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COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

A EUROPEAN STRATEGY FOR MICRO- AND NANOELECTRONIC COMPONENTS AND SYSTEMS

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1. INTRODUCTION

Micro- and nanoelectronic components and systems[1] are not only essential to digital products and services; they also underpin innovation and competitiveness of all major economic sectors. Today's cars, planes, and trains are safer, more energy-efficient and comfortable thanks to their electronic parts. The same holds for large sectors like medical and health equipment, home appliances, energy networks and security systems. This is why micro- and nanoelectronics is a Key Enabling Technology (KET)[2] and is essential for growth and jobs in the European Union (EU).

This Communication sets out a strategy to strengthen the competitiveness and growth capacity of the micro- and nanoelectronics industry in Europe. In line with the updated industrial policy[3], the aim is for Europe to stay at the forefront in the design and manufacturing of these technologies and to provide benefits across the economy.

The strategy spans policy instruments at regional, national and EU level including financial support for research, development and innovation (R&D&I), access to capital investment (CAPEX) as well as the improvement and better use of relevant legislation. The strategy builds on Europe's strengths[4] and on regional clusters of excellence. It covers the whole value chain from material and equipment manufacturing to design and volume production of micro- and nanoelectronics components and systems.

The importance of the area and the challenges faced by the stakeholders in the EU require urgent and bold actions in order to leave no weak link in Europe's innovation and value chains. The focus is on:

- Attracting and channelling investments in support of a European roadmap for industrial leadership in micro- and nanoelectronics.
- Setting up an EU-level mechanism to combine and focus support to micro- and nanoelectronics R&D&I by Member States, the EU and the private sector.
- Taking measures to strengthen Europe's competitiveness towards a global level playing field regarding state aid, to support business development and SMEs, and to address the skills gap.

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1 Referred to as "micro- and nanoelectronics" in this Communication, spans from nano-scale transistors to micro-scale systems integrating multiple functions on a chip

2 COM(2012) 341 final

3 COM(2012) 582 final 'A stronger European Industry for Growth and Economic Recovery'

4 e.g. electronics for cars, energy and manufacturing sectors

2. WHY ARE MICRO- AND NANOELECTRONICS ESSENTIAL FOR EUROPE?

2.1. An important industry with a significant potential for growth and a massive economic footprint

Micro- and nanoelectronics underpin a significant part of the worldwide economy. Their role will continue to grow as future products and services will become more digital, as illustrated below.

- The global turnover of the sector alone was around €230 billion in 2012[5]. The value of products comprising micro- and nanoelectronic components represents around €1.600 billion of value worldwide.
- Despite the recent financial and economic setbacks, the worldwide market for micro- and nanoelectronics has grown by 5% per year since 2000. Further growth of at least the same magnitude is predicted for the remaining part of the current decade.
- The pace of innovation in the field is one of the main drivers behind the high growth rates of the whole digital sector which today has a total value of around €3.000 billion worldwide[6].
- In Europe, micro- and nanoelectronics is responsible for 200.000 direct and more than 1.000.000 indirect jobs[7] and the demand for skills is unceasing.
- The impact of micro- and nanoelectronics on the whole economy is estimated at 10% of the worldwide GDP[8].

2.2. A key technology for addressing the societal challenges

Micro- and nanoelectronics are not only the computing power in PCs and mobile devices. They fulfil also the sensing and actuating functions[9] found for example in smart meters and smart grids for lower energy consumption, or in implants and sophisticated medical equipment for better healthcare and for helping the elderly population. They are also the building blocks for better security, for the safety and efficiency of the whole transport systems and for environmental monitoring.

Today no societal challenge can be successfully met without electronics.

3. A CHANGING INDUSTRIAL LANDSCAPE FOR MICRO- AND NANOELECTRONICS

3.1. Technology progress opens new opportunities

Two main tracks characterise technology development and drive business transformation. A first track progresses the miniaturisation of components at the nano scale along an international roadmap for technology development established by industry[10]. This is the "*more Moore*" track aiming at higher performance, lower costs and less energy consumption[11].

