The EU strategy for micro and nano-electronic components and systems

"Airbus of Chips"

Where do we stand?

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Outline

1. In the last 12 months..
2. Electronic Components and systems in H2020
3. The ECSEL JTI
4. The ELG
5. What's next?
• May 2012: VP Kroes calls for a new approach for μ & nano electronics in Europe.

• Nov. 2012 industry issues a vision document announcing industry readiness to engage and the need to act urgently

• 23 May 2013: Commission proposes a new EU wide strategy for the field with the aim of regaining production shares
  • Highlights the importance of the sector and the need to act
  • VP Kroes launches the challenge of doubling production in Europe
    • economic value in Europe to reach 20 % of world share

• 29 May 2013: Event with policy makers and industry leaders
  • Supporting the strategy, urgency to act and "deliver"
• Mastering the essential technology base for the whole economy

• An 'aggressive' strategy – beyond business as usual
  • Reverse the trend of declining market share, double our share
  • Remain and become a world leader in selected areas
  • Focus on areas of strength

• A bold and 'holistic' approach covering
  • Full value chain
  • Full innovation chain

• Be at the forefront of technology development
Towards one strategic framework for Europe: Combining policy instruments

**Reaching critical mass of support to R&I**
- All TRLs bridging the valley of death
- Mobilising around a clear agenda: EU, national & regional support
- Smart specialisation, complementarity and cooperation
  - More Moore, More than Moore (200, 300 and 450 mm).

- Facilitating access to finance (EIB, regional funds)
- Addressing state aid and trade issues
  - Possible Important Project of Common European Interest,..

- Addressing skills; Opportunities for talents across Europe
Combining efforts public and private (regional, national, EU,)

• Strategic roadmap for R&I supported jointly
  • Public support: ~5 Billion Euro in 7 years
  • 1/3 from the EU, 2/3 from regional and national efforts
  • To be matched at least with private funding

• Concentrate effort, build world reference industrial hubs
  • Focus on less than 10 centres in Europe
  • Three main ones: Grenoble, Leuven-Eindhoven, Dresden
    • + Milan, Carinthia-Steria, Dublin-cork, Cambridge,..
  • Value chains spreading across Europe (upstream, downstream)

• A key Pillar: The ECSEL JTI
  • Building on successes and lessons learnt from ENIAC/ARTEMIS
Since May

- Commission proposes a new JTI, ECSEL, on 10 July 2013
  - Part of the innovation investment package, JU (Art 187)
  - Covers the value chain from components to systems
  - Total budget ~5 B€
- New ENIAC call:
  - Total budget more than a billion Euro
    - EU: ~163 M€, MSs: ~156 M€
- Setting up of an Electronics Leaders Group (ELG)
  - A Strategic Industrial roadmap for electronics in Europe by 16/12/13
  - Roadmap to guide public policy and ensure industry engagement
- Also
  - General agreement on H2020: Announcement of WP2014-15
  - On-going revision of state aid rules, discussions on an IPCEI
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   What's next?
LEIT - ICT

Components and systems:
- Smart CPS
- Advanced Computing
- Future Internet
- Content 
- Robotics 
- Smart Spaces
- Robotics

ICT KETs
- Micro/Nano Electronics
- Photonics

ECSEL JTI
- Photonics
- Electronic

21 ICT for Manuf.
- Factories of the Future
- Horizontal Support to Innovation

Excellent Science/ FET ("Graphene Flagship")

Cross cutting actions:
- Open Disruptive Innovation, IoT, Cyber-Security
- Horizontal Support to Innovation

Societal Challenges

H2020 - LEIT - ICT,

Estimate for 2014-20: ~ 3B€ all encompassing, ~ 15 - 18 B€ on components (draft)

In 2014-15: ~700 M€, ~360 M€ on components
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What is ECSEL?

