Synergies and complementarities in RD&I programs across the EU

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Outline

• Rationale
  • Competitive landscape of the ECS industry and R&D spending
  • Skills gap for future ECS industries

• Complementarity and synergy in different funding schemes
  • Overview of European funding landscape
  • Role of venture capital in Europe

• Pivotal role of RTOs

• Conclusions
Rationale

Competitive landscape of the ECS industry and R&D spending
Competitive landscape and market share

Electronics and Semiconductor Industry Value Chain in 2016

<table>
<thead>
<tr>
<th>Level</th>
<th>Prod in Europe (€B)</th>
<th>% Europe / World</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 4</td>
<td>253</td>
<td>15%</td>
</tr>
<tr>
<td>Of which Embedded Electronics</td>
<td>189</td>
<td>27%</td>
</tr>
<tr>
<td>Level 3</td>
<td>75</td>
<td>10%</td>
</tr>
<tr>
<td>Level 2</td>
<td>43</td>
<td>10%</td>
</tr>
<tr>
<td>Level 1</td>
<td>28</td>
<td>26%</td>
</tr>
<tr>
<td>Of which SC</td>
<td>21</td>
<td>29%</td>
</tr>
</tbody>
</table>

Source: DECISION, ACSIEL, EURIPIDES®
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R&D investing companies - 2018

The world map includes only countries with at least 10 companies.

- US: 778
- EU: 577
- Switzerland: 59
- China: 438
- South Korea: 70
- Japan: 339
- Israel: 21
- India: 31
- Taiwan: 99
- Australia: 14
R&D spending continues to grow
Rationale
Skills gap in the ECS industry
Digital Skills Gap is widening

- Access to skilled workers is a key factor to make companies successful.
- The European Commission forecasts as many as 756,000 unfilled jobs in the European ICT sector by 2020.
- As such, it will slow down the digital transformation of Europe.

Technologies likely to be adopted by companies in 2022.

<table>
<thead>
<tr>
<th>Technology</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine learning</td>
<td>67%</td>
</tr>
<tr>
<td>User and entity big data analytics</td>
<td>84%</td>
</tr>
<tr>
<td>Internet of things</td>
<td>82%</td>
</tr>
<tr>
<td>Cloud computing</td>
<td>76%</td>
</tr>
<tr>
<td>App- and web-enabled markets</td>
<td>78%</td>
</tr>
<tr>
<td>Autonomous transport</td>
<td>74%</td>
</tr>
<tr>
<td>New materials</td>
<td>71%</td>
</tr>
<tr>
<td>Augmented and virtual reality</td>
<td>71%</td>
</tr>
<tr>
<td>Digital trade</td>
<td>68%</td>
</tr>
<tr>
<td>Wearable electronics</td>
<td>61%</td>
</tr>
<tr>
<td>3D printing</td>
<td>61%</td>
</tr>
<tr>
<td>Encryption</td>
<td>58%</td>
</tr>
<tr>
<td>Stationary robots</td>
<td>53%</td>
</tr>
<tr>
<td>Non-humanoid land robots</td>
<td>42%</td>
</tr>
<tr>
<td>Distributed ledger (blockchain)</td>
<td>32%</td>
</tr>
<tr>
<td>Quantum computing</td>
<td>29%</td>
</tr>
<tr>
<td>Humanoid robots</td>
<td>29%</td>
</tr>
<tr>
<td>Biotechnology</td>
<td>18%</td>
</tr>
<tr>
<td>Aerial and underwater robots</td>
<td>18%</td>
</tr>
</tbody>
</table>

Skills gap in electronics industry

• Europe is not only losing market-share in semiconductor manufacturing, but also its share in scientific papers and conference presentations is declining.
  • At ISSCC2019, there was a record-low numbers of papers from Europe.
  • Despite national initiatives, more needs to be done across Europe to raise the interest of the next generation of engineers in electronics design.