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5 World Semiconductor Trade Statistics (WSTS), 2012 (http://www.wsts.org/)

6 Digiworld report, IDATE 2012 (http://www.idate.org)

7 http://ec.europa.eu/enterprise/sectors/ict/files/kets/hlg_report_final_en.pdf

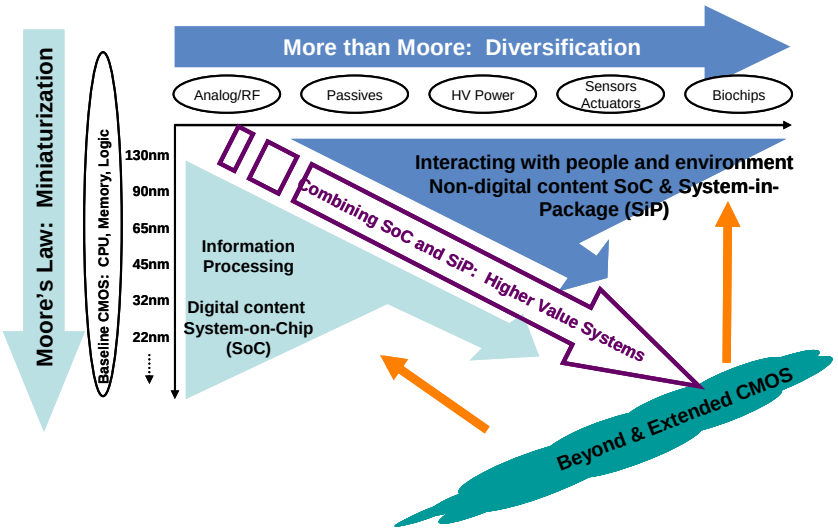
8 See European Semiconductor Industry Association (ESIA) Competitiveness Report, 2008 "Mastering Innovation Shaping the Future" (https://www.eeca.eu/data/File/ESIA_Broch_CompReport_Total.pdf)

9 A sensor is any device, such as a thermometer, that detects a physical condition in the world. Actuators are devices, such as switches, that perform actions such as turning things on or off or making adjustments in an operational system

10 International Technology Roadmap for Semiconductors (ITRS) (http://www.itrs.net)

11 Moore's Law: doubling performance to cost ratio every 18-24 months

A second track aims at diversifying the functions of a chip by integrating micro-scale elements such as power transistors and electro-mechanical switches. This is referred to as the "*more than Moore*" track. This track is at the basis of innovations in many important fields such as energy-efficient buildings, smart cities and intelligent transport systems.



In addition, totally new, disruptive technologies and architectures are being researched. This is often referred to as the "*beyond CMOS*"[12] track. It requires multi-disciplinary research, deep understanding of physics and chemistry and excellence in engineering.

Furthermore, in order to lower production costs, industry increases also step by step the size of the material support[13] for producing micro- and nanoelectronics. Massive investments in R&D&I and CAPEX are required for such transitions in manufacturing standards.

3.2. Escalating R&D&I costs and a more competitive R&D&I environment

Further miniaturisation implies escalating costs for R&D&I and CAPEX. The R&D&I intensity of the micro- and nanoelectronics industry increased from 11% in 2000 to 17% in 2009[14]. This trend appears to continue. Such high investments can only be sustained by volume production.

Consolidation in the industry is on-going. This could lead to a situation where only a few actors are left worldwide and perhaps none in Europe. It is estimated that a 10% share of the worldwide market is needed for a semiconductor company to sustain the investment to keep up with technology development.

As a result, global alliances between companies are formed, e.g. the New York based IBM alliance on 300 mm wafer technology and the Global 450 Consortium focusing on the transition to 450 mm wafers. In Europe, the next generation technology development is centred on leading research centres such as LETI[15], Fraunhofer[16], and imec[17] working in close

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12 Complementary metal-oxide-semiconductor (CMOS) is the standard technology for integrated circuits in the "more Moore" track

13 Micro- and nanoelectronics chips are produced on round material supports called 'wafers'. Successive technology generations are identified by the diameter size of the wafers on which they are produced. Today production is mainly done on 200 mm and 300 mm wafers. The next wafer size will be 450 mm

14 OECD Information Technology Outlook (http://www.oecd.org/internet/ieconomy/oecdinformationtechnologyoutlook2010.htm)

15 LETI is an institute of CEA, a French research-and-technology organization. It specialises in nanotechnologies and their applications, from wireless devices, to biology, healthcare and photonics (http://www-leti.cea.fr)

cooperation with industrial players. Research itself is increasingly becoming global with the emergence of Asia as the home of patent holders and a skilled workforce.