- A public private partnership to support R&D&I
- Implementing an industry designed roadmap for R&D&I
- Total Budget: ~5 B€ for 2014-20
  - 1.2 B€ from the EU
  - 1.2 B€ from MSs
  - 2.4 B€ from industry at least
- Covers the whole value chain for components and systems
  - From material and equipment to embedded systems
- Managed by a Joint Undertaking
  - Balanced governance structure, Industry, MSs, Commission
11% of world production

30% of world production
ECSEL: Objectives

- A strong and globally competitive electronics components and systems industry in the Union
  - Double Europe's share of electronics production worldwide

- Availability of electronic components and systems for key markets and for addressing societal challenges,

- Grow semiconductor and smart system manufacturing capability in Europe, including leadership in manufacturing equipment and materials processing

- Leadership in design and systems engineering including embedded technologies
Objectives (cont'd)

• Keeping Europe at the forefront of technology development
  • 200, 300 and 450 mm, below 10 nm scale
  • Safe, reliable, almost zero power consumption Emb. Syst, ..

• Access to for all stakeholders to a world-class research infrastructure for design and manufacturing

• Create a dynamic ecosystem involving innovative Small and Medium-Sized Enterprises (SMEs),
  • strengthening existing clusters and nurturing the creation of new clusters in promising areas
Approach principles

- **Align strategies** with Member States and regions
  - Attract private investment, improve impact of public support
  - avoid unnecessary duplication & fragmentation of efforts

- **Bridging the gap** in the innovation chain
  - Address the valley of death between research and exploitation
  - strengthening innovation capabilities
  - Essential to generate economic growth & employment

- Facilitate integration **across the value chain** from Components to Systems
  - Multi-stakeholder partnerships
  - RTOs, SMEs, Large companies, user companies, ..
Focus: High TRLs, Large scale Pilots, demos

Implement in JTI

Capital-intensive R&D & I, Pilot lines, Demonstrators / Applications

Implementation in normal H2020

Intensity of investment

TRL
1  2  3  4  5  6  7  8  9
Basic Principles Observed Technology Concept Formulated Experimental Proof of Concept Technology Validation in lab Tech valid. in relevant environment Demonstration in relevant environment Demonstration in operational environment System complete and qualified Successful mission operations

Pan-European Innovation: Take-up, Assessment, Infrastructure, Design services

Industrially-driven R&D

Advanced R&D

Technological Research Pillar 1

KET Pilot Line and demonstrator projects Pillar 2

Manufacturing & KET Deployment Project Pillar 3
Building on ENIAC & ARTEMIS

**ENIAC**

- Participation:
  - Large Industry: 168 (41%)
  - SME: 126 (30%)
  - Uni/Inst/NP: 119 (29%)

**ARTEMIS**

- Participation:
  - Large Industry: 209 (36%)
  - SME: 166 (29%)
  - Uni/Inst/NP: 200 (35%)

**Funding**

- **ENIAC** Funding:
  - 2008: 25.1M
  - 2009: 62.1M
  - 2010: 114.2M
  - 2011: 142.0M
  - 2012: 113.5M
  - 2013: 224.3M

- **ARTEMIS** Funding:
  - 2008: 31.8M
  - 2009: 60.7M
  - 2010: 104.7M
  - 2011: 54.6M
  - 2012: 54.6M
  - 2013: 173.4M
µ and nano-electronics components and systems in WP2014-15

- ICT 25: Generic micro- and nano-electronic technologies
- ICT 2: Smart System Integration
- ICT 3: Advanced Thin and Organic and Large Electronics
- ICT 29: OLED
- ICT 4: Advanced computing
- + Cross Cutting KETs Photonics+µ and nanoelectronics
**ICT 25 – Generic micro- and nano-electronic technologies**

### Research & Development

- Extend MOSFET to the end of the ITRS roadmap. Make "Beyond and Extended CMOS" devices CMOS compatible.
- Integrate functionalities in System-on-Chip (SoC) / System-in-Package (SiP).
- New computing paradigms like quantum computing and neuromorphic computing with a focus on their future integration with Si technologies.
- Design for advanced nanoelectronics technologies. Focus on: Energy efficiency, high reliability, robustness.

**40 M€**

### Innovation actions

- Access to advanced design tools and IC fabrication (includes training).
- Assessment for technology suppliers:
  - Evaluate novel equipment, processes,..

**7 M€**

### Coordination and Support Actions

- International cooperation:
  - 450mm wafers
  - Potential impact on workers
- Development of common roadmaps.
- Awareness actions targeted at young students.

