R&D projects/activities must be able to be reproduced by others;
  - Since the purpose is to increase the stock of knowledge, the results cannot remain “tacit knowledge” (i.e., remain only in the minds of researchers or other human resources involved);
  - Even if protected by means of Intellectual Property Protection, it is expected that processes and results will be registered for use by

Generally speaking, it is considered R&D if the resolution of a problem is not evident to any individual who is aware of the set of knowledge and basic techniques commonly used in the area in question. Activities of a routine nature must be included in R&D, if they are developed, exclusively or mainly, within the scope of R&D projects.

The R&D activities can be classified into three categories:

Basic research	consists of experimental or theoretical work, developed with the main purpose of obtaining new knowledge about the fundamentals of phenomena and observable facts, without any specific objective of practical application.
Applied research	consists of original research work, developed with the aim of creating new knowledge, directed towards a predetermined application or objective.
Experimental development	The systematic use of existing knowledge obtained through research and/or practical experience in order to manufacture new materials, products or devices; to install new processes, systems or services; or to improve existing ones substantially.

Examples of R&D activities:

1. Education, training and other atividies

Teachers

- Guidance of doctoral theses.
- Guidance and implementation of R&D projects.

Doctoral/Master's students

- As long as they are integrated in the R&D activities of the responding unit

Other personnel

- Guidance and implementation of R&D projects.

2. Other Scientific and technical activities

Data collection

- Research on new measurement methods (e.g. temperature).
- Study and development of new systems and techniques for data collection, analysis and interpretation.
- Data collection that is part of the R&D process, exclusively or mainly, should be considered as R&D activity (e.g. topographic mapping, geological, hydrological, oceanographic or meteorological surveys and astronomical observations). Similarly, in the social sciences, survey or other data collection undertaken for the purpose of serving R&D projects should also be considered as R&D activity. Routine data collection for purposes other than scientific research should not be considered as R&D activity. Market research is also to be excluded from R&D.

Methodologies and statistics
- Conceptual and methodological work related to the development of new or substantially modified surveys or statistical survey methods.
- Work on sampling methodologies, estimation/forecasting techniques and data analysis.

Feasibility studies and scientific articles
- Feasibility studies for R&D projects.
- Scientific articles.

Patents and licences
- Administrative and legal work performed for patent and licence registration should be excluded from R&D. However, work on patents directly related to R&D projects is considered as R&D activities.

Mining and prospecting activities
- Development of new methods and techniques of geological surveys.
- Geological surveys undertaken as an essential part of a research project concerning geological phenomena.
- Research on geological phenomena per se undertaken as a subsidiary part of geological prospecting and surveying programmes.

Specialised medical care
- Research into the side-effects of particular therapies (e.g. in an autopsy, research into a particular death to establish the side-effects of a particular treatment).
- Research into the effects of the use of new drugs (e.g. special blood collection and testing programmes).

Clinical trials
- Systematic trials on human volunteers to ensure the efficacy and safety of new drugs, vaccines or treatments before they are placed on the market (Phases 1, 2 and 3).
- Activities related to the testing of medicinal products or treatments, after their production and placing on the market, if they bring scientific and technological advances (Phase 4).

Space exploration
All activities except the routine activities of placing satellites in orbit or establishing tracking and communication stations.

Software development
Include as R&D activites:
- Development of new operating systems or languages;
- Design and implementation of new search engines based on original technologies;
- Efforts to solve hardware or software conflicts based on re-engineering processes of a system or a network;
- Creation of new or more efficient algorithms based on new techniques;
- Creation of new and original encryption or security techniques.

Routine activities not considered R&D (exclude from IPCTN):
- Improvements of already existing systems or specific programs;
- Technical problems already solved in previous projects on the same operating systems and computer architecture;
- The routine maintenance of computers and software.

Other software-related activities that are not considered R&D activities (exclude from IPCTN):
- Development of application software and information systems using known methods and existing software tools;
- Adding functionality to existing programs/applications (e.g. user-friendly features);
- Creating websites or software using existing tools;
- Use standard methods of encryption, security verification and data integrity testing;
- The customisation of a product for a specific use, unless knowledge is added in the process that significantly improves the base program;
- The routine analysis (debugging) of existing systems and programs.

3. R&D management activities and other direct support activities

Direct management of R&D projects
- Planning activities and supervision of scientific and technical aspects carried out by the directors of the R&D projects.

Other direct or auxiliary support activities
- Management, administration and secretarial activities that directly contribute to the R&D projects.
- Writing the progress reports and the final report of the R&D projects."

4. Industrial activities

Studies and projects
- Studies of prototypes, models, pilot installations, special equipment, structures or tools necessary for the design and implementation of a new product, process or service.

Prototypes
- Designing, building and testing original models that have all the technical qualities and operating characteristics of a new product (includes all activities performed up to the last necessary modifications to prototypes and after tests are satisfactorily completed).

Pilot plants/installations

All activities of construction and use of pilot plants provided that their main purpose is to gain experience, gather data necessary for:
- verification of hypotheses;
- elaboration of new product formulas;
- establishing new specifications of finished products;
- design of special structures and equipment necessary for the establishment of new processes;
- writing operating instructions or process manuals.

When the pilot plant starts operating as a normal commercial production unit it can no longer be considered as R&D.

Experimental production

- Activities associated with new design and engineering work in the early pre-production phase.

R&D "feedback"

- Activities related to solving technical problems that need further R&D after a new product or process moves to production units.