3.3. New business and production models

The micro- and nanoelectronics industrial landscape is changing drastically with a significant shift of volume production to Asia in the last 15 years[18]. Overall, production in Europe has dropped to just less than 10% of world production in 2011. Despite the strengths of US companies in the field only 16% of production is made in the US.

With the increased cost of setting up production facilities ("*fabs*"), the granting by territorial authorities of financial incentives has become an important element in the decision where to build new capacity. Tax breaks, land, cheap energy and other incentives play a major role as does the availability of skilled labour force[19].

Another important trend is the rise of the "*foundry*" model[20]. Foundries developed strongly in Asia and represent already around 10% of the worldwide electronic components production. In conjunction, there are an increasing number of "*fabless*" companies[21] that generate income from selling chip designs. Without production, these fabless companies have not the high financial overheads of the manufacturing companies.

Secure access to production capacity may however become problematic in the future as foundries extend their offer to include design and prototyping which would give them an insight into the end products. To minimize the risk, some companies doing own designs keep limited production lines in-house (the so-called "*fab-lite* model").

3.4. Equipment manufacturers own key elements of the value chain

Without progress in production equipment, advances in further miniaturisation and increased functionality of chips are not possible. Equipment manufacturers have become a key part of the value chain which is reflected in their prominent role in the international technology alliances.

4. EUROPE'S STRENGTHS AND WEAKNESSES

4.1. Industry structured around centres of excellence and wider supply chains covering all Europe

Similar to the rest of the world, Europe's micro- and nanoelectronics industry is concentrated around major regional production and design sites. The regions around Dresden (DE), Grenoble (FR) and Eindhoven-Leuven (NL-BE) host three main research and production centres with increased specialisation in one of the three areas of "*more Moore*", "*more than Moore*" and equipment and materials. In addition, the region of Dublin (IE) hosts a large

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16 The German Fraunhofer-Gesellschaft undertakes applied research of direct utility to private and public enterprise and of wide benefit to society. Several institutes are focusing on integrated circuits and systems (http://www.fraunhofer.de)

17 Belgian imec performs world-leading research in nanoelectronics, leveraging scientific knowledge with global partnerships in ICT, healthcare and energy (http://www.imec.be)

18 e.g. Capital expenditure of Korean companies increased from 13% in 2005 to 27% in 2012

19 See Semiconductor Industry Association (SIA), Maintaining America's Competitive Edge: Government Policies Affecting Semiconductor Industry R&D and Manufacturing Activity, March 2009 (http://www.semiconductors.org/clientuploads/directory/DocumentSIA/Research%20and%20Technology/Competitiveness_White_Paper.pdf)

20 A foundry is a company owning factories and offering manufacturing services to "fabless" customers

21 A fabless company designs its own components but outsources their manufacturing to a service provider (the "foundry")

European manufacturing site of microprocessors, and Cambridge (UK) e.g. is home to the leading company in the design of low power consumption microprocessors that equip most of today's mobile devices and tablets.

This clustering and regional specialisation is essential for the future development of the sector. However, it relies on a wide supply chain spread across Europe. This includes relatively smaller but highly innovative and specialised clusters such as the regions of Graz and Vienna (AT), Milan and Catania (IT) or Helsinki (FI).

Europe counts three large indigenous micro- and nanoelectronics companies ranking 8th (STMicroelectronics), 10th (Infineon) and 12th (NXP) in worldwide sales in 2012. Europe also attracted some major overseas companies that invest in Europe (e.g. GlobalFoundries and Intel). Micro- and nanoelectronics manufacturing in Europe is further served by a very competitive and extended value chain and ecosystem of companies, including many SMEs. The main manufacturing sites are embedded in the regional clusters as mentioned above.

