

UNITED ARAB EMIRATES
MINISTRY OF FINANCE



الإمارات العربية المتحدة
وزارة المالية

Guidance Paper on the Foundations of Research and Development (“R&D”)



R&D Definition

R&D is about practicing creative thinking processes in a systematic, logical, and orderly manner to increase the stock or balance of human, cultural and societal knowledge, to create new applications based on the existing knowledge. Research is categorised into three types:

1. *Basic Research*

Means the theoretical and practical work is carried out mainly to acquire new knowledge on the basis of observed phenomena and facts without specifying the purpose of use or direct application.

2. *Application-Oriented Research*

A genuine research investigation conducted to gain new knowledge, which is mainly directed towards a specific or pre-defined practical purpose or objective, and is in the form of products, policies, or services.

3. *Experimental Research*

Aims to work in a systematic, structured manner based on knowledge gained from research and practical experience, to produce (generate) additional knowledge directly deployed to producing new products (goods and services) or processes, or to improve existing or current products or processes.

Key R&D characteristics are set out in the following table.



R&D Characteristics

Criteria	Description	Examples	Reference in Frascati Manual
Novel	The objective is to generate new knowledge based either on entirely new advancements in knowledge of a specific concept or to reproduce an existing result that finds potential discrepancies in an existing context.	<ul style="list-style-type: none"> Development of a new method for harvesting energy out of non-existing sources of energy based on earlier theoretical studies. Development of an enhanced methodology for harvesting energy out of an existing energy source that is currently being used. 	2.14, pg46
Creative	The objective is to create new concepts or ideas that improve on existing knowledge of a specific topic and hence human interference is required, which may not include routine changes.	<ul style="list-style-type: none"> Researching into new methods of data processing is meeting the creativity criteria but data processing by itself is not, as it may involve routine changes to how current processing is happening. 	2.17, pg47



Criteria	Description	Examples	Reference in Frascati Manual
Uncertain	The project outcome cannot be precisely estimated and hence resources (time and cost) cannot be determined relative to the goals of the project.	<ul style="list-style-type: none"> For example, uncertainty is a key criterion when making a distinction between R&D prototyping (models used to test technical concepts and technologies with a high risk of failure, in terms of applicability) and non-R&D prototyping (preproduction units used to obtain technical or legal certifications). 	2.18, pg47
Systematic	The R&D activity is conducted in a planned manner, with records kept of both the process followed and the outcome expected. Also, there should be an identification of sources of funding and percentage of utilization throughout the project.	<ul style="list-style-type: none"> Research project budget prepared to estimate manpower hours, cost per manhour and any relevant CAPEX allocated to this project. 	2.19, pg47



Criteria	Description	Examples	Reference in Frascati Manual
Transferable & Reproducible	The results of the R&D project should have the potential for the transfer of the new knowledge and allowing other researchers to reproduce the results as part of their own R&D activities, including both negative and positive results.	<ul style="list-style-type: none"> In the field of medicine, a routine autopsy to determine the causes of death is the practice of medical care and is not R&D; a special investigation of a particular mortality to establish the side effects of certain cancer treatments is R&D (in fact, novelty and uncertainty about the final results of the study, as well as the transferability of the results for broader use, apply here). 	2.20, pg48

Common R&D Activities

Identifying R&D activities and distinguishing them from activities related to traditional science and technology requires separating the activities that are overlapping between them, by knowing the advantages of activities that fall under R&D. To clarify this, the following needs to be reviewed on common activities that fall under R&D and activities that do not fall under it. Some of the most common R&D activities in various fields are:

- Laboratory research that is aimed at discovering new knowledge.
- Transforming research outcomes into new applications or knowledge.
- Conducting tests to find alternatives to products or processes or for evaluation purposes.
- Modifying or changing the composition of product components or re-design processes for production.
- Preparing basic designs for the initial industrial models and building industrial experiment units for the pre-operational and production stages.



- Designing tools, equipment and moulds incorporating new technologies.
- Design, construction, and operation of an experimental industrial unit that may not have economic feasibility related to the commercial production for companies or government agencies or higher education institutions.
- Design and development of tools, equipment, and devices used to facilitate R&D activities, or components involved in the production of products or processes related to R&D projects.

