

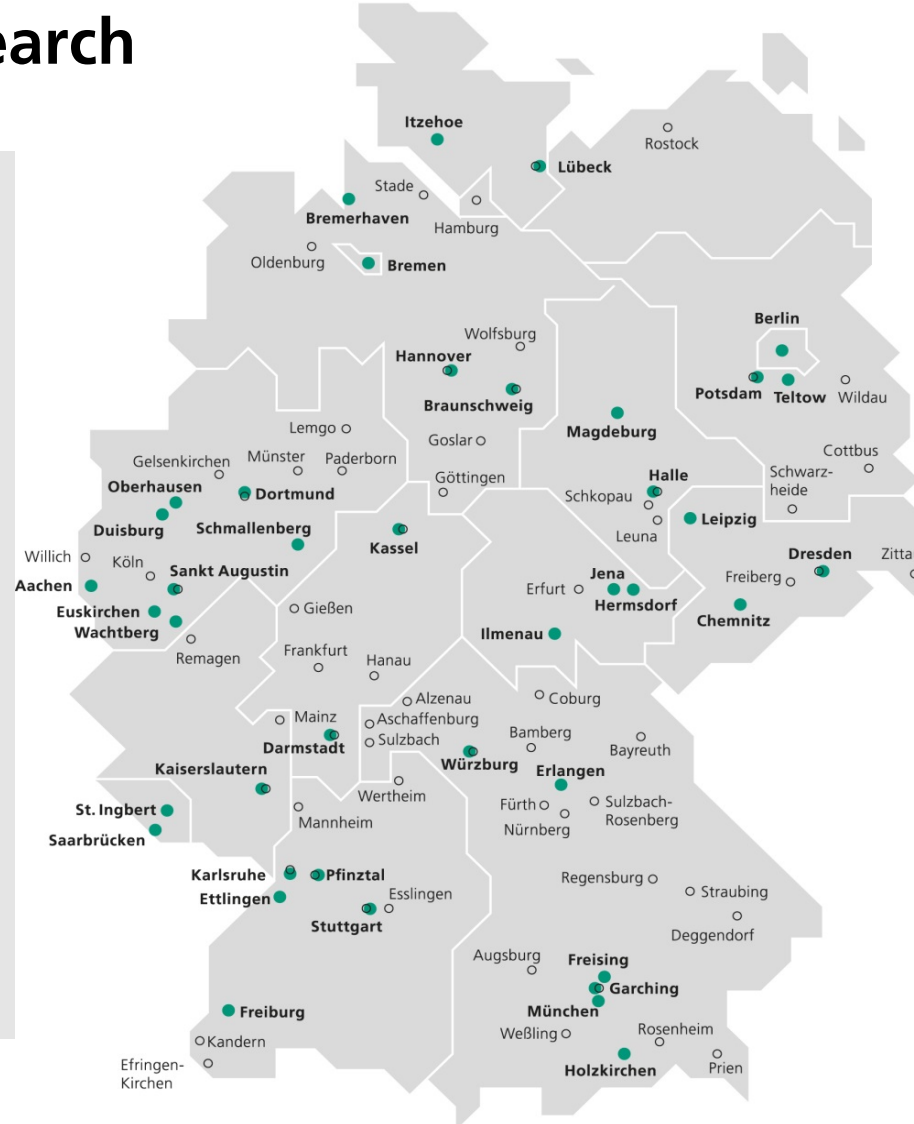
# **Forschungsfabrik Mikroelektronik Deutschland**

**Fraunhofer Group for Microelectronics in Cooperation with Leibniz  
Institutes FBH and IHP**

# The Fraunhofer-Gesellschaft Dedicated to Applied Research

- Fraunhofer Model for Applied Research (benchmark: Industry)
- 72 institutes and research units
- over 26,600 staff (2018)
- 2.6 billion € annual budget (2018)
  - 2.2 billion € contract research
  - 70% (industrial and public calls)

● main location  
○ other location



Europe's Largest Not-for-Profit Research and Technology Organisation (RTO)