Industrial design

- Drawing up plans and designs used to define the procedures, technical specifications and operational characteristics which constitute the documentation necessary for the design, development and production of new products and processes.

Machinery and industrial engineering

- Activities that in the process of preparing machinery and tools give rise to new R&D work, such as developments in machinery and production tools, changes in production processes and quality control procedures or the development of new methods and standards.

Testing, trials and standardisation

- Routine testing and trials to ascertain compliance with standards are not R&D activities. Conducting final tests and trials (before going into production) of new materials, components, products and processes and others, as a result of R&D projects, should be considered as ancillary R&D activities. Work consisting of the creation of new standards, requiring special effort of reflection and sometimes testing, and the development of new test methods or substantial improvement of existing ones are also R&D activities.

5. R&D activities in services

Banking and insurance

- Mathematical research applied to financial risk analysis.
- Development of risk models for credit policy.
- Experimental development of new software for homebanking.
- Development of techniques for investigating consumer behaviour with the aim of creating new types of accounts and banking services.
- Research on new risks or new risk characteristics to be taken into account in insurance contracts.
- Research on social phenomena having an effect on the creation of new types of insurance (e.g. non-smoking insurance).
- Research and development on insurance and e-banking, Internet services and e-commerce applications.
- Research and development on new or significantly improved financial services (e.g. new concepts for current accounts, loans, insurance and savings instruments).
- Analysis of the effects of economic and social changes on consumption and leisure activities.

Other service activities

- Development of new methods for measuring consumer expectations and preferences.
- Development of new methods of delivering and measuring social service outcomes that can be adapted to a variety of socio-economic or cultural settings.
- Development of new survey methods and instruments.
- Development of follow-up and recognition procedures, particularly in the area of logistics;.
- Research on new concepts of travel and holidays.

6. R&D activities in arts

New instruments and technologies

- The experimental development to produce new electronic musical instruments.
- The exploration of new technologies for the performance art, e.g. improving audio/video quality.

Arts and artistic expression studies

- The basic and applied research that contributes to most arts studies in the areas of musicology, art history, theatre studies, communication and literature, among others.
- Artistic performance is normally excluded from R&D. However, higher education institutions that award doctoral degrees to artists as a result of their artistic performance can recognize artistic practice as an R&D activity.

Preservation and restoration

Conservation and restoration activities may be considered as R&D if they involve specialised technical staff linked to scientific research (e.g. researchers) or the publication of scientific work.

How types of R&D can be differentiate?

A key criterion that guides the classification of R&D activities by type is the expected use of the results: in basic research, the results don't have any specific objective of practical application; in applied research, the results are aimed to a predetermined application or objective; in experimental development, the results are aimed at manufacturing new materials, products or devices, installing new processes, systems or services or substantially improving the existing ones.

In addition, two questions can help identify the type of R&D: how far ahead in time are the activities likely to lead to results that can be applied, and how broad is the range of potential fields of application for the results of the R&D (the more fundamental the research, the broader the potential field of application).

The relationship between basic research, applied research and experimental development has to be seen within a dynamic perspective. It is possible that applied research and experimental development could adapt fundamental knowledge arising from basic research directly for general application. However, the linearity of such a process is affected by the feedback that takes place when knowledge is used to solve a problem. This dynamic interaction between knowledge generation and the solution of problems links basic and applied research and experimental development.

With reference to the organisations where R&D is performed, a clear-cut separation of the three types of R&D rarely exists. All three types may sometimes be carried out in the same unit by essentially the same staff, but some research activities may cover one or two types of R&D. For instance, the search for a new medical treatment for people affected by an epidemic disease may involve both basic and applied research. It is recommended to undertake an evaluation of the type of R&D at the level of the activity performed, by classifying its expected results according to the two indicators described above.

Examples of how to differentiate types of R&D in the **Natural sciences and engineering**

• The study of a given class of polymerisation reactions under various conditions is basic research. The attempt to optimise one of these reactions with respect to the production of polymers with given physical or mechanical properties (making it of particular utility) is applied research. Experimental development then consists of “scaling up” the process that has been optimised at the laboratory level and investigating and evaluating possible methods of producing the polymer as well as products to be made from it.

• The modelling of a crystal’s absorption of electromagnetic radiation is basic research. The study of the absorption of electromagnetic radiation by this material under varying conditions (for instance, temperature, impurities, concentration, etc.) to obtain given properties of radiation detection (sensitivity, rapidity, etc.) is applied research. Testing a new device using this material in order to obtain a better detector of radiation than those already existing (in the spectral range considered) is experimental development.

• The development of a new method for the classification of immunoglobulin sequences is basic research. Investigations undertaken in an effort to distinguish between antibodies for various diseases is applied research. Experimental development then consists of devising a method for synthesising the antibody for a particular disease on the basis of knowledge of its structure and clinical tests of the effectiveness of the synthesised antibody on patients who have agreed to accept an experimental advanced treatment.

• A study about how the properties of carbon fibres could change according to their relative position and orientation within a structure is basic research. The conceptualisation of a method to allow for processing carbon fibres at industrial level with a degree of precision at the nano-scale could be the outcome of some applied research. Testing the use of new composite materials for different purposes is experimental development.

• Controlling material processes in the domain where quantum effects occur is an objective to be pursued through basic research. Developing materials and components for inorganic and organic light-emitting diodes for improved efficiency and cost reduction is applied research. Experimental development could be aimed at identifying applications for advanced diodes and incorporating them in consumer devices.