4.2. Leading in essential vertical markets, almost absent in some large segments

Europe is relatively absent in the production of computer and consumer related components that represent a large part of the total market. It is leading though in electronics for automotive (~50% of global production), for energy applications (~40%) and industrial automation (~35%). Europe is also still strong in designing electronics for mobile telecommunications.

European companies, including a large number of SMEs, are world leaders in smart micro-systems like health implants and sensing technologies. Although these are currently niche markets, they are areas of high growth (typically more than 10% per year). Another key asset is the European leadership in the high growth market of low power consumption components.

4.3. Undisputed European leadership in materials and equipment

Europe has some of the most important equipment and materials suppliers including e.g. ASML and SOITEC that hold significant shares of the relevant world market. These companies rely on many suppliers established throughout Europe many of them SMEs. These European equipment and materials suppliers uniquely master highly sophisticated technologies ranging from optics and lasers to precision mechanics and chemistry. Their role in progressing the micro- and nanoelectronics area is significant and well acknowledged as e.g. illustrated by the recent strategic investment of major semiconductor companies in ASML[22].

4.4. Investments of EU companies remain relatively modest

Although in absolute terms investments by European companies are high (in the order of billions of euros), they remain relatively modest compared to investments made elsewhere. Europe's business attractiveness nevertheless remains high given the size of its consumption which is above 20% of the world market. But future investments in electronics manufacturing in Europe are not guaranteed. Competition with other regions in the world is stiff.

Public investment in R&D&I and policies to attract private investment remains highly fragmented across the EU despite the progress made in the last five years. This sharply contrasts with the fact that European R&D&I in micro- and nanoelectronics is world-class and very attractive to international players.

[22] See http://www.asml.com/asml/show.do?ctx=5869&rid=46974 - "As part of the program, Intel, TSMC and Samsung will each acquire ASML shares, equal to an aggregate 23 percent minority equity stake in ASML for EUR 3.85 billion in cash"

5. EUROPEAN EFFORTS SO FAR

5.1. Regional and national efforts reinforcing the clusters of excellence

Important efforts, notably over the last 15 years, have been devoted at regional level to build industrial and technology clusters in the area. The most successful clusters are the result of long-term sustained strategies that combine policies such as tax incentives, investment in R&D&I in public labs, intensive industry-academia cooperation, world-class infrastructures, critical coverage of the value chain and a dynamic business environment. The availability of skills and knowledge is equally of major importance for the field.

With the challenges ahead including the increasing costs of R&D&I, the fierce worldwide competition and the erosion of some key parts of the value chain in Europe (e.g. the stage of packaging components into systems), much closer collaboration along value chains and in innovation ecosystems at EU level is a must.

5.2. A growing and more coordinated investment in R&D&I at EU level

Investment in R&D&I in micro- and nanoelectronics is part of the EU programmes for research and development since their inception. The EUREKA programme also has a large research cluster on micro- and nanoelectronics[23].

After 10 years of stagnation of EU support to R&D&I in the field[24], a gradual increase of around 20% per year started in 2011 leading to a budget of more than €200 million in 2013. In order to focus the R&D&I efforts and build critical mass, the Commission, Member States and private stakeholders together launched, in 2008, a public-private partnership in the form of a Joint Undertaking[25] (ENIAC JU). By the end of 2013, the ENIAC JU will have invested both from the public and private sides more than €2 billion on R&D&I in addition to around €1 billion invested in micro- and nanoelectronics in the Seventh Framework Programme.

5.3. Technology breakthroughs but gaps in the innovation chain

The focus in the EU R&D&I support is on preparing for the next two generations of technologies[26]. Through these programmes, industry kept pace with the state-of-the-art developments in further miniaturisation. Also through these programmes, sophisticated smart systems were developed that today are deployed for example in cars or health systems.

However the EU R&D&I programmes so far supported the early phases of the innovation process, i.e. validating the technologies up to a laboratory level[27]. The logic was to leave the next steps getting closer to the final product up to industry, given the high level of investment these require. This led to clear gaps in the innovation chain. To be effective and cross the so-called 'valley of death', support to research and innovation in the field needs increasingly to address the whole innovation chain spreading beyond any one company, region or Member State.