• What factors explain the mismatch between workforce needs and availability?
  • What policy changes are needed at the EU and national level to prepare the workforce of tomorrow?
European funding landscape

Synergies and complementarities
Horizon European Funding landscape

Pillar I
Open Science (Bottom-up)

Pillar II
Global Challenges (Top Down)
Health, Security, Digital, Climate, Food

Pillar III
Open Innovation (Bottom-up)

InvestEU
Structural Funds
Social Funds
Digital Europe
IPCEI

Large Multi-Partner Projects
Medium Multi-Partner Projects
Single Partner

Technology (and Social) Readiness Level

‘Science Push’
‘Technology Push’
‘Demand Pull’

@Sean McCarthy Hyperion Ltd, May 2018 – www.hyperion.ie
Synergy between HorizonEU and ESIF

ESI Funds

- R&I Infrastructures and Equipments
- Skills (ESF)
- Business Advisory services

ESFRI

ESI Funds

Horizon 2020

- Basic research (ERC grants, FETs)
- Demonstration Pilots
- Collaborative projects in KETs
- Marie Curie actions
- ERA-Net
- Joint Programming initiatives
- EUREKA/EUROSTAR
- Joint technology initiatives
- Public-private partnerships

ESI Funds

- KETs
- Business Innovation
- Prizes
- SME instruments
- Procurement
- SME support
- Pilot lines
- Financial instruments

Upstream

Capacity Building

Downstream

Research Development and Innovation

Market
Collaboration between JTIs

• Electronic components and systems (ECS) find their way to various application domains and therefore collaboration between ECSEL and other JTIs should be enhanced.

  • A good example is the foreseen collaboration (e.g. joint calls) between IMI and ECSEL. Future healthcare will be revolutionized by electronics and ICT systems.
Importance of EU-funded programs

• Quite some programs (such as Europractice) provide added value to the entire European ecosystem and therefore should benefit from EU-funding rather than national.

• Important to keep a sound mix of national and EU funding for the variety of RD&I in Europe.
Startups require fast access to capital

- Most EU countries have national grants for startups.
- However, at EU level many funding schemes for startups (e.g. FTI) are too slow (mainly due to low success rate).
Share of VCs

Where the deals are happening
(investment activity by region, in billions of dollars)

2014: North America, Asia, Europe, Others
2015: North America, Asia, Europe, Others
2016: North America, Asia, Europe, Others
2017: North America, Asia, Europe, Others

Includes private equity and venture capital investments
Source: Preqin
The creation of a European Design Alliance can find a natural synergy with the Digital Europe Programme, where support will also go to small and medium-sized enterprises to engage in digital transformation.

Pivotal role of RTOs

Between public and private, bridging technologies and applications across the entire value chain
Key roles of RTOs in European RD&I

- Research and Technology Organisations (RTOs) are defined as organisations “whose predominant activity is to provide research and development, technology and innovation services to enterprises, governments and other clients”.

- In addition, RTOs
  - Harness science and technology in order to serve innovation, improve quality of life and build economic competitiveness.
  - Operate across the innovation value chain, from fundamental to technological research, through demonstration and prototyping, to applications in the public and private sectors.
RTOs – bridging public and private

Task 1 – RTOs R&I Policy Advisors
Task 2 – RTOs providing R&I solutions to Societal Challenges
Task 3 – RTOs supporting the industry

Public (local, regional, national)

Private

Science / Research

Market / Innovation

Large Enterprises
SMEs
RTO Spin-offs

Source: Attané (2015) EARTO presentation
imec acts as a trusted partner for companies and academia, while focusing on key societal challenges.
RD&I programs @imec

APPLICATION DOMAINS

SMART HEALTH    SMART MOBILITY    SMART CITIES    SMART INDUSTRIES    SMART ENERGY

SEMICONDUCTOR & SYSTEM TECHNOLOGIES

CORE CMOS    SENSOR TECHNOLOGY    FLEXIBLE TECHNOLOGY

DIGITAL TECHNOLOGY PLATFORMS

NETWORKING    DIGITAL PRIVACY & SECURITY    SOFTWARE & DATA MANAGEMENT SKILLS

SERVICES

TRAINING    INNOVATION SERVICES    VENTURING
EU RTOs cooperation for Next Generation Computing

- Encouraged by EC, 3 major European RTOs, CEA-Leti, FhG/FMD and imec, collaborate in a strategic alliance to develop **compute platforms enabling new applications**.
- This unique collaboration focuses on full technology development on 300mm wafers to realize the European hardware for the new **compute infrastructure** for applications in need of AI, HPC and cybersecurity.
- This new initiative unlocks an affordable, **fast-track access for SMEs and systems houses**.
Final Remarks and Conclusions
Conclusions and final remarks

• Europe is still a strong player in the ECS value chain; however it needs to cope with a skills gap.

• A good funding mix for the European ECS players is needed to remain competitive at the global level.
  • National versus European
  • Public vs Private (incl. VCs)

• But for all schemes, there is a need for speed!

• RTOs play a key role in the ECS value chain, by bridging basic research and product development in numerous application domains and connecting public with private.
embracing a better life