• Searching for alternative methods of computation, such as quantum computation and quantum information theory, is basic research. Investigation into the application of information processing in new fields or in new ways (e.g. developing a new programming language, new operating systems, program generators, etc.) and investigation into the application of information processing to develop tools such as geographical information and expert systems are applied research. Development of new applications software and substantial improvements to operating systems and application programmes are experimental development.

• The study of sources of all kinds (manuscripts, documents, monuments, works of art, buildings, etc.) in order to better comprehend historical phenomena (the political, social, cultural development of a country, the biography of an individual, etc.) is basic research. Comparative analysis of archaeological sites and/or monuments displaying similarities and other common characteristics (e.g. geographic, architectural, etc.) to understand interconnections of potential relevance to teaching material and museum displays is applied research. The development of new instruments and methods for studying artefacts and natural objects recovered through archaeological endeavours (e.g. for the age-dating of bones or botanic remains) is experimental development.

Agricultural sciences

• Basic research: Researchers investigate genome changes and mutagenic factors in plants to understand their effects on the phenome. Researchers investigate the genetics of the species of plants in a forest in an attempt to understand natural controls for disease or pest resistance.

• Applied research: Researchers investigate wild potato genomes to locate the genes responsible for resistance to potato blight in an effort to improve the disease resistance in domestic/crop potatoes. Researchers plant experimental forests where they alter the spacing and alignment of the trees to reduce the spread of disease while ensuring the optimum arrangement for maximum yield.

• Experimental development: Researchers create a tool for gene editing by using knowledge of how enzymes edit DNA. Researchers use existing research on a specific plant species to create a plan for improving how a company plants its forests to achieve a specific goal.

Nanotechnology

• Basic research: Researchers study the electrical properties of graphene by using a scanning tunnelling microscope to investigate how electrons move in the material in response to voltage changes.

• Applied research: Researchers study microwaves and thermal coupling with nanoparticles to properly align and sort carbon nanotubes.

• Experimental development: Researchers use research in micromanufacturing to develop a portable and modular micro-factory system with components that are each a key part of an assembly line.

Computer and information sciences

• Basic research: Research on the properties of general algorithms for handling large amounts of real-time data.
• Applied research: Research to find ways to reduce the amount of spam by understanding the whole structure or business model of spam, what spammers do, and their motivations in spamming.
• Experimental development: A start-up company takes code developed by researchers and develops the business case for the resulting software product for improved on-line marketing.

Examples to differentiate types of R&D in the **Social sciences, humanities and the arts**

With reference to the social sciences, humanities and the arts, the distinction between basic and applied research may not be as clear-cut as it is in other fields. Bellow are some examples of R&D in these fields of research.

Economics and business

• Basic research: A review of theories on the factors determining regional disparities in economic growth. Economists conducting abstract research in economic theory that focuses on whether a natural equilibrium exists in a market economy. The development of new risk theories.
• Applied research: The analysis of a specific regional case for the purpose of developing government policies. Economists investigating the properties of an auction mechanism that could be relevant to auctioning the telecommunications spectrum. The investigation of new types of insurance contracts to cover new market risks or new types of savings instruments.
• Experimental development: The development of operational models, based upon statistical evidence, to design economic policy tools to allow a region to catch up in terms of growth. The development by a national telecommunications authority of a method for auctioning the telecommunications spectrum. The development of a new method to manage an investment fund is experimental development as long as there is sufficient evidence of novelty.

Education

• Basic research: Analysis of the environmental determinants of learning ability. The investigation by researchers of the effect of different types of manipulatives on the way first graders learn mathematical strategy by changing manipulatives and then measuring what students have learned through standardised instruments.
• Applied research: The comparative evaluation of national education programmes aimed at reducing the learning gap experienced by disadvantaged communities. The study by researchers of the implementation of a specific math curriculum to determine what teachers needed to know to implement the curriculum successfully.
• Experimental development: The development of tests for selecting which educational programme should be used for children with specific needs. The development and testing (in a classroom) of software and support tools, based on fieldwork, to improve mathematics cognition for student special education.

Social and economic geography
• Basic research: Researchers seek to understand the fundamental dynamics of spatial interactions.
• Applied research: A research study analyses the spatial-temporal patterns in the transmission and diffusion of an infectious disease outbreak.
History
• Basic research: Historians study the history and human impact of glacial outburst floods in a country.
• Applied research: Historians examine past societies' responses to catastrophic natural events (e.g. floods, droughts, epidemics) in order to understand how contemporary society might better respond to global climate change.
• Experimental development: Using previous research findings, historians design a new museum exhibit on the adaptations of past human societies to environmental changes; this serves as a prototype for other museums and educational installations.
Language/linguistics
• Basic research: Linguists study how different languages interact as they come into contact with one another.
• Applied research: Speech therapists examine the governing neurology of languages and how humans acquire language skills.
• Experimental development: Linguists develop a tool for diagnosing autism in children based on their language acquisition, retention and use of signs.
Music
• Basic research: Researchers develop a transformational theory that provides a framework for understanding musical events not as a collection of objects that have particular relationships to each other but as a series of transformational operations applied to the basic material of the work.
• Applied research: Researchers use historical records and the techniques of experimental archaeology to recreate an ancient and long-disappeared musical instrument and to determine how it would have been constructed, how it was played and the types of sounds it would have produced.
• Experimental development: Music educators and theorists work to produce new pedagogical materials based on new discoveries in neuroscience that change our understanding of how humans process new sounds and information.