The ENIAC JU called recently for manufacturing pilot lines addressing particularly these higher scales of technological maturity. The strong interest demonstrated by the private stakeholders and the public authorities to support these pilot lines show their strategic importance.

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23 http://www.catrene.org/

24 At ~€130 million per year

25 Based on Article 187 TFEU

26 Along the International Technology Roadmap for Semiconductors (ITRS) http://www.itrs.net/

27 Technology Readiness Levels (TRLs) are used to assess the maturity of evolving technologies. Levels 1 to 4 typically refer to early R&D while levels 5-8 indicate prototyping and actual system validation in an operational environment

6. THE WAY FORWARD - A EUROPEAN INDUSTRIAL STRATEGY

The proposed strategy builds on the European initiative on Key Enabling Technologies and on the HORIZON 2020[28] proposal for research, development and innovation. It focuses though on the actions that are specific for the challenges faced in micro- and nanoelectronics.

6.1. Objective: Reverse the decline of EU's share of world's supply

Europe cannot afford to lose the capacity to design and manufacture micro- and nanoelectronics. This would put large parts of the value chains of major industrial sectors at risk and deprive Europe of essential technologies needed to address its societal challenges.

Given the wide range of opportunities ahead and the challenges industry is facing, it is now urgent to step up and coordinate all relevant public efforts across Europe. An industrial strategy should ensure return to growth and reach, in a decade, a level of production in the EU that is closer to its share of world GDP. In detail, the aims are to:

- Ensure the availability of micro- and nanoelectronics that are needed for the competitiveness of key industries in Europe.
- Attract higher investment in advanced manufacturing in Europe and reinforce industrial competitiveness across the value chain from design to manufacturing.
- Maintain leadership in equipment and material supply and in areas such as "*more than Moore*" and energy-efficient components.
- Build leadership in the design of chips in high growth markets, notably in the design of complex components.

6.2. Focus on Europe's strengths, build on and reinforce Europe's leading clusters

As indicated above, Europe's assets in micro- and nanoelectronics include an excellent academic research community and industrial leadership in vertical markets. Moreover, when considering Europe as a whole, there is an industrial and technology presence across the full value chain including equipment, material, manufacturing, design as well as strong end-user industry.

Building on these strengths and mobilising the resources needed should make Europe a major player in micro- and nanoelectronics. Mobilising resources will need alignment of actions at regional, national and European level. This will build confidence and stimulate the renewal and growth of manufacturing capability in Europe.

Emphasis is on reinforcing and building on the excellence of research and technology organisations (RTOs) in terms of facilities and staff. They should be the "places to be" for talented engineers and researchers in the field, at the centre of ecosystems to attract private investments in manufacturing and design. In order to maximise return on investment and ensure excellence, further progress towards complementary specialisation and stronger cooperation between the main RTOs will be a key for success in line with the Smart Specialisation strategy[29] of the EU.

To ensure the further uptake of electronics in all industrial sectors and seize the opportunities arising from cross-disciplinary work, closer cross-border and cross-sector collaborations including with end-user industries should be reinforced.

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[28] COM(2011) 809 final

[29] http://s3platform.jrc.ec.europa.eu/home

6.3. Seize opportunities arising in non-conventional fields and support SMEs growth

SMEs play a key role in emerging areas like plastic and organic electronics, smart integrated systems and in general in the field of design. An important goal therefore is to better integrate SMEs in value chains, and provide them with access to state-of-the-art technologies and R&D&I facilities. Support to centres of excellence that help embed micro- and nanoelectronics in all types of products and services will be essential to spur innovation across the economy and mainly in non-technology SMEs.

EU–wide partnerships between end-user industries, public authorities and suppliers (large and small) of micro- and nanoelectronics will help open up new high growth areas like electric vehicles, energy-efficient buildings and smart cities and all types of mobile web services.

7. THE ACTIONS

7.1. Towards a European Strategic Roadmap for investment in the field

The aim is to attract higher public and private investments and channel these to implement a roadmap for leadership to be established by industry.

The level of public and private investment will match the size of the challenge. The intention is to bring the total public and private investment in R&D&I at EU, national and regional level to more than €1.5 billion per year, i.e. a total budget of more than €10 billion over seven years.