**3 M€**
Research & Innovation

- Heterogeneous integration into Smart Systems
  - Nanoelectronics
  - Micro-Electro-Mechanic
  - Magnetic
  - Photonic
  - Micro-fluidic, Acoustic
  - Bio/Chemical
  - Microwave, ultra-wide band...

- Application specific smart systems
  - Work driven by users-requirements
  - Target concrete solutions

Innovation actions

- Access services to design and manufacturing for academia, research institutes & SMEs to accelerate the deployment of smart systems.
- Assessment for technology suppliers in smart systems.

Pre-commercial procurement

- Lab-On-Chip solutions for in-vitro diagnosis (3M€)
- CSAs Networking, Training (1M€)
ICT 3 Advanced TOLAE technologies

- Research & Innovation Actions (17 M€)
  - TOLAE technologies and manufacturing processes:
    - Conformable / flexible / stretchable substrates
    - Advanced materials and technologies
    - Scalable manufacturing processes

- Innovation Actions (15.5 M€)
  - Demonstrate innovative products enabled by TOLAE

- Technology Take-up and Innovation support Actions
  - Competence centres providing EU-wide access services to industry (3M€)

- Innovation support through pre-commercial public procurement (PCP) actions (2.5 M€)
Focus: Materials, process & device technology for OLED lighting

Aims:
- Allow for a competitive lifetime for all colours and white light
- Realise OLED devices over larger surfaces, with higher brightness, larger uniformity and longer lifetimes

Specific target: energy efficacy above 100 lm/W, with improved out-coupling efficiency

A demonstrator at the end of every project

18 M€ 100% funding
ICT 4: Customised & low power computing

Research and Innovation Actions (37M€)
- Next generation servers, micro-servers, highly embedded computing systems (large projects)
- New x-layer programming approaches (small projects)

Innovation Actions (17M€)
- Towards platforms and ecosystems (small projects)
- Connection innovators across value chains (large projects)

Support Actions (3M€)
- X-sectoral platform building, clustering, structuring communities,
- dissemination, impact analysis, constituency building & road-mapping
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The Electronic Leaders Group:

- ELG : 11 members + Chair

- + A Stakeholder Engagement Forum
  - 120 invitees across the value chain
  - +open on line consultation

- Mandate: Define a European strategic industrial roadmap
  - Elements are already there in industry position (Nov 2012)

- A three months' task
  - Work started mid-September 2013
  - Strategic Industrial roadmap to be delivered on 16 December
  - Roadmap to guide public policy & ensure industry engagement
ELG Composition

- 11 members and chair (Ben Verwaayen), appointed by VP Kroes
- Representative of main stakeholders in the innovation and value chains
- Strategic credibility to influence policy making, investments, make choices and define priorities

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<tr>
<th>Name</th>
<th>Position</th>
<th>Organisation</th>
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<tbody>
<tr>
<td>Jean Therme</td>
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<td>CEA</td>
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<td>Luc Van den Hove</td>
<td>CEO</td>
<td>IMEC</td>
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<td>Hubert Lakner</td>
<td>Head of μelectronics institutes</td>
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An open process involving all stakeholders

- **SEF**
  - Electronics Value Chain
  - Input to ELG and Sherpa

- **Electronics Leaders Group (ELG)**
  - Key stakeholders in the innovation and value chain
  - Strategic credibility

- **Sherpa group**
  - Nominated by the ELG members
  - On-line consultations and dialogue (e.g. workshops and meetings)
  - Roadmap preparatory work

- **Electronics Strategic Roadmap**
  - R&D&I actions and investments
  - Policy actions (regional, national and EU level)
  - Private and public sector partnerships (e.g. JTI)
  - Commitments from the private sector on investments and employment
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Next milestones

- Final Co-decision on H2020: Dec 2013
- ELG report: 16/12
- First Call in H2020 launch: 10 Dec
- ECSEL Council Decision: March 2014
- ECSEL first call: Q2/Q3 2014
THANK YOU

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DG CONNECT (Communications Networks, Content and Technology):
http://ec.europa.eu/dgs/connect/index_en.htm

Horizon 2020 on the web:
http://ec.europa.eu/research/horizon2020/index_en.cfm