Annex II – Expenditures on R&D activities

Intramural expenditure on R&D activities

All current and capital or investment expenditures on R&D activities carried out within the Unit, regardless of the source of the funds.

The amounts to be declared must include the amounts incurred directly by the reporting unit and/or the amounts provided by its host institution.

Neither deductible VAT nor refunded VAT is taken into account.

Current expenditures on R&D activities

The unit's current expenses on R&D activities when performed in experimental or similar laboratories of other units should be accounted as the unit's intramural expenditure.
Depreciation/Amortisation is excluded. These expenses include the following:

Expenses on R&D personnel carried out by the unit or its host institution:

It includes expenses on individuals with an **employment contract** (e.g.: open-ended contract; fixed-term contract; tenures; mobility situation), who were part of the unit's staff or its host institution and were involved in the unit's R&D activities in the reference period, whatever the duration of that participation.

Taking into account the time spent on these activities, it should include their respective gross remuneration; the prizes/bonuses; social security costs for personnel, including legal, contractual or optional employer's social security costs; funds and other provident schemes, by way of pension, family allowances, accidents at work, insurance, etc.

It includes expenses on **grants** borned by the unit or its host institution.

It includes expenses on individuals under a **service provision contract** (e.g.: service providers also known as "green receipts" or single acts, or other kind of independent work) paid by the unit or its host institution.

Expenses on R&D personnel carried out by other Institutions:

It includes expenses on individuals paid by other institutions than the unit or its host institution (e.g.: grant holders paid directly by the FCT or by other institutions, teachers from other Higher Education institutions, employees from other public or private entities).

Other current expenses on R&D activities:

It includes the expenses on the purchase of small laboratory equipment (chemicals, animals, etc.), office supplies and miscellaneous equipment to support R&D activities, not considered as capital expenditure; the share of expenses with water, gas and electricity; the use and/or rental of computers; the purchase of services of a technical-scientific nature; displacements/ travel; the purchase of books, magazines and other reference materials; subscriptions to libraries and scientific societies, etc.; costs with consulting firms; actual or imputed costs for small prototypes or models made outside the Unit; costs for patents, overheads, etc. It also includes all the costs of other indirect or ancillary support services, whether carried out in the Unit or contracted from external providers. Some examples are: transport services, storage, food, cleaning, security, use, repair or maintenance of buildings or equipment, computer services, printing costs of R&D reports, etc..
It also includes other costs related to individuals involved in R&D activities within the reporting unit, who weren't under an employment contract, a grant or a services contract (e.g.: doctoral or master's students, volunteers, etc), but had received other type of compensation (meal or transport allowances, tuitions fee, etc).

Capital or investment expenditures on R&D activities

Set of the actual gross expenditure incurred by the reporting statistical Unit on the acquisition of fixed capital goods or investment goods. If the acquired goods are also used for other activities of the statistical Unit, only the value related to use in R&D activities is to be estimated and taken into account. All actual or imputed provisions for depreciation of real estate, plant and equipment should be excluded from the measurement of internal R&D expenditure. From the perspective of the IPCTN, this type of unit expenditure should relate to the share of use, for R&D purposes, of the purchased equipment, or the share of use of other capital goods in use in the year of the statistical operation. These expenses include the following:

Land, buildings and facilities:

It includes the expenses on the purchase of land for R&D (e.g. test plots, laboratory and pilot plant sites) and the construction or purchase of buildings, including major building improvements, alterations or repairs.

Instruments and equipment:

It includes expenses on the purchase of major items of instrumentation and equipment used exclusively or not exclusively for R&D; the purchase of books if this is for the installation/creation of a library or documentation centre with exclusive R&D use; the purchase of software, including programme descriptions and documentation accompanying systems and applications software. Also included are the annual licence fees for the purchased software.

Extramural expenditure on R&D activities

Amount spent by the research Unit on contracting R&D activities and funding/transfer of funds for R&D activities performed by other units. The funds received by the research Unit (from foreign or national entities) that are transferred to other entities for external R&D execution (subcontracting) should be considered as extramural expenditure.

Contracting:

R&D service provision contract by an external entity, the results of which revert to the contracting Unit. The amounts to be declared should include the amounts paid directly by the Unit or by its host institution. Deductible VAT must not be taken into account.

Financing:

Transfer of funds for R&D to be developed by third parties, such as other public or private institutions or individuals (e.g. scholarships or R&D grants, prizes within the scope of R&D projects, etc.) without there being counterpart for the funding institution.

Annex III - Human resources performing R&D activities

All personnel directly involved in research and development activities, such as researchers and those providing services directly linked to R&D activities, such as R&D managers, technical R&D personnel and other R&D support personnel.

Human resources in R&D can be categorised according to the main function performed within the scope of R&D activities:

Reserchear

- Professionals working in the design or creation of new knowledge;
- Research guidance, development and improvement of concepts, theories, models, instrumentation techniques, software or operational methods;
- Collection, processing, evaluation, analysis and interpretation of research data;
- Evaluation of results of investigations and experiments; presentation of conclusions using different techniques and models;
- Application of principles, techniques and processes to develop or improve practical applications;
- Planning and management of the scientific and technical aspercts of R&D activities;
- Preparation of scientific articles and reports.

Technical or equivalent

- Their main mission requires technical knowledge and experience;
- Research and literature review or information gathering/collecting;
- Execution of laboratory activity (experiments, tests and analysis) and equipment maintenance and repair;
- Preparation of computer programs;
- Assistance in collecting, recording, analyzing data and preparing reports;
- Application of questionnaires and interviews;
- Other technical assistance tasks and support to R&D activities.