To this end the Commission will pursue the dialogue with stakeholders and set up an Electronics Leaders Group to elaborate and help implement a European Industrial Strategic Roadmap that will build on Europe's strengths and cover three complementary lines:

- The development of the "*More than Moore*" technology track on wafer sizes of 200 mm and 300 mm. This will enable Europe to maintain and expand its leadership[30] in a market that represents roughly €60 billion per year and has a 13 % yearly growth. It will have a direct impact on high-value jobs creation including notably in SMEs.
- The further progression of "*More Moore*" technologies for ultimate miniaturisation on wafer sizes of 300 mm. The investment should enable Europe to gradually increase production in this market that represents more than €200 billion[31].
- The development of new manufacturing technology on 450 mm wafers. The investment will initially benefit equipment and material manufacturers in Europe who are today world leaders on a market of around €40 billion per year and will provide a clear competitive edge to the whole industry, in a five to ten years range.

The roadmap will be established at the latest by the end of 2013 as a set of concrete actions reinforcing notably Europe's clusters of excellence in manufacturing and design (see Section 4.1) and ensuring openness to partnerships and alliances across the value chain. The actions of the public sector, European Commission, Member States and regional authorities will consist of:

- Supporting R&D&I through institutional funding or grants to actions driven by the roadmap. Focused and coordinated interventions[32] generating critical mass and maximising return on investment will be mobilised.

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30 Currently, production in Europe in this track is more than 30% of the world value.

31 Europe's share of production is around 9%, but Europe is still at the leading edge of technology in the miniaturisation race.

- Developing, in partnership with industry and in support to innovation, an advanced manufacturing and piloting infrastructure to bridge the gap in the innovation chain and connect design with actual deployment.
- Facilitating access to financing CAPEX through loans and equities, notably regional funds and the innovation schemes of the European Investment Bank (EIB). In this context, the European Commission signed in February 2013 a Memorandum of Understanding with the EIB signalling KETs as a priority for investments.

The Commission will prepare the ground for industry to team up along the value chain and to develop and regularly update the roadmap. Member States, regional authorities and the European Commission will support the roadmap individually and/or collectively including through a Joint Technology Initiative (JTI) and the EUREKA initiative. It will ensure the best use of regional Structural Funds including through Smart Specialisation between the target clusters and the use of financial instruments foreseen under European Structural Investment Funds (ESI Funds)[33].

Industry will engage in maintaining and expanding design and manufacturing activities in Europe and will regularly update the roadmap with the help of RTOs and the academic community in order to keep it up to date with the dynamics of market and technology developments.

7.2. The Joint Technology Initiative: A tri-partite model for large scale projects

The European Commission will propose a Joint Technology Initiative[34] based on Article 187 TFEU that combines resources at project level in support of cross-border industry-academia collaborative R&D&I. The proposal for a Council Regulation to establish a Joint Undertaking will replace the two existing Joint Undertakings on embedded computing systems (ARTEMIS) and nano-electronics (ENIAC) that were set up under the Seventh Framework Programme. Within HORIZON 2020 under the 'Leadership in Enabling and Industrial Technologies' challenge, the new JTI will cover three main interrelated areas:

- Design technologies, manufacturing processes and integration, equipment and materials for micro- and nanoelectronics.
- Processes, methods, tools and platforms, reference designs and architectures for embedded/Cyber-Physical Systems.
- Multi-disciplinary approaches for smart systems.

