



# Nanoelectronics

*Small and Smart*

“Nanoelectronics Activities in the  
7th Framework Programme for  
Research and Technological Development”

European Commission  
Information Society and Media



## Nanoelectronics

The word nanoelectronics consists of two parts: nano and electronics.

- One nanometre (nm) equals 0.000 000 001 metre. This very tiny length goes almost beyond our imagination and can not be seen using traditional microscopes. A nanometre to a metre is the same as a marble compared to the size of the earth. A hair is around 100.000 nm thick.
- Electronics studies the flow of charge through various devices and materials such as semiconductors, metals, resistors, inductors and nano-structures. Electronic parts are important for many tools we use in daily life: cell phones, computers, television, home equipment, cars...

Nanoelectronics is the branch of electronics dealing with miniaturised electronic circuits integrated on semiconductor ‘chips’. Its basic element is the transistor. Up to recently, transistor dimensions were in the micrometer range but today they are manufactured at 65 nanometer or below. Nanoelectronics research is dealing with devices of dimensions of 22 nm and smaller, the technology and equipment to make them, the competences to design them with integrated circuits and electronic components and the art to manufacture them cheap in large volumes. The smaller the technology, the smaller, faster, more powerful and cheaper electronic equipment can be.

## Overall objectives

The objectives of the activities on nanoelectronics in the 7th Framework Programme for research and technological development (FP7) are to advance innovation in miniaturisation in digital components and complex digital Systems-on-a-Chip (‘More Moore’) and to master diversification targeting non digital applications, adding extra functions and heterogeneous integration in Systems-on-a-Chip or Systems-in-a-Package (‘More than Moore’).

Innovation and research on concepts and technologies addressing a market penetration perspective beyond 2015 are directly targeted in the regular part of the 7th Framework Programme operated by the European Commission. Cooperation with a target closer to the market and more application oriented innovation is addressed in a public private partnership operated by the ENIAC Joint Undertaking.

It is the aim to prepare in the regular part of the 7th Framework Programme for very advanced technologies and for the technology generation beyond the CMOS scaling limits (‘beyond CMOS’). Activities cover process equipment, metrology, technology, manufacturing, design, testing, characterisation of innovative components and subsystems.

The European Commission also carries out many supporting activities necessary to promote and to establish nanoelectronics as a strategically important industrial sector underpinning many relevant socio-economic innovations justifying an increased political and public interest.



## Approach

- Provide and advocate a holistic approach and strategic view to increase the competitiveness of the nanoelectronics industry covering research, innovation, education, as well as legal and competition aspects.
- Stimulate leadmarkets and contribute to socially relevant actions of importance for European citizens as well as for the semiconductor industry (e.g. aging population, energy saving, carbon reduction, safe and more mobile transport, ambient intelligence, security...).
- Promote, coordinate and support research, education and innovation.
- Promote dialogue with the Member States, regional innovation clusters and encourage the coordination of research between them.
- Promote dialogue with third countries.
- Support European companies, in particular SMEs, institutes and universities to innovate and compete at global level.
- Monitor the general trends in the sector, the work of the ENIAC Technology Platform and stimulate a dialogue with all key stakeholders.
- Support all relevant legal and policy aspects including state aid cases, ...
- Disseminate results and promote European excellence.



## The ENIAC Joint Technology Initiative

The ENIAC Joint Technology Initiative (JTI) is a European public-private partnership on nano-electronics. It was officially launched in Brussels on February 22nd 2008. The headquarters of the JTI is located in Brussels.



ENIAC combines for the first time efforts of industry, EU Member States (and associated states) and the European Commission in the field of nanoelectronics. Although other European initiatives, like the European Technology Platforms or the regular calls in the Framework Programmes have established cooperation between these three actors before, none of them bring all together at the same time to implement a focused research programme.

- The ENIAC JTI has the legal form of a Joint Undertaking. Over its lifespan of 10 years, the JTI is expected to bring together 3 billion euros of which more than half will be provided by industry.
- The association AENEAS represents all R&D actors (industry, research institutes and universities) in the JTI.
- The ENIAC Joint Technology supports R&D activities (via calls for proposals) and defines and implements a Research Agenda.
- Members: AENEAS, the European Commission, a set of Member States and associated countries.



## How to contact us

Within the European Commission the activities of Nanoelectronics in the 7th Framework Programme, the involvement in the ENIAC Joint Undertaking and any other supporting measures are governed by the unit 'Nanoelectronics' - part of the 'Components and Systems' directorate in the Information Society and Media Directorate-General.

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<http://cordis.europa.eu/fp7/ict/nanoelectronics>

Further information:

<http://cordis.europa.eu/fp7/jtis>

<http://www.eniac.eu/web/aeneas/jti.php>