Other support staff

- Administrative and secretarial tasks (including conferences and events organisation);
- Provision of legal and related services at an intermediate level;
- Law enforcement inspection and similar;
- Technical assistance in galleries, libraries, archives and museums;
- Performing skilled tasks in agriculture, forestry and fishing;
- Carrying out of plant and machine operation tasks and assembly work;
- Management of financial and human resources aspects and administration of general matters.

Notes:

a) Personnel in R&D activities that indirectly support R&D (computer services, library, finance, personnel, security, canteens, cleaning, maintenance, etc.) are not accounted for, although the charges for acquiring these services must be considered under current expenses as general expenses (overheads).

b) For the purposes of surveying the national scientific and technological potential, personnel are accounted for according to their function in the statistical unit surveyed , their qualifications and the length of time they have been engaged in R&D activities.

Percentage of time dedicated to the R&D activities	
Personnel 100% dedicated to R&D	All personnel exclusively performing R&D activities throughout the year (12 months), during normal working hours.
Personnel part-time dedicated to R&D	All personnel that do not exclusively performed R&D activities throughout the year (12 months) or during normal working hours.

It will be considered part-time all personnel in the period under review (year) that:

(i) Does not exclusively perform R&D activities during normal working hours in a single unit;

(ii) Performs exclusively R&D activities in more than one unit (and as such is considered part-time in each of them);

(iii) Although exclusively providing R&D activities during normal working hours in one unit, was not in service for the whole year (12 months).

Examples for calculating the percentage of time dedicated to R&D activities

Person A is 100% dedicated to R&D activities during the whole year (12 months) in theunit;

Person B is 100% dedicated to R&D activities for 6 months (1/2 year) in the unit;

Person C is 25% dedicated to R&D activities during the whole year in the unit;

Person D is 30% dedicated to R&D activities during 4 months (1/3 year) in the unit.

Person	Percentage of time in R&D	Percentage of time in R&D in the year
A	100%	100% x 1 year = 100%
B	100%	100% x 1/2 year = 50%
C	25%	25% x 1 year = 25%
D	30%	30% x 1/3 year = 10%

Annex IV - Socio-economic objectives, according to the EUROSTAT nomenclature for the analysis and comparison of scientific programmes and budgets (NABS 2007)

1. Exploration and exploitation of the Earth

Includes R&D relating to exploration and exploitation of the earth's environment - crust, mantle and seabed; seas and oceans; hydrology; atmosphere; climate, meteorological research and polar research; mining, oil and gas exploration; other general research relating to exploration and exploitation of Earth's environment.
Does not include rsearch related to pollution (consider under 2.); land use improvement (included in 4.); agricultural land-use and fisheries (included in 8.).

2. Environment

Includes R&D relating to pollution control; identification and analysis of the sources and causes of pollution and pollutants, including their dispersion in the environment and their effects on man, other species (fauna, flora and microorganisms) and the biosphere; research on the development of monitoring equipment for measuring all types of pollution and the elimination and prevention of all forms of pollution of all types of environment protection of the atmosphere and the climate; protection of ambient air; solid waste; protection of ambient water; protection of soil and groundwater; noise and vibration; protection of species and habitats; protection against natural disasters; radioactive pollution and other general research concerning the environment.

3. Exploration and exploitation of space

Includes civil space related R&D – aimed exclusively at increasing general knowledge (e.g. astronomy) or related to the development of specific applications (e.g. satellite telecommunications); scientific exploration of space; applied research programmes; launcher systems; space laboratories and space travel; and other general research related to aerospace exploration and exploitation.

4. Transport, telecommunication and other infrastructures

Includes R&D related to infrastructure and territorial development, including building construction and planning; general planning of the territory; transport and telecommunications systems; civil Engineering; water supply and other general infrastruture and land use planing research and pollution research related to the detrimental effects of unplanned land and cities.

5. Energy

Includes R&D relating to the production, storage, transport, distribution and efficient use of all forms of energy; processes designed to increase the efficiency of energy production and distribution; energy conservation studies; energy efficiency research; CO2 capture and storage; renewable energy sources; nuclear fission and fusion; hydrogen and fuel gas and other energy and energy storage technologies.
Does not include exploration research (included in 1.) and vehicles and engine propulsion (included in 6.).

6. Industrial production and technology

includes R&D relating to the improvement of production and industrial technology; industrial products and their manufacturing processes; increasing economic efficiency and competitiveness and all manufacturing activities as classified by CAE, namely manufacture of food products, beverages and tobacco; textile, clothing and leather manufacturing; products from the wood, cork and furniture industries; pulp, paper and cardboard products; manufacture of products for the chemical and pharmaceutical industries; manufacture of rubber and plastic products; base metallurgical industry products; metal products; computer, communication, electronic and optical equipment; manufacture of electrical material and machinery and equipment, n.e., motor vehicles and their parts and other transport material; other manufacturing products and recycling (metal and non-metal products).
Does not include research relating to industrial products and their manufacturing processes wich are integrated into other objectives such as, for example, defense (consider in 14.), aerospace exploration and exploitation (consider in 3.), energy (consider in 5.) and agriculture (consider 8.).

