Are innovative sensor concepts included in the funding programmes of the EU and Germany?

Dr. Bernhard Ruf, VDI/VDE-IT
# VDI/VDE IT: Who we are?

| Company | • Employees: ca. 270  
|         | • Turnover (2012): 24.8 Mio. € |
| Share holder | • VDI GmbH (50%)  
|             | • VDE (50%) |
| Executive directors | • Dipl.-Kaufm. Peter Dortans  
|                    | • Dr. rer. Nat. Werner Wilke |
| Location | • Berlin (Headquarter)  
|          | • München  
|          | • Dresden |
Outline

• „More Moore“, „More than Moore“ and funding policy
• EU Funding: Horizon2020
• EU Funding: ENIAC, ECSEL, CATRENE
• German funding
• Bavarian funding
ITRS 2012: „Moore‘s Law and More“

More than Moore: Diversification

- Analog/RF
- Passives
- HV Power
- Sensors MEMS
- RFID/NFC

Interacting with people and environment

Non-digital content
System-in-package (SiP)

Combining SoC and SiP: Higher Value Systems

Information Processing

Digital content
System-on-chip (SoC)

More Moore: Miniaturization

Baseline CMOS: CPU, Memory, Logic

130nm
90nm
65nm
45nm
32nm
22nm
16 nm

Source: Synopsis (http://blogs.synopsys.com/theeyeshaveit/2012/03/03/the-role-of-ip-in-more-moore-and-more-than-moore)
„More Moore“: Technology nodes

Figure ORTC4  
2011 ITRS—MPU/high-performance ASIC Half Pitch and Gate Length Trends

© VDI/VDE-IT 21.03.2014
More Moore: Technology trends

• One Driving Force: Moore‘s Law -> smaller structure sizes
  • New Transistor Technologies (FinFET, FDSOI)
  • EUV-Lithography
  • 450 mm Wafer
  • ...

-> Generally accepted roadmap: ITRS
Growth drivers

More Moore

- Transistor Scaling
- Better Performance/Cost
- Market Growth
- Investment

More than Moore

- Technology, Device & Circuit Innovations, System Integration
- Market Growth
- Investment
- Increased functionality, and/or lower Cost

**Fig. 1** – The virtuous circle of the semiconductor industry

**Fig. 6** – The virtuous circle which made the success of the digital microelectronic industry should be extended to include the contribution of “More-than-Moore” technologies (Adapted from Prof. Tsu-Jae King-Liu, UC Berkeley)

Trends for More than Moore

„MEMS Law“ *

One Product = One Process

No ITRS Roadmap for MEMS

More than Moore: ITRS Roadmap Suggestion 2012

System view
“More than Moore“: System view

Embedded Systems,
Cyber Physical Systems,
Smart Systems,
Smart Systems Integration,
Industrie 4.0,
Internet of things

... System view is essential for MEMS technology development and also for funding
EU Funding: Horizon 2020

Three priorities

- Excellent science
- Industrial leadership
- Societal challenges

Horizon 2020: Excellent Science

• 'Excellent Science' (24.6 bn €):
  • European Research Council (13.2 bn €)
  • Future and Emerging Technologies (FET) (3.1 bn €)
  • Marie Sklodowska-Curie-measures (5.8 bn €)
  • European Research Infrastructures (2.4 bn €)
Horizon 2020: Societal Challenges

Societal challenges' (31.7 bn €):

- Health, demographic change and well-being (8.0 bn €)
- Food security, sustainable agriculture, marine and maritime research and the bio-economy (4.2 bn €)
- Secure, clean and efficient energy (5.8 bn €)
- Smart, green and integrated transport (6.8 bn €)
- Climate action, environment, resource efficiency and raw materials (3.2 bn €)
- Inclusive, innovative, reflective and secure societies (3.8 bn €)
Horizon 2020: Industrial Leadership

- **Industrial Leadership'** (17.9 bn €):
  - Enabling and Industrial Technologies (13.8 bn €)
    - ICT: i.e. Cyber Physical Systems, Robotics, Smart system integration, .., KET: Micro- und Nanoelectronics, Photonics
    - Nanotechnologies
    - Advanced materials
    - Biotechnology (Biotechnologie)
    - Advanced manufacturing and processing
    - Space
  - Access to risk finance (3.5 bn €)
  - Innovation in KMU (619 m €)
Horizon 2020: presence of ICT

Horizon 2020 work programme 2014/2015: ICT

• 37 topics are identified (ICT1-ICT37)
• MEMS related topics:
  • A new generation of component and systems
    • ICT 1 2014: Smart cyber physical systems
    • ICT 2 2014: Smart system integration
  • Micro- and nano-electronics and photonics
    • ICT 25 2015: Generic micro- and nano-electronics technologies
    • ICT 26 2014: Photonics KET
    • ICT 27 2015: Photonics KET
    • ICT 28 2015: Cross-cutting ICT KETs
• **Deadline for ICT1, ICT2 and ICT 26: 2014-04-23**
EU Funding: ENIAC and ECSEL

- From 2014 on ECSEL combines former ENIAC and ARTEMIS
  - ENIAC: micro- and nano-electronics
  - ARTEMIS: embedded systems, cyber physical systems

- Estimated total budget (2014-2020): ~ 4.8 bn € (100%)
  - 25 % member states, 25 % EU, 50 % from industry

- First call expected mid 2014
EU (Funding): CATRENE

• CATRENE (Cluster for Application and Technology Research in Europe on NanoElectronics)
• CATRENE is continued until 2015
• National funding for EU projects; no direct funding from EU

• Current call 7:
  • Nanoelectronics for smart cities and Enabling Technologies
  • Deadline for PO: 2014-04-05
German Funding: High Tech Strategy 2020
German Funding of MEMS related topics

• „Elektroniksysteme; Elektromobilität“:
  • Micro- and Nano-Electronic, Chip design, Power electronics, 3D-Integration, Electro mobility
  • EU-Projects within ECSEL (ENIAC) and CATRENE

• No current call
• Last call (InPro3D) on heterogeneous 3D integration for industry 4.0 application

• „KMU-Innovativ“:
  • No dedicated calls; Funding programme for SME; proposals are possible at any time
Bavarian Funding

• „Mikrosystemtechnik Bayern“:
  Sensors, MEMS, Micro- and nano-electronic, Systemintegration, Embedded Systems, …

• no dedicated calls, proposals are possible at any time
Summary

• System and application view is essential for a technology roadmap for MEMS

• System and application view is essential for funding of MEMS related projects

• Many funding opportunities on EU and national level if this aspect is taken into account
Thank you for your attention!