JTI Implementing Aligned European/National/Regional Investment Policies in Nanoelectronics

Andreas Wild, Executive Director
Content

• Nanoelectronics: A Key Enabling Technology
• European Priorities
• Joint Undertaking: The KET Implementation Instrument
• Perspective Horizon 2020: Co-funding
• Opportunity: Growing Awareness
The Approach KET

- A diminishing percentage produce food (agriculture) and goods (industry)
- «Re-industrialisation» policy = Public-Private Partnerships on key enabling technologies
- Traditional industrial policy: impact on revenue and jobs
- In the future, the dominant criterion: systemic and strategic impact

KETs!

Active Population (U.S.A.)

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Source: Bureau of Labor Statistics, Federal Reserve Economic Data
Impact

Systemic

Services

7-10 jobs

20-25 €

Electronic Equipment

Nano electronics

1 job

1 €

Strategic

Nanoélectronics: a KET

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Nanoelectronics: the “Smart” of Everything

**Smartphone**

**Smart Card**

**Smart Grid**

**Smart Cities**

**Smart Mobility**

**Smart Governance**

....

**Smartanything !**
Market Failure: Market Share

Market Share of the Leading Companies
Headquartered in Europe

The Challenge!
Challenge: Capital Expenditure, Installed Capacity

CapEx per Headquarter Region

- N. America
- Korea
- Taiwan
- Japan
- Europe

European Priorities

The Challenge:

- 200mm: +70%
- 300mm: -15%

1 Million wafers/month (200mm equivalent)

Taiwan 21.5%
Japan 18.8%
Korea 18.1%
America 14.6%
ROW 10.4%
China 9.0%
Europe 7.6%

2017:
- 20.1%: 29.6%
- 19.9%: 70.4%

2012:
- 44%
- 56%

-15%
European Suppliers

Micron Technologies Italy 🇺🇸

Telefunken 🇩🇪 Altis 🇬🇧

X-Fabs 🇩🇪 LFoundries 🇬🇧

Lumiled 🇺🇸 Osram 🇩🇪

Bosch 🇩🇪 NXP 🇺🇸 Infineon 🇩🇪

GlobalFoundries Dresden 🇺🇸

Intel Ireland 🇺🇸

ASM-I 🇩🇪

Carl Zeiss 🇩🇪

ASML 🇪🇸
European Priorities

1. Strengthen advanced CMOS on 300mm

2. Derive value from ≤200mm diversification

3. Prepare transition to 450mm
The Weakest Link: Foundries

2012: 33.9%
2017: 45.3%

Foundry Sales as a Percent of Total IC Sales

- Total Reported IC Foundry Sales % of Total IC Sales
- *Final Market Value* IC Foundry Sales % of Total IC Sales

Equipment
Materials
EDA

IDM
Fabless
OutSourced Assembly & Test

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Positioning on the Innovation Chain

- **Diversification**
  - Many technologies, ~15% of market
  - Additional value on depreciated capabilities
  - Affordable: lagging state of the art by 10-15 years

- **Customization**
  - Few technology flavours, ~85% of market
  - Creates, depreciates technology basis
  - Large capital investments
  - Driving state of the art, cost reduction

- **Advanced Users**
  - Long term RoI
  - Preceding state of the art by ~5 years

- **Early Adopters**
  - Intelligent Diversification
    - Affordable: lagging state of the art by ~10-15 years
  - Future Generation
    - Mainstream Miniaturization
      - 2002
      - 2017
    - Future Generation
      - 1997 300mm
      - 2011 450mm
The Concept: Key Enabling Technologies

- Nanotechnologies
- Micro and Nanoelectronics
- Photonics
- Advanced materials
- Industrial Biotechnology
- Advances Manufacturing Systems

ENIAC Joint Undertaking Vision

A Public-Private Partnership bringing together R&D actors, Member States and the European Union

VISION

The ENIAC Joint Undertaking shall increase and leverage private and public investments in nanoelectronics contributing to strengthening Europe’s future growth, competitiveness and sustainability
The High-level Expert Group:
The “Three Pillar Bridge” across the “Valley of Death”

Second Pillar → “Pilot Line Projects”
Execution of the KET Pilot Line Call 2012-2

From Full Project Proposal to Funding Decision: 99 Days
ENIAC Call 2012-2
KET Pilot Line Projects:
728 M€ (220 M€ grants)
128 Participations (28% SME)
20 European Countries
JU Implementing KET Policies

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JU Implementing KET Policies

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AGATE Lab4MEMS
EPPL
PLACES2BE
E450EDL

≤ 200mm
300mm
450mm

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* : Pilot Line Call

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Participation in the KET Pilot Line Call

**Total Eligible Costs: 728 M€**

- AT: 54.4
- BE: 52.3
- CH: 0.5
- CZ: 45.0
- DE: 6.1
- EL: 2.9
- FR: 43.8
- HU: 11.2
- IE: 4.6
- IT: 1.0
- LI: 1.5
- LT: 6.8
- LU: 1.0

**National Funding: 111 M€**

- AT: 4.7
- BE: 5.7
- CH: 0.3
- CZ: 1.5
- DE: 0.8
- EL: 2.5
- FR: 10.5
- HU: 0.9
- IE: 1.0
- IT: 0.2
- LI: 0.9
- LT: 0.3
- LU: 0.1

**JU Funding: 108 M€**

- AT: 8.2
- BE: 7.8
- CH: 0.1
- CZ: 0.1
- DE: 0.1
- EL: 0.4
- FR: 1.7
- HU: 1.0
- IE: 0.3
- IT: 0.7
- LI: 0.2
- LT: 0.2
- LU: 0.3
ENIAC member State Participation 2008-2012