7. Health

Includes R&D concerned with the protection, promotion and recovery of human health, considered in the broad sense, including aspects of nutrition and food hygiene; preventive medicine, with all aspecta relating to medical and surgical treatment - both for individuals and for groups - hospital structures and medical care at home, social medicine and pediatrics and geriatrics research; prevention, surveillance and control of communicable and non-communicable diseases; health status monitoring; health promotion; occupational health; public health legislation and regulations; public health organisation; specific public health services; health care for vulnerable and high risk groups and other general health-related research.

8. Agriculture

Includes R&D related to promotion of agriculture, forestry and fisheries; food production; chemical fertilisers, biocides, biological pest control and mechanisation of agriculture; impact of forestry activities on the environment; development of food productivity and technologies, animal and dairy science; veterinary science and other agricultural sciences.

Does not include: research on pollution abatement (included in 2.), development of rural areas, construction and planning of buildings, use of the countryside for recreation and leisure and water supply for agriculture (included in 4.), energy measures (included in 5.) and food industry (included in 6.).

9. Education

Includes R&D related to general education(teaching, pedagogy and didactics); special education (gifted persons and persons with learning disabilities); research related to pre-school and primary education, secondary and post-secondary education (technical and vocational training courses), higher education; services ancillary to education and other general research related to education.

10. Culture, recreation, religion and mass media

Includes R&D relating to the social phenomena of cultural, religious and leisure activities and their impact on life in society; racial and cultural integration and socio-cultural changes in these areas; recreational, sporting and cultural services; broadcasting and publishing services; religious and other community services and other general research relating to cultural, religious and communication phenomena.

11. Political and social systems, structures and processes

Includes R&D on the political structure of society; issues of public administration and economic policy; regional studies and studies on decentralized governance; social change, social processes and social conflict; the development of social security and welfare systems; social aspects of work organization; gender studies, including gender discrimination and family problems; the development of anti-poverty strategies (local, national and international); the protection of certain classes of the population, at the social level (immigrants, delinquency, 'drop-outs', etc.) and at the sociological level (forms of life for young people, adults, pensioners, the disabled, etc.) and economic level (consumers, farmers, fishermen, miners, the unemployed, etc.); strategies for the provision of social security and social assistance, etc.), at sociological level (ways of life of young people, adults, pensioners, disabled people, etc.) and at economic level (consumers, farmers, fishermen, miners, the unemployed, etc.); strategies for providing social assistance in situations of sudden changes in society (natural, technological or social) and other general research concerning political and social systems, structures and processes.

12. General advancement of knowledge

Includes fundamental research with no discriminated socio-economic objective.

13. Defense

Includes research for military purposes.

Annex V - National Strategic Priorities as defined in the National Strategy for Intelligent Specialization - ENEI 2030

For more/futher information consult - https://www.ani.pt/media/7676/enei_2030.pdf

1. Digital transition

- Organization models and production technologies combined from i5.0, with the addition of the human factor to artificial intelligence and autonomous production systems, promoting a response to society's challenges and the re-skilling and up-skilling of people.
- Promote the development of digital platforms and solutions for new models and processes of electronic commerce and business.
- Development and adoption of integration and optimization systems for production chains, implementing logics of collective efficiency and circularity.
- Valuing technical-scientific capacities and developments, promoting the creation, attraction and growth of companies producing digital, communication and software technologies.
- Act on the demand side, stimulating the digitalization of the national economy through the adoption of digital platforms and solutions.

2. Materials, systems and production technologies

- Development and production of equipment goods with added functionality that are associated with higher added value solutions and that allow the development of integrated and customized equipment systems.
- Leverage the industry for valuing endogenous resources (of biological and non-biological origin), and also the extraction of compounds with high added value and the development of materials through Industrial Biotechnology.
- Development and production of advanced materials and components, with added functionality (intelligent surfaces, integration of functionalities, sustainability and recyclability, etc.).
- Creation of more intelligent and sustainable solutions, associated with ecodesign and the optimization of value chains, contributing to the development of sustainable and functional products and systems, maximizing and reducing the cost of reusing materials.
-Development and dissemination of technologies and materials for additive manufacturing, aiming at their application in multiple sectors, allowing the production of customized products with high added value.

3. Great natural assets: forest, sea and space

- Design, development and construction of satellites, rockets and micro-launchers and observation systems for space, oceans and Earth.
- Development and commercialization of applications based on Earth observation technologies and their respective articulation with digital technologies and KET.
- Reinforce advanced demand for Earth observation technologies by boosting the levels of related variety and promoting market demand dynamics for the development of models for monitoring, predicting and analyzing Forest, Soil, Defense and Maritime Surveillance, as well as the effects of climate
- Valuing endogenous resources associated with plant and forest production through research and development of green biotechnology and the promotion of technologies and innovation in transformation.
- Promotion of new technologies for exploring the oceans, including blue biotechnology, promoting the valorization of waste and effluents resulting from fishing activity, multiplying the research of substances and micro-organisms with health and cosmetic applications and treatment by bioremediation, of monitoring and security, the development of technologies for managing the coastline, minimizing the impact of rising sea levels, ocean mining and underwater communications.
- Development of competitive positioning in the global market through digitization, standardization, Service Level Agreement opportunities and evolution of the Smart Port concept, including autonomous navigation and the reduction of environmental impacts.