Activities Excluded From R&D

Engineering and scientific activities are **often excluded from R&D activities** when they fall within the following areas:

- Subsequent engineering operations after development are completed in the early stage of commercial production.
- Quality control tests that include quality control during commercial production such as routine product tests.
- Inspection and maintenance works, such as troubleshooting during commercial production.
- Adapting the capabilities available to meet specific requirements or specific needs of the customer as an integral part of an ongoing business activity.
- Other occasional or regular changes to the design relating to existing products.
- Routine design of various tools, equipment, and moulds.
- Engineering designs, works and structural engineering related to the construction, transfer, rearrangement or operation of facilities or equipment, except for facilities and equipment that are used in R&D projects only.
- Legal work related to patent applications, sale or licensing of patents, or any related litigation.
- Training of scientific and technical cadres is not considered part of R&D activities unless the education and training activity aims at providing knowledge and skills in areas related to the development of workers in R&D projects.



Activities Connected to Science and Technology

The activities included in the fields related to science and technology are numerous and may often overlap with R&D activities. To distinguish between them, the following are **examples** of these activities that are **not considered R&D activities**:

1. *Scientific and Technical Information Services*

Activities specialized in collecting, coding, recording, classifying, publishing, translating, and analyzing. However, if the said activities are conducted in the context of implementing or supporting R&D projects, then they are considered as R&D activities.

2. *Testing and Standards Unification*

Tests related to maintaining national standards, routine testing and analysis of materials, composition, products, processes, soils, climate, etc. These activities are not included in R&D activities.

3. *Feasibility Studies*

Economic feasibility studies for establishing engineering or industrial projects depending on the available technologies, except for economic and technical feasibility studies related to specific research projects, which are considered part of R&D activities.

4. *Policies-related Activities*

Activities related to policy or studies, such as the analysis and evaluation of current programs, policies and operations of government departments and other institutions, the work of units involved in the continuous analysis and monitoring of external phenomena, and the work of legislative investigation committees concerned with the public policies or operations of government or its departments.

Any activity aimed at providing close support to policy actions, as well as legislative activity, is also excluded from R&D activities. This includes consulting, policy relations with the media, legal advice, public relations, and technical support for administrative activities (such as accounting business).

5. *R&D Funding Management Activities*

The operations of managing and distributing donations for R&D grants to those in charge of R&D activities by ministries, research institutions, foundations or charities are not included in R&D activities.



6. *Indirect Support Activities*

Activities related to the provision of technology services such as technical testing, standardization, technology transfer (such as physical transfer of technology, processes and/or technical knowledge), development of new tools, maintenance, storage and accessibility of scientific and knowledge collections through libraries, databases and repositories, providing infrastructure and major scientific facilities (such as nuclear reactors, satellites, large telescopes, etc.) are excluded.

Methods of Identifying R&D Projects

R&D projects can be distinguished from traditional technical or technological activities by considering the following questions and examples:

1. *What are the project objectives?*

Pursuing original challenging/difficult goals by creating new knowledge (e.g., searching for previously undiscovered phenomena, foundations, or relationships) is a core criterion in R&D that it contributes to the advancement of scientific knowledge and technological progress. Any utilization of already available Knowledge (such as adaptation, modification, etc.) which does not require any attempt to extend the scope of modern technology should be excluded.

2. *What is new about this project?*

In addition to creating a “New Knowledge”, R&D project should follow a creative thinking approach, such as devising new applications of existing scientific knowledge or new uses of available means or methods (creativity).

3. *What are the methods used to implement a project?*

Project implementation relies on diverse methods from scientific, technological, and social research to address uncertainties in outcomes, such as resource requirements and time constraints. The selection of methods is a creative process, strategically managing uncertainty. This dynamic approach fosters adaptability and innovation, ensuring effective responses to evolving project challenges throughout its lifecycle.

4. *How applicable are the Project outcomes in general?*

In general, for the outcomes to be applicable, they should adhere to transmissibility/recurrence criteria. For example, the transmission of the outcomes can



be demonstrated through publication in scientific media or the use of intellectual property protection tools.

5. *What type of staff are involved in a project?*

It is supposed to make available a set of skills necessary to conduct any R&D activity. Project research teams are categorized as researchers, technicians, and support staff, but only researchers -who act as researchers- can identify an R&D activity that implicitly satisfies the five core criteria (novel, creative, uncertain, systematic, and transferable/reproducible).

6. *How should research projects and research institutions be classified?*

In specific cases, an "institutional approach" can be used to distinguish between R&D projects and non-R&D projects. For example, most projects implemented in research institutions or research universities are described as R&D projects. Projects in other fields, such as commercial companies or organizations not entirely oriented to R&D activities, should be reviewed against the five R&D criteria.