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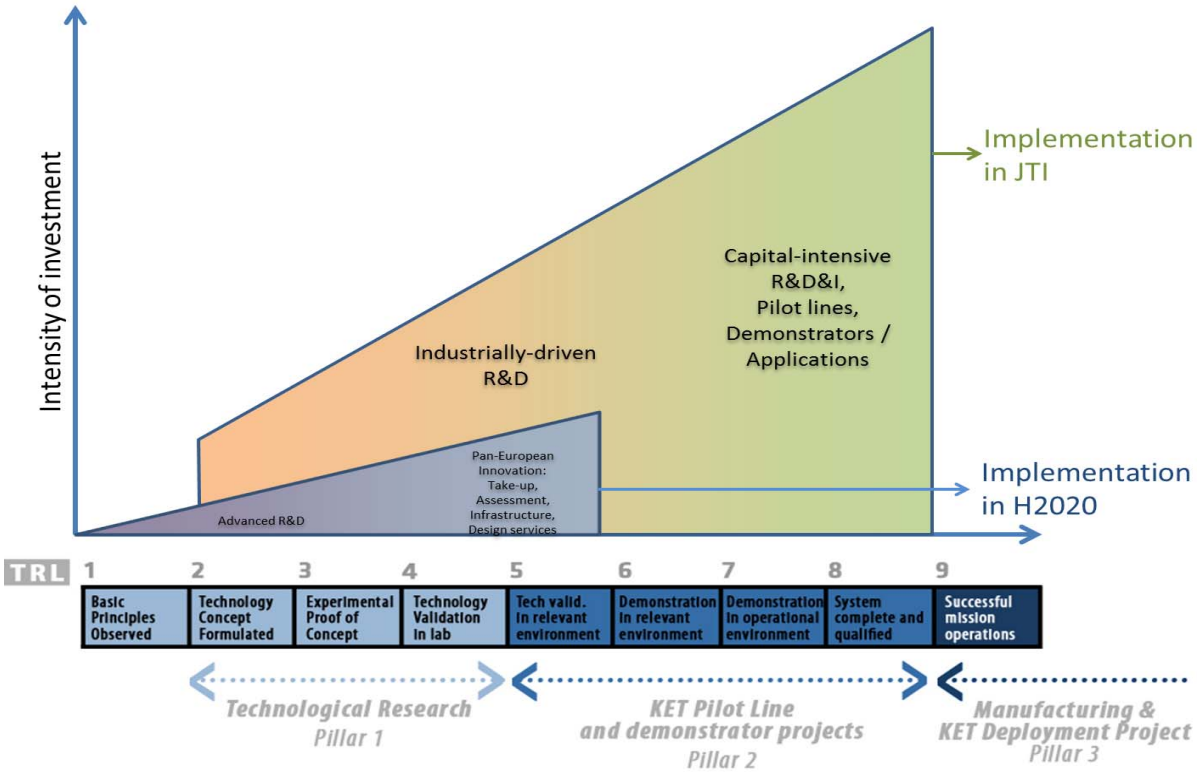
32 From regional, national and EU level programmes.

33 http://s3platform.jrc.ec.europa.eu/home

34 The impact of the proposal will be presented in the impact assessment. The budgetary impact will be included in the legislative and financial statement.



The new JTI will build on lessons learned from the current JTIs[35] and provide a simplified funding structure. It will mainly support capital-intensive actions[36] such as pilot lines or large scale demonstrators at higher Technology Readiness Level up to level 8 as shown above. These will require a tri-partite funding model involving the European Commission, Member States and industry and will help align relevant investment strategies across Europe. The implementation will follow the principles of HORIZON 2020 and will be consistent with the cross-cutting KETs work programme to strengthen cross-fertilisation between the different KETs.

Support to the JTI will be complemented with EU funding for technological R &D and for innovation actions targeting notably SMEs. This will cover R&D&I in new areas of micro- and nanoelectronics (see Section 6.3), including those requiring the combination of several key enabling technologies such as advanced materials, industrial biotechnology, photonics, nanotechnology and advanced manufacturing systems[37].

Within the new JTI the Commission will furthermore explore how to simplify and accelerate state aid approvals including through a Project of Common European Interest according to Article 107.3(b) of TFEU.

7.3. Building on, and supporting horizontal competitiveness measures

The access to a highly skilled workforce of engineers and technicians and to high quality graduates is essential for attracting private investments in electronics. Similar to the whole ICT sector, micro- and nanoelectronics is suffering from an increasing skills gap and a mismatch between supply and demand of skills. The Commission will continue to promote digital competences for industry through the e-Skills initiative and has recently launched the "Grand Coalition for ICT skills and jobs". . For micro- and nanoelectronics the engagement of

35 First interim evaluation of the ARTEMIS and ENIAC Joint Technology Initiatives, 2010 http://ec.europa.eu/dgs/information_society/evaluation/rtd/jti/artemis_and_eniac_evaluation_report_final.pdf

36 Currently, public support to pilot lines in ENIAC JU is between €50 and €120 million per action.

37 See COM(2012) 582 final Section III.A.1.ii)

industry to attract the young generation early in its education is critical. In addition to industrial efforts and relevant initiatives at regional and national level the Commission will continue to co-finance in HORIZON 2020 projects to develop and disseminate training and teaching materials on the latest technology in micro- and nanoelectronics as well as support awareness campaigns targeting young entrepreneurs.