4. Green transition

- Design and implementation of technological and social solutions that facilitate the operationalization of circular models and the promotion of a sustainable bioeconomy with applications in value chains such as construction, forestry, agri-food, waste management, plastics or the economy of the
- Adaptive transformations to climate change and development of sustainable models of agriculture and forest exploitation.
- Development and implementation of technologies and production systems with a lower carbon footprint, including the optimization of industrial activities and infrastructure, the integration of thermal storage and capture solutions, storage and management of carbon use.
- Integrated and systemic solutions for the decarbonisation of urban structures at different levels, integrating technological, digital, social, cultural, planning and territorial governance solutions in communities.
- Valuing endogenous resources such as water and energy, promoting research and innovation in production, management of use and monitoring of networks, facilitating the interconnection, efficiency and complementarity of systems.
- Development and application of new materials, technologies and systems for more efficient energy storage, enhancing the reliability and penetration of renewable energies and the energy transition.

5. Health, biotechnology and food

- Development of new therapeutic approaches, namely through the creation of innovative drugs, chemically and/or biologically/technologically based, and new solutions and interventions in the areas of antimicrobial resistance.
- Development of medical diagnostic technologies, multifactorial integration and artificial intelligence, as well as new paradigms of response organization, remote assistance and use of health data.
- Development of human-centric, integrated and multidimensional technology that contribute to new models and solutions for human health, animal health and environmental health, from an individual and societal perspective.
- Creative and innovative digital health solutions to support chronically ill patients and/or active and healthy aging, in terms of, among others, inclusion and effective quality of life, remote monitoring, self-care, therapy and the adoption of regimens personalized foods.
- Development of foods with specific medicinal purposes, functional and personalized diets in response to consumer awareness of food quality and safety.

6. Society, creativity and heritage

- Promotion of design activities in all areas of specialization (product design, fashion design, interior design, graphic and visual design, web design), as an activity that induces transformation.
- Creation and management of corporate and territorial Brands and their articulation with the set of Marketing and Corporate and Institutional Communication activities, aiming at greater notoriety and differentiation of products and services and leveraging internationalization.
- New forms of distribution, accessibility, diversity and media coverage of culture and creativity, including the production of multiplatform cultural and artistic content, intensifying the relationship between higher education institutions and research centers and the content ecosystem (audio-visuals, video, music , multimedia), in order to promote the development of new languages and new business models.
- Exploring the potential of new segments of the tourist offer associated with the enhancement of creative, cultural and heritage assets, the territory, landscape and natural resources, including attraction and capitalization around major events, as well as responding to new consumer preferences and assets existing.
- Actions to promote a more inclusive society, to promote cultural heritage and to respond to social, economic, technological and cultural transformations, mobilizing the interdisciplinarity of social sciences and humanities for a better understanding of contemporary transformations in society, including social innovation.

Annex VI - Classification of Fields of Research and Development (FORD, 2015)

1. Natural sciences

1.1. Mathematics: Pure mathematics, Applied mathematics; Statistics and probability.

1.2. Computer and information sciences: Computer sciences, information science and bioinformatics (hardware development to be 2.2, social aspect to be 5.8).

1.3. Physical sciences: Atomic, molecular and chemical physics (physics of atoms and molecules including collision, interaction with radiation; magnetic resonances; Moessbauer effect); Condensed matter physics (including formerly solid state physics, superconductivity); Particles and fields physics; Nuclear physics; Fluids and plasma physics (including surface physics); Optics (including laser optics and quantum optics), Acoustics; Astronomy (including astrophysics, space science).

1.4. Chemical sciences: Organic chemistry; Inorganic and nuclear chemistry; Physical chemistry, Polymer science, Electrochemistry (dry cells, batteries, fuel cells, corrosion metals, electrolysis); Colloid chemistry; Analytical chemistry.

1.5. Earth and related Environmental sciences: Geosciences, multidisciplinary; Mineralogy; Palaeontology; Geochemistry and geophysics; Physical geography; Geology; Volcanology; Environmental sciences (social aspects to be 5.7); Meteorology and atmospheric sciences; climatic research; Oceanography, Hydrology, Water resources.

1.6. Biological sciences: Cell biology, Microbiology; Virology; Biochemistry and molecular biology; Biochemical research methods; Mycology; Biophysics; Genetics and heredity (medical genetics to be 3); reproductive biology (medical aspects to be 3); developmental biology; Plant sciences, botany; Zoology, Ornithology, Entomology, Behavioural sciences biology; Marine biology, freshwater biology, limnology; Ecology; Biodiversity conservation; Biology (theoretical, mathematical, thermal, cryobiology, biological rhythm), Evolutionary biology; other biological topics.

1.7. Other natural sciences

2. Engineering and technology

2.1. Civil engineering: Civil engineering; Architecture engineering; Construction engineering, Municipal and structural engineering; Transport engineering.

2.2. Electrical engineering, Electronic engineering, Information engineering: Electrical and electronic engineering; Robotics and automatic control; Automation and control systems; Communication engineering and systems; telecommunications; Computer hardware and architecture.

2.3. Mechanical engineering: Mechanical engineering; Applied mechanics; Thermodynamics; Aerospace engineering; Nuclear related engineering; (nuclear physics to be 1.3); Audio engineering, reliability analysis.

2.4. Chemical engineering: Chemical engineering (plants, products); Chemical process engineering

2.5. Materials engineering: Materials engineering; Ceramics; Coating and films; Composites (including laminates, reinforced plastics, cermets, combined natural and synthetic fibre fabrics; filled composites); Paper and wood; textiles; including synthetic dyes, colors, fibers; (nanoscale materials to be 2.10; biomaterials to be 2.9).

2.6. Medical engineering: Medical engineering; Medical laboratory technology (including laboratory samples analysis; diagnostic technologies); (Biomaterials to be 2.9 [physical characteristics of living material as related to medical implants, devices, sensors]).