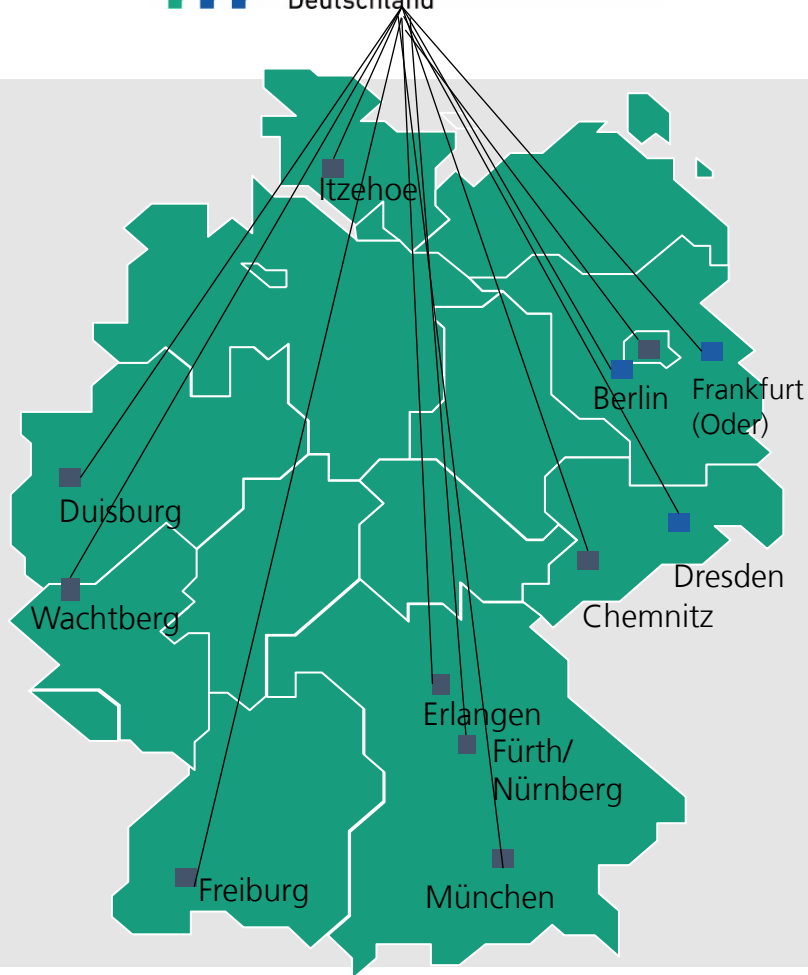
Founded in 1949 (in part with US Marshall Funds)

Celebrating 70 years of Applied Research in 2019

# Fraunhofer Microelectronics Group: 11 institutes + 5 guest institutes

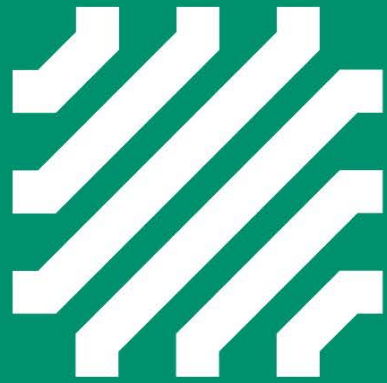
- 1 of 8 Fraunhofer Groups
- 11 member institutes:  
EMFT, ENAS, FHR, HHI, IAF, IIS, IISB, IMS,  
IPMS, ISIT, IZM
- 5 associated members from other  
Fraunhofer Groups
  - ICT: AISEC, ESK, FOKUS,
  - MATERIALS: IMWS, IZFP
- Founded in 1996
- Chairman: Hubert Lakner
- Vice Chairman: Anton Grabmaier
- Managing Director: Patrick Bressler
- Business office: Berlin

- Budget: 481,7 Mio € (2019)
- Industrial contract share: 47,7 %
- Staff: over 3.000 employees
- Cleanrooms at 9 institutes
- Internationally networked research in:
  - micro-/ nanoelectronics,
  - microsystem and communication technology
  - Team building with CEA-Leti and imec



## Fraunhofer Forschungsfabrik Mikroelektronik Deutschland (FMD)

- 11 institutes of Fraunhofer Microelectronics and 2 institutes of Leibniz-Association (FBH, IHP) pool their R&D&I services for industry.
- Research activities are coordinated under the umbrella of FMD.
- Joint business office in Berlin responsible for organizing the cooperation and acts as a one-stop-shop portal for customers.



