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# Research and Development in the EU

## Basic concepts of R&D&I in the EU

### Lecture 1

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# Basic concepts of R&D&I in the EU

## Lecture 1

### In this lecture you will learn about:

- The main concepts of research and development
- The basics of research and development and innovation

### The main concepts of research and development

Before going into the core contents of this course, we first introduce the **concepts** we use throughout the study materials. We use the definitions that the *EU's office for statistics*, the *Eurostat* is using.



**Research and experimental development**, abbreviated as **R&D**, refers to *creative work undertaken on a systematic basis in order to increase the stock of knowledge* (including knowledge of man, culture and society), *and the use of this knowledge to devise new applications*.



**Gross domestic expenditure on R&D (GERD)** includes *expenditure on research and development by business enterprises, higher education institutions, as well as government and private non-profit organisations*.



**Research and development (R&D) intensity for a country** is defined as the *R&D expenditure as a percentage of gross domestic product (GDP)*.

**For an enterprise**, R&D intensity is *the ratio of a firm's R&D investment to its revenue* (the percentage of revenue that is reinvested in R&D).

R&D is the *main driver of innovation*, and **R&D expenditure and intensity** are *two of the key indicators* used to monitor resources devoted to science and technology worldwide. Governments are increasingly referring to international benchmarks when defining their science policies and allocating resources.



A **researcher** is *a professional engaged in the conception or creation of new knowledge, products, processes, methods and systems*, as well as in the management of the projects concerned.



**Innovation** is *the use of new ideas, products or methods where they have not been used before*. For the *Community Innovation Survey (CIS)*, an innovation is defined as *a new or significantly improved product (good or service) introduced to the market, or the introduction within an enterprise of a new or significantly improved process*.



The **Community Innovation Survey**, abbreviated as **CIS**, is conducted in every European Union (EU) Member State to *collect data on innovation activities in enterprises*, i.e. on product innovation (goods or services) and process innovation (organisational and marketing aspects). The survey covers areas such as new or significantly improved goods or services, and the introduction of new or significantly improved processes, logistics or distribution methods. It also gives information on the characteristics of innovation activity at the enterprise level, thereby creating a better understanding of the innovation process and the effects of innovation on the economy.

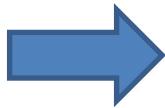
The CIS produces a broad set of indicators on innovation activities, innovation spending, effects of innovation, public funding, innovation co-operation, sources of information for innovation, main obstacles to innovation activity and methods of protecting intellectual property rights.

**Innovations** are based on the results of:

- new technological *developments*,
- new technology *combinations*, or
- the *use of other knowledge*, acquired by the enterprise.

The innovations may be developed by the innovating enterprise or by another enterprise. However, purely selling innovations wholly produced and developed by other enterprises is not included as an innovation activity, nor is introducing products with purely aesthetic changes.

*Innovations should be new to the enterprise concerned:* for product innovations, they do not necessarily have to be new to the market and, for process innovations, the enterprise does not necessarily have to be the first one to have introduced the process.



Enterprises carrying out innovation activities cover all types of **innovators** including product and process innovators, as well as those enterprises with only ongoing and/or abandoned innovation activities.

The proportion of enterprises undertaking innovation activities is also called the **propensity (tendency) to innovate**.

**Innovation** can be *categorised* based on its subject. It can accordingly be:

- *product* innovation
- *process* innovation
- *organisational* innovation

A **product innovation** is the *introduction of a good or service that is new or significantly improved* with respect to its characteristics or intended uses. This includes significant improvements in *technical specifications, components and materials*, incorporated



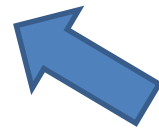
*software, user friendliness or other functional characteristics. Product innovations can utilise new knowledge or technologies, or can be based on new uses or combinations of existing knowledge or technologies. The term 'product' is used to cover both goods and services. Product innovations include both the introduction of new goods and services and significant improvements in the functional or user characteristics of existing goods and services.*



A **process innovation** is the *implementation of a new or significantly improved production or delivery method*. This includes significant changes in *techniques, equipment and/or software*. Process innovations can be intended to *decrease unit costs* of production or delivery, to *increase quality*, or to *produce or deliver new or significantly improved products*. Process innovations include new or significantly improved methods for the creation and provision of *services*. They can involve significant changes in the equipment and software used in services-oriented firms or in the procedures or techniques that are employed to deliver services.

*Examples* are the introduction of *GPS tracking devices for transport services*, the implementation of a *new reservation system in a travel agency*, and the development of *new techniques for managing projects* in a consultancy firm. Process innovations also cover new or significantly improved techniques, equipment and software in ancillary support activities, such as *purchasing, accounting, computing and maintenance*. The implementation of new or significantly improved information and communication technology (*ICT*) is a process innovation if it is intended to improve the efficiency and/or quality of an ancillary support activity.

An **organisational innovation** is the implementation of a *new organisational method in the firm's business practices, workplace organisation or external relations*. Organisational innovations can be intended to *increase a firm's performance* by reducing administrative costs or transaction costs, improving workplace satisfaction (and thus labour productivity), gaining access to non-tradable assets (such as non-codified external knowledge) or reducing costs of supplies. The *distinguishing features* of an organisational innovation compared to other organisational changes in a firm is the *implementation of an organisational method* (in business practices, workplace organisation or external relations) *that has not been used before in the firm and is the result of strategic decisions taken by management*.



**Invention** is *different from innovation*. It is related to a *discovery*.



An **invention** is a new solution to a technical problem which satisfies the criteria of:

- *novelty*: the solution must be novel (new);
- *inventiveness*: it must involve a (non-obvious) inventive step;
- *industrial applicability*: it must be capable of industrial use.

### Questions for self-study

- What is the Eurostat's definition for research and development? And for innovation? What are the main differences between these activities?
- What is the Eurostat's definition for a researcher? And for an innovator? What are the main differences between these actors?

### References:

Eurostat Statistic Explained main website: [http://ec.europa.eu/eurostat/statistics-explained/index.php/Main\\_Page](http://ec.europa.eu/eurostat/statistics-explained/index.php/Main_Page)