In addition, the European Commission is putting in place an EU Skills Panorama with updated forecasts of skills supply and labour market needs up to 2020, to improve transparency for Skills, Competences and Occupations classification (ESCO), as a shared interface between the worlds of employment, education and training and to support mobility.

Together with RTOs, Universities and national and regional authorities, the Commission will seek to make shared facilities and services for testing and early experimentation of micro- and nano-electronics technologies available to start-ups, SME's and users across Europe.

Furthermore through public procurement of innovations that are driven by micro- and nanoelectronics such as health or security equipment better conditions for market developments in these fields will be created.

7.4. International dimension

The European Commission will promote international cooperation in micro- and nanoelectronics especially in areas of mutual benefit such as international technology road-mapping, bench marking, standardisation, health and safety issues linked to nano-materials[38], and preparing the transition to 450 mm wafer size or advanced research in "*beyond CMOS*".

The European Commission will continue its efforts to move towards a more transparent and global level playing field in international multi- and bilateral fora by limiting trade/market distortions and to support industry in sectorial trade negotiations and in relevant issues demanding an international debate such as the problem of non-practicing entities (NPEs).

8. CONCLUSIONS

As it has done in strategic fields such as aeronautics or space, Europe has no other choice but to engage in an ambitious industrial strategy for micro- and nanoelectronics. This Communication proposes such a strategy that is based on a European roadmap for the field. It supports smart regional specialisation and promotes close cooperation along the value and innovation chains.

The EU, national and regional financial resources in this field have to be aligned in order to reach the critical mass needed to attract investments and the world best talents. Financial resources will be concentrated on Europe's leading clusters. The further development of these will enable the whole European businesses, wherever located, to exploit the latest developments in micro- and nanoelectronics. The action plan in annex summarises what should be done.

[38] COM(2012) 572 final: Second Regulatory Review on Nanomaterials

ANNEX

	Main actions:	By:	When:
1	Pursue the dialogue with stakeholders, set up an Electronics Leaders Group to elaborate and help implement a European Electronics Industrial Strategic Roadmap	European Commission, Industry	The latest by end 2013
	Promote smart specialization, use of financial instruments foreseen under European Structural Investment Funds (ESI Funds) and HORIZON 2020	European Commission, Member States	On-going - to be reinforced
	Promote, under the Memorandum of Understanding signed with the EIB on KETs, the means to ensure capital investment in production in Europe	European Investment Bank, Industry	1Q2014
2	Adopt Council Regulation and launch of the new tri-partite JTI	European Commission, Member States, Industry	Early 2014
	Within the JTI, explore how to simplify and accelerate state aid approvals including through a Project of Common European Interest according to Article 107.3(b) TFEU	European Commission, Member States, Industry	3Q13
3	Continuous dialogue with key RTOs, regions and Member States to strengthen the micro- and nanoelectronics eco-system at a European level	European Commission, Member States, Regions, RTOs	On-going – to be reinforced
	Within HORIZON 2020 make shared facilities for testing and early experimentation available to start-ups, SME's, universities and users	RTOs, European Commission	1Q2014
	Invest in building bricks (education, training); foster a favourable engineering environment in Europe	Member States, Academics	1Q14 - 4Q20
4	Elaborate and implement a market-pull strategy focussed on electronics-intensive products using diverse instruments such as public procurement	Industry, Member States, Regions, European Commission	By 2Q2014
	Elaborate policy actions aimed at establishing a world level-playing field by limiting trade/market distortions including within the Government and Authorities Meeting on Semiconductor (GAMS)	European Commission, Industry	On-going - to be reinforced