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Research and Development in the EU  
Research and development in the early  
times of European integration

Lecture 2

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# Research and development in the early times of European integration

## Lecture 2

### In this lecture you will learn about:

- How research and development appeared in the beginnings of European integration
- The Joint Research Centre
- The role of the Euratom Treaty in the evolution of European R&D
- The main areas and focus of R&D in the first decades of European integration

### Research and development in the beginnings of European integration

The European Union that we know today was established by the **Treaty of Rome**: in 1957, France, (West) Germany, Italy, Belgium, the Netherlands and Luxembourg agreed to form themselves into the **European Economic Community (EEC)**.<sup>1</sup> The EEC, as its name suggests, was a *cooperation agreement of an economic nature in principle*, aiming at establishing a *common market* among the participating countries where the outputs of production (i.e. goods and services) and its inputs (i.e. capital and labour) can move freely.

The Treaty of Rome *did not explicitly point out research and development either as an objective or as a tool*. Nevertheless, we can find *indefinite references* to these in its Preamble.

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<sup>1</sup> The 1951 Paris Treaty establishing the European Coal and Steel Community, by the same six countries, can be regarded as the forerunner to the EEC.

Excerpt from the **Preamble of the  
Treaty establishing the European Economic Community**

**RESOLVED** to ensure the economic and social progress of their countries by common action to eliminate the barriers which divide Europe,  
**AFFIRMING** as the essential objective of their efforts the constant improvement of the living and working conditions of their peoples,  
**RECOGNISING** that the removal of existing obstacles calls for concerted action in order to guarantee steady expansion, balanced trade and fair competition...  
**HAVE DECIDED** to create a **EUROPEAN COMMUNITY**.

Source: Treaty of Rome

Nevertheless, *the Treaty established the **Joint Research Centre (JRC)** as the common institution for European research and development.*

## The Joint Research Centre

The **Joint Research Centre (JRC)** is a *network of research institutes fully financed by the EU*, thus belonging directly under the European Commission.



### The JRC in brief

As the *European Commission's science and knowledge service*, the **Joint Research Centre (JRC)** supports EU policies with independent scientific evidence throughout the whole policy cycle.

- The JRC creates, manages and makes sense of *knowledge* and develops *innovative tools* and makes them *available to policy makers*.
- The JRC anticipates *emerging issues that need to be addressed at EU level* and understand policy environments.
- The JRC *collaborates with over a thousand organisations worldwide* whose scientists have access to many JRC facilities through various collaboration agreements.
- The work at the JRC has a direct impact on the lives of citizens by contributing with its research outcomes to a *healthy and safe*

*environment, secure energy supplies, sustainable mobility and consumer health and safety.*

- The JRC draws on over 50 years of scientific experience and continually build our expertise in knowledge production and knowledge management.
- The JRC hosts specialist laboratories and unique research facilities and is home to thousands of scientists.

*Source: JRC website*

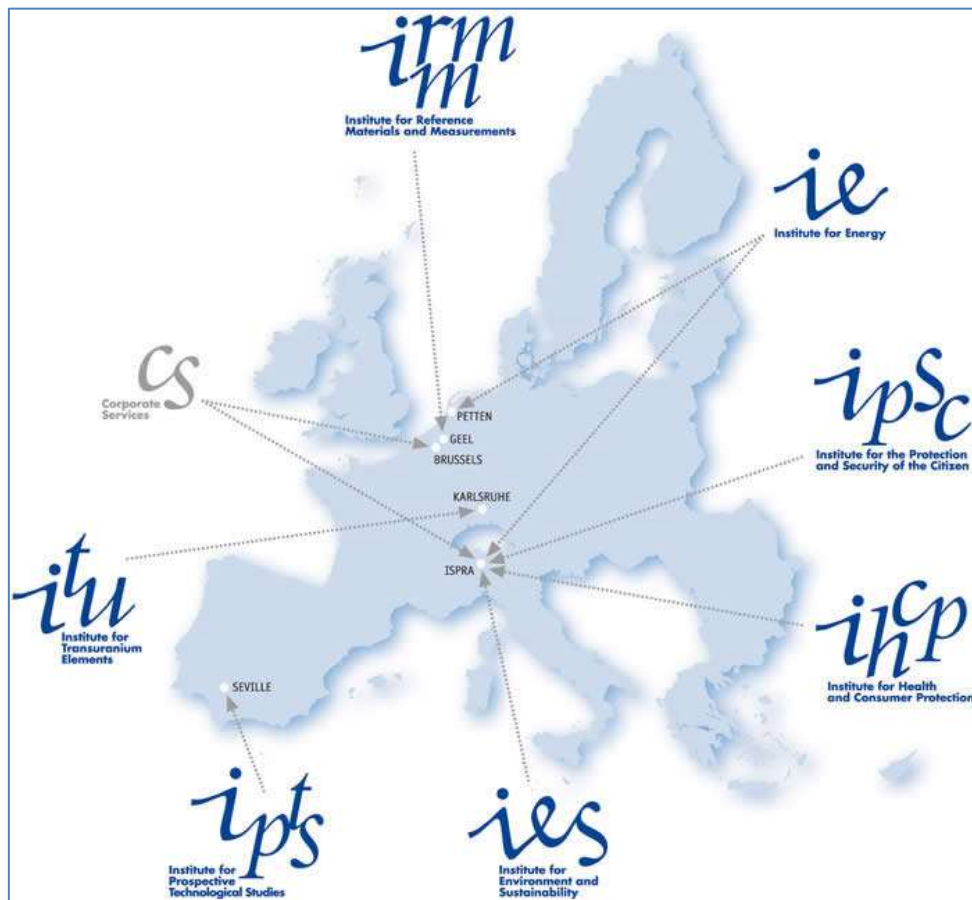
As said above, **the JRC** *has existed since the beginning of European integration. Its role has constantly developed* according to the upcoming issues and challenges ahead of the Community that are to be addressed and tackled at the European level as they point beyond the member states.