# Forschungsfabrik Mikroelektronik Deutschland

Fraunhofer Group for Microelectronics in Cooperation with Leibniz  
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# Next Generation Computing: A Competitive Alliance for Global Industry

Patrick Bressler, Fraunhofer Group for Microelectronics

# European Cooperation for Next Generation Computing (NGC alliance)



# Emerging Technologies and New Markets: New Opportunities for a Global Industry



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Deutschland

Markets for microelectronic are in transition

New demands:

- New applications (Ind. 4.0, IoT, etc.), more complexity
- New higher security (trusted hardware and software)
- Increase in parallel data processing and transfer

Trends beyond „Moore’s law“ (size reduction) are

- Reduction in energy consumption
- Reduction in necessary data transfer
- Reduction in latency (increase communication speeds)



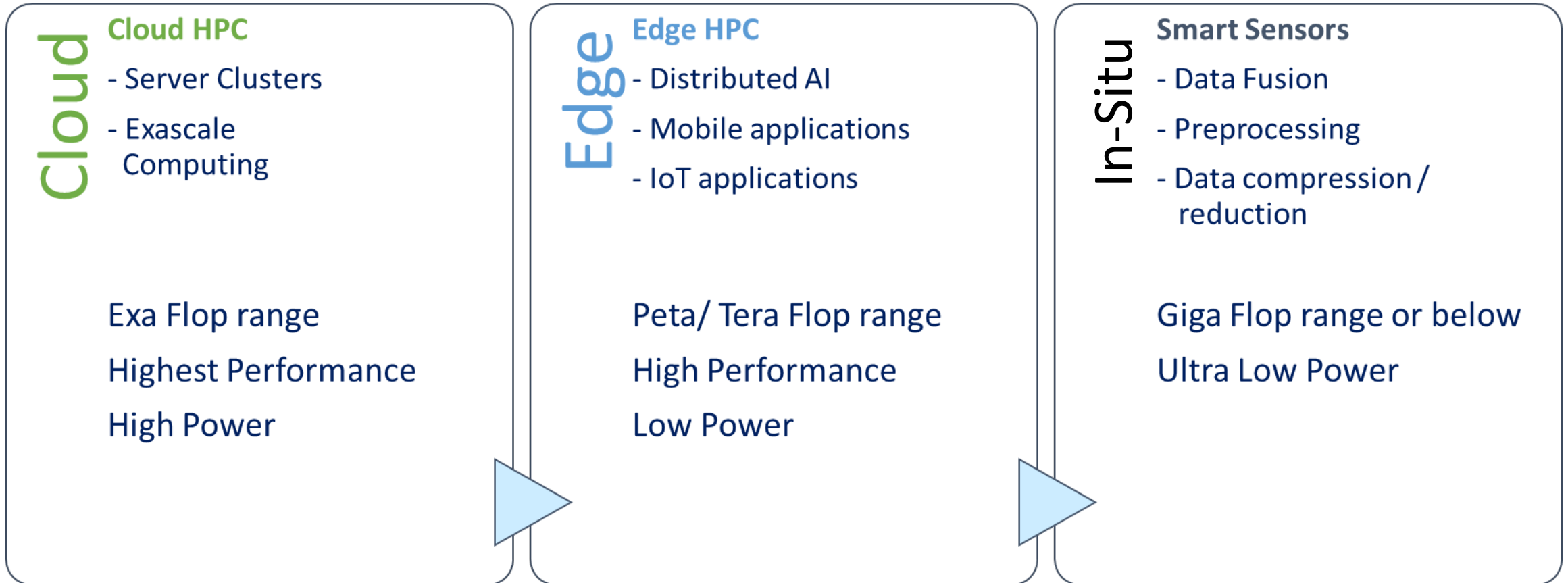
# Emerging Technologies and New Markets: New Opportunities for a Global Industry



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- **New computer architectures** (non-von-Neumann) based on neural networks for Artificial Intelligence (AI): **neuromorphic computers**
- **Quantum technologies** for secure communication, **quantum computers**, powerful quantum algorithms
- **Advanced wireless networks** (photonic communication)
- Trusted and safe **complex integration technologies**

# NGC Initiative - Application Domains



# Emerging Technologies and New Markets: New Opportunities for a Global Industry



In distributed (embedded) intelligence



Automated cars



Aircraft & drones



Trains & Railways