2.7. Environmental engineering: Environmental and geological engineering, geotechnics; Petroleum engineering, (fuel, oils), Energy and fuels; Remote sensing; Mining and mineral processing; Marine engineering, sea vessels; Ocean engineering.

2.8. Environmental biotechnology: Environmental biotechnology; Bioremediation, diagnostic biotechnologies (DNA chips and biosensing devices) in environmental management; environmental biotechnology related ethics.

2.9. Industrial biotechnology: Industrial biotechnology; Bioprocessing technologies (industrial processes relying on biological agents to drive the process) biocatalysis, fermentation; bioproducts (products that are manufactured using biological material as feedstock) biomaterials, bioplastics, biofuels, bio-derived bilk and fine chemicals, bio-derived novel materials.

2.10. Nano-technology: Nano-materials [production and properties]; Nano-processes [applications on nano-scale]; (biomaterials to be 2.9).

2.11. Other engineering and technologies: Food and beverages; Other engineering and technologies.

3. Medical and Health sciences

3.1. Basic medicine: Anatomy and morphology (plant science to be 1.6); Human genetics; Immunology; Neurosciences (including psychophysiology); Pharmacology and pharmacy; Medicinal chemistry; Toxicology; Physiology (including cytology); Pathology.

3.2. Clinical medicine: Andrology; Obstetrics and gynecology; Pediatrics; Cardiac and Cardiovascular systems; Peripheral vascular disease; Hematology; Respiratory systems; Critical care medicine and Emergency medicine; Anesthesiology; Orthopedics; Surgery; Radiology, nuclear medicine and medical imaging; Transplantation; Dentistry, oral surgery and medicine; Dermatology and venereal diseases; Allergy; Rheumatology; Endocrinology and metabolism (including diabetes, hormones); Gastroenterology and hepatology; Urology and nephrology; Oncology; Ophthalmology; Otorhinolaryngology; Psychiatry; Clinical neurology; Geriatrics and gerontology; General and internal medicine; other clinical medicine subjects; Integrative and complementary medicine (alternative practice systems).

3.3. Health sciences: Health care sciences and services (including hospital administration, health care financing); Health policy and services; Nursing; Nutrition, Dietetics; Public and environmental health; Tropical medicine; Parasitology; Infectious diseases; epidemiology; Occupational health; Sport and fitness sciences; Social biomedical sciences (includes family planning, sexual health, psycho-oncology, political and social effects of biomedical research); Medical ethics; Substance abuse.

3.4. Medical biotechnology: Health-related biotechnology; Technologies involving the manipulation of cells, tissues, organs or the whole organism (assisted reproduction); Technologies involving identifying the functioning of DNA, proteins and enzymes and how they influence the onset of disease and maintenance of well-being (gene-based diagnostics and therapeutic interventions (pharmacogenomics, gene-based therapeutics); Biomaterials (as related to medical implants, devices, sensors); Medical biotechnology related ethics.

3.5. Other medical sciences: Forensic science; Other medical sciences

4. Agricultural and veterinary sciences

4.1. Agriculture, Forestry, and Fisheries: Agriculture; Forestry; Fishery; Soil science; Horticulture, viticulture; Agronomy, plant breeding and plant protection; (Agricultural biotechnology to be 4.4).

4.2. Animal and Dairy science: Animal and dairy science; (Animal biotechnology to be 4.4); Husbandry; Pets

4.3. Ciências veterinárias

4.4. Agricultural biotechnology: Agricultural biotechnology and food biotechnology; GM technology (crops and livestock), livestock cloning, marker assisted selection, diagnostics (DNA chips and biosensing devices for the early/accurate detection of diseases) biomass feedstock production technologies, biopharming; agricultural biotechnology related ethics.

4.5. Other agricultural sciences

5. Social sciences

5.1. Psychology and cognitive sciences: Psychology (including human - machine relations); Psychology, special (including therapy for learning, speech, hearing, visual and other physical and mental disabilities).

5.2. Economics and Business: Economics, Econometrics; Industrial relations; Business and Management.

5.3. Educational sciences: Education, general; including training, pedagogy, didactics; Education, special (to gifted persons, those with learning disabilities).

5.4. Sociology: Sociology; Demography; Anthropology, ethnology, Social topics (women's and gender studies; Social issues; Family studies, Social work).

5.5. Law: Law, criminology, penology.

5.6. Political science: Political science; public administration; organization theory.

5.7. Social and economic geography: Environmental sciences (social aspects); Cultural and economic geography; Urban studies (Planning and development); Transport planning and social aspects of transport (transport engineering to be 2.1).

5.8. Media and communications: Journalism; Information science (social aspects); Library science; Media and socio-cultural communication.

5.9. Other social sciences: Social sciences, interdisciplinary; Other social sciences.

6. Humanities and arts

6.1. History and Archaeology: History (history of science and technology to be 6.3, history of specific sciences to be under the respective headings); Archaeology.

6.2. Languages and Literature: General language studies; Specific languages; General literature studies; Literary theory; Specific literatures; Linguistics.

6.3. Philosophy, Ethics and Religion: Philosophy, History and philosophy of science and technology; Ethics (except ethics related to specific subfields); Theology; Religious studies.

6.4. Arts (history of arts, performing arts, music): Arts, Art history; Architectural design; Performing arts studies (musicology, theater science, dramaturgy); Folklore studies; Studies on Film, Radio and Television.

6.5. Other humanities

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Government, Higher Education and Private Non-Profit sectors

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