*At present, the JRC deals with the following science areas:*

- Agriculture and food security
- Economic and Monetary Union
- Energy and transport
- Environment and climate change
- Health and consumer protection
- Information society
- Innovation and growth
- Nuclear safety and security
- Product standards

The JRC has *seven sites in five EU countries* (in the cities of Brussels, Geel, Ispra, Karlsruhe, Petten, and Seville).

### JRC sites



Source: Pelle (2015)

## The role of the Euratom Treaty in the evolution of European R&D

The other treaty signed in Rome in 1957, the **Euratom Treaty** was much more conscious about research and development – but only in relation to nuclear power. In particular, Title II, Chapter I of the Euratom Treaty talks about the **promotion of joint research in the field of nuclear power**, and sets up the *Joint Nuclear Energy Research Centre*. This institution would host two types of research activities that we see in the common R&D policy later:

- 1) **research carried out by the centre**, and
- 2) **contracted research**.

## Excerpts from Title II of the Euratom Treaty

### TITLE II PROVISIONS FOR THE ENCOURAGEMENT OF PROGRESS IN THE FIELD OF NUCLEAR ENERGY

#### CHAPTER 1

#### Promotion of research

##### *Article 4*

1. The Commission shall be responsible for promoting and facilitating nuclear research in the Member States and for complementing it by carrying out a Community research and training programme.

(...)

##### *Article 6*

To encourage the carrying out of research programmes communicated to it the Commission may:

- (a) provide financial assistance within the framework of research contracts, without, however, offering subsidies;
- (b) supply, either free of charge or against payment, for carrying out such programmes, any source materials or special fissile materials which it has available;
- (c) place installations, equipment or expert assistance at the disposal of Member States, persons or undertakings, either free of charge or against payment;
- (d) promote joint financing by the Member States, persons or undertakings concerned.

##### *Article 7*

Community research and training programmes shall be determined by the Council, acting unanimously on a proposal from the Commission, which shall consult the Scientific and Technical Committee.

These programmes shall be drawn up for a period of not more than five years.

The funds required for carrying out these programmes shall be included each year in the research and investment budget of the Community.

The Commission shall ensure that these programmes are carried out and shall submit an annual report thereon to the Council.

The Commission shall keep the Economic and Social Committee informed of the broad outlines of Community research and training programmes.

##### *Article 8*

1. After consulting the Scientific and Technical Committee, the Commission shall establish a Joint Nuclear Research Centre.

This Centre shall ensure that the research programmes and other tasks assigned to it by the Commission are carried out.

(...)

##### *Article 10*

The Commission may, by contract, entrust the carrying out of certain parts of the Community research programme to Member States, persons or undertakings, or to third countries, international organisations or nationals of third countries.

Source: Euratom Treaty

Then, Chapter II of the same part of the Euratom Treaty contains provisions on the *dissemination of information* as an important aspect of the research activities.

## The main areas and focus of R&D in the first decades of European integration

In the early years of European integration, the participating member states and the common institutions found themselves in the midst of the Cold War between the United States of America and the Soviet Union. In both these superpowers, research and development was mainly driven by military purposes. At the same time, Europe still remembered World War II too well in order not to participate in this type of military-driven research competition. Instead, **the participants of the European integration were striving for laying the foundations of an R&D that is targeting reaching peaceful objectives** – such as ensuring economic and social progress, or the constant improvement of the living and working conditions of the people.