Eligible Costs: 1.749 B€

National Funding: 386.9 M€

JU Funding: 276.0 M€
ENIAC Joint Undertaking Multi Annual Strategy Plan

2008-2012: Total Eligible Costs 1,785.8 M€

- Automotive and Transport: 111.5 M€ (6%)
- Communications and Digital Life Style: 421.3 M€ (24%)
- Energy Efficiency: 505.9 M€ (28%)
- Health Care and Aging Society: 107.5 M€ (6%)
- Safety and Security: 41.6 M€ (2%)
- Design Technology: 50.6 M€ (3%)
- Semiconductor Process and Integration: 106.7 M€ (6%)
- Equipment, Materials and Manufacturing: 440.8 M€ (25%)
ENIAC JU: Increase and Leverage Public and Private Investments

Total Eligible Costs (as per PAB)

2008-2013 (estimate)
- Total Eligible Costs: ~2.6 B€
- Project selected for funding: ~60
- Participating org.: ~600 (40% SME)
- 26 countries participating

2013 Capability
Implementing KET Policies
Autonomy: strategy alignment
# Full Project Proposals

**Calls ENIAC-2013-1 and -2**

<table>
<thead>
<tr>
<th>Call</th>
<th># of proposals</th>
<th># of participations</th>
<th>Total eligible costs</th>
<th>National funding</th>
<th>JU funding</th>
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<tr>
<td>2013-1</td>
<td>11</td>
<td>241</td>
<td>266*</td>
<td>93*</td>
<td>40*</td>
</tr>
<tr>
<td>2013-2 (Pilot Lines)</td>
<td>12</td>
<td>258</td>
<td>1,320*</td>
<td>236*</td>
<td>199*</td>
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<td><strong>TOTAL</strong></td>
<td><strong>23</strong></td>
<td><strong>499</strong></td>
<td><strong>1,586</strong>*</td>
<td><strong>329</strong>*</td>
<td><strong>239</strong>*</td>
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| 2012 Full Project Proposals  | 17             | 377                 | 1,051*               | 274*             | 158*       |
| 2012 Projects selected for funding | 11           | 247                 | 845**                | 162.4**          | 125.4**    |

*: Requested    **: Awarded
Horizon 2020 Perspective

- The ENIAC JU in Framework Programme 7 considerably increased funding: to be continued and enhanced in Horizon 2020 as the **ECSEL JU**

- The ECSEL JU will cover the topics addressed within the ARTEMIS JU, the ENIAC JU and in the ETP EPoSS

- ECSEL estimated eligible costs: 4.8 Billion Euro
  - EU grants through ECSEL JU: 1.2 B Euro
  - ECSEL Member State contributions: 1.2 B Euro

- Project co-financing using regional and R&D&I funds:
  Nanoelectronics must be included in the regional
  **Smart Specialization Strategy!**

- The decision to participate or not is with the Member States and the Regions!
From FP7 to Horizon 2020: Co-financing Hope

(decided in principle, implementation under debate)

THE CO-FUNDING JUs NEED

SME in less developed region quits, project continues

Large contributor quits, project cancelled
## European Regional Development Funds

### Proposed Allocation Criteria

<table>
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<tr>
<th>Priority</th>
<th>Description</th>
<th>More developed regions GDP/Head &gt; 90%</th>
<th>Transition regions GDP/Head &gt; 75% and &lt; 90%</th>
<th>Less developed regions GDP/Head &lt; 75%</th>
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<tbody>
<tr>
<td>Priority 1</td>
<td>Strengthening research, technological development and innovation (including KETs)</td>
<td>At least 80% of the ERDF resources at national level shall be allocated to 2 or more of the 4 Priorities</td>
<td>At least 60% of the ERDF resources at national level shall be allocated to 2 or more of the 4 Priorities</td>
<td>At least 50% of the ERDF resources at national level shall be allocated to 2 or more of the 4 Priorities</td>
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<tr>
<td>Priority 2</td>
<td>Enhancing access to and use and quality of ICT</td>
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<td>Priority 3</td>
<td>Enhancing the competitiveness of SMEs</td>
<td>At least 20% of the ERDF resources at national level shall be allocated to Priority 4</td>
<td>At least 15% of the ERDF resources at national level shall be allocated to Priority 4</td>
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<td>Priority 4</td>
<td>Supporting the shift towards a low carbon economy in all sectors</td>
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<td>At least 12% of the ERDF resources at national level shall be allocated to Priority 4</td>
</tr>
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Regions Must Include Micro- and Nanoelectronics in their Smart Specialisation Strategy!
Europe Raises to the Challenge...

Neelie Kroes
VP of the European Commission

Shouldn't we be looking for an “Airbus of Chips”? (24.05.2013)
I want to double our chip production to around 20% of global production… (23.05.2013)

Jean-Marc Ayrault
French Prime Minister

600 millions d’euros c’est ce que l’Etat va investir dans le nouveau programme de recherche Nano 2017… l’ensemble des porteurs du programme engageront plus de trois milliards d’euros d’investissements industriels ou de recherche (22.07.2013)

Angela Merkel
German Chancellor

…we decided for Airbus to have the capability to build airplanes as good as Boeing. We are still working to develop Galileo… so that we are not entirely dependent upon the American GPS system. And we have to ask the question, what capabilities we want to establish in Europe, in order to master the Internet technologies… to reduce the gap and become capable to act on our own. (13.08.2013)

European Commission

Europe must be able to act without relying on the capabilities of third party. Security of supply, access to critical technologies and operational sovereignty are therefore crucial.
When the object is to raise the permanent condition of a people small means do not merely produce small effects: they produce no effect at all.

Should’t we be looking for an ”Airbus of Chips”?

Neelie Kroes, Vice President of the European Commission
Thank You for Your Attention!