Accordingly, in the **1950s and 1960s, aeronautics and space research, but strictly their civilian utilisation**, was in the focus of the European R&D. The latter one, space research was from integrated into the **European Space Agency (ESA)** at the time it was established in 1973.



In the **1970s and 1980s**, there was a shift of focus in European R&D. The new core area was **technology (in general)** and the possibilities of **its economic applicability**.

It was in this time period that the need was formulated to make the JRC more “customer-oriented”. The big impetus to new fields of research and technological development was the fast growing new area of **telematics**.



### Telematics

**Telematics** are an *interdisciplinary field* encompassing *telecommunications, vehicular technologies, road transportation, road safety, electrical engineering* (sensors, instrumentation, wireless communications, etc.), and *computer science* (multimedia, Internet, etc.). The term *telematics* describes the process of long-distance transmission of computer-based information.

Hence the **application of telematics** is with any of the following:

- The technology of sending, receiving and storing information via telecommunication devices in conjunction with affecting control on remote objects.
- The integrated use of telecommunications and informatics, for application in vehicles and with control of vehicles on the move.
- Telematics includes but is not limited to GPS technology integrated with computers and mobile communications technology in automotive navigation systems.
- Most narrowly, the term has evolved to refer to the use of such systems within road vehicles, in which case the term vehicle telematics may be used.

Source: Wikipedia

This was the time period *in the history of technology* when *the following areas emerged and developed quickly*:

- integrated circuits (IC),
- computing science,
- electronics, and
- communication engineering.





### The historic significance of integrated circuits (IC)

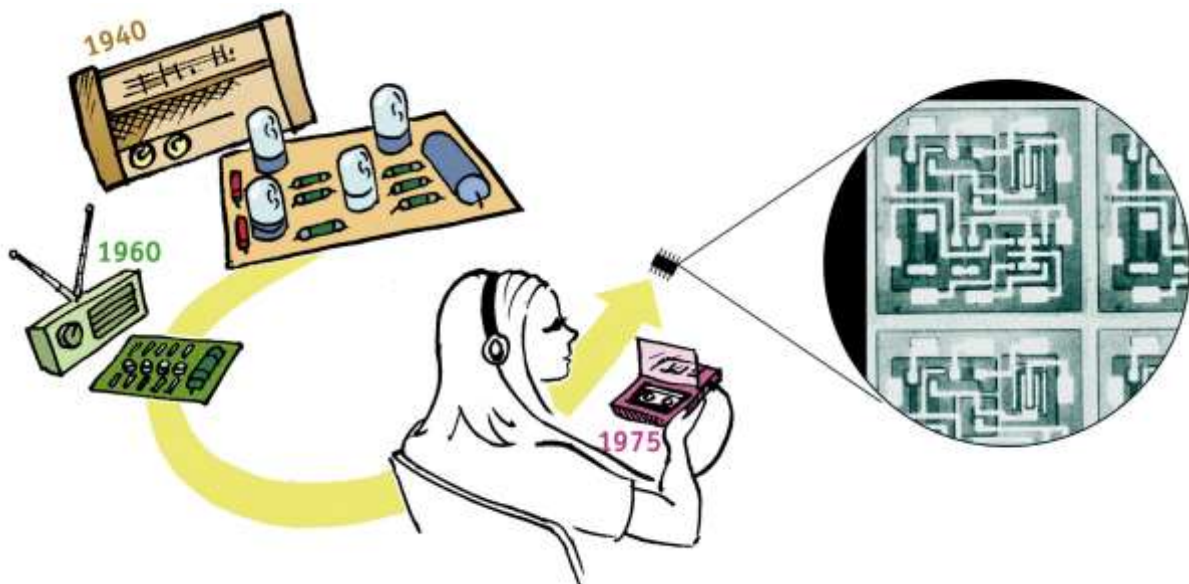
The **integrated circuit** is nothing more than a *very advanced electric circuit*. An electric circuit is made from different electrical components such as *transistors, resistors, capacitors* and *diodes* that are connected to each other in different ways. These components have different behaviours and are *like the building blocks in an electrical construction kit*. Depending on how the components are put together when building the circuit, everything from a burglar alarm to a computer microprocessor can be constructed.

*Building an integrated circuit like a computer chip is a very complex process*. It is divided into two major parts, front end and back end. In the front end, you make the components of the circuit. In the back end, you add metal to connect the components and then you test and package the chip. Today the most advanced circuits contain several hundred millions of components on an area no larger than a fingernail.

The Nobel Prize in Physics 2000 was awarded "*for basic work on information and communication technology*" with one half jointly to Zhores I. Alferov and Herbert Kroemer "*for developing semiconductor heterostructures used in high-speed- and opto-electronics*" and the other half to Jack S. Kilby "*for his part in the invention of the integrated circuit*".

Source: Nobel Prize website

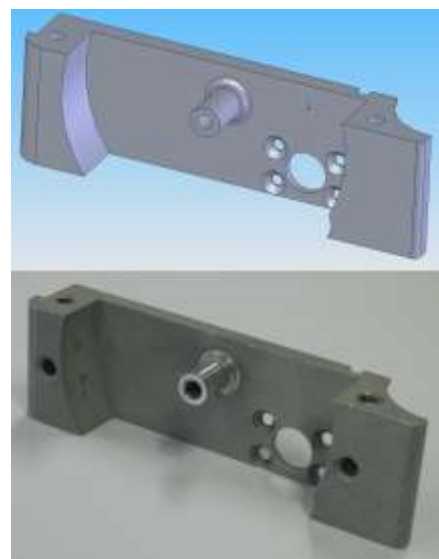
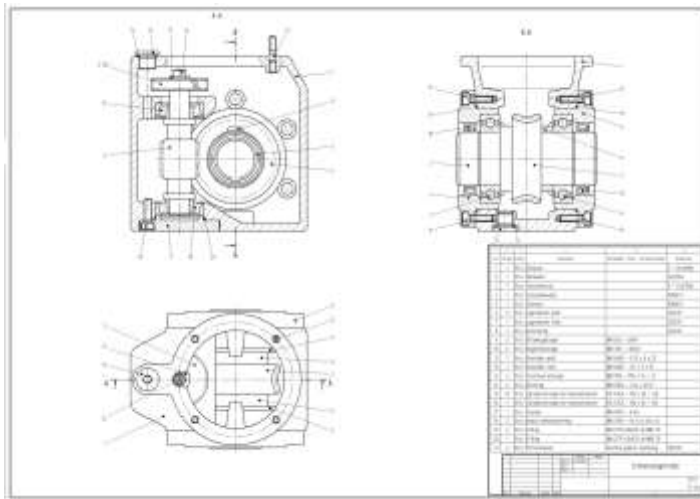
Development has gone from radio valves via transistors to integrated circuits, chips, present in all modern electronics.



Source: Nobel Prize website

With these fast developing new fields, the European economy witnessed **major technological advancements in the 1980s**:

- *more developed and more refined materials in manufacturing;*
- *new planning methodologies and quality control in production,*
- *new methods of production (organisation and automatisisation of procedures);*
- *new technologies in production (e.g. CAD/CAM);*
- *further refinement of the technologies used in aeronautics.*



### The CAD/CAM technologies

**Computer-aided design (CAD)** is the use of computer systems to assist in the creation, modification, analysis, or optimization of a design. CAD software is used to increase the productivity of the designer, improve the quality of design, improve communications through documentation, and to create a database for manufacturing. CAD output is often in the form of electronic files for print, machining, or other manufacturing operations.

Computer-aided design is used in many fields. CAD is an important industrial art extensively used in many applications, including *automotive, shipbuilding, and aerospace industries, industrial and architectural design, prosthetics*, and many more. Because of its enormous economic importance, CAD has been a major driving force for research in *computational geometry, computer graphics* (both hardware and software), and *discrete differential geometry*.

**Computer-aided manufacturing (CAM)** is the use of computer software to control machine tools and related machinery in the manufacturing of

*workpieces*. CAM may also refer to the use of a computer to assist in all operations of a manufacturing plant, including *planning, management, transportation and storage*. Its primary purpose is to create a *faster production process and components* and tooling with *more precise dimensions and material consistency*, which in some cases, uses only the required amount of raw material (thus *minimising waste*), while simultaneously *reducing energy consumption*. CAM is a subsequent computer-aided process after computer-aided design (CAD) as *the model generated in CAD can be input into CAM software*, which then controls the machine tool.

Source: Wikipedia

Thus, *new technologies in production were driving* not only the *R&D activities*, but also *economic growth* in the EEC in these times.

### Questions for self-study

- How did R&D appear in the Treaty of Rome?
- What scientific areas were in the focus of European R&D in the 1950s and 1960s? And in the 1970s and 1980s?
- What were the major technological advancements in the 1980s? Introduce them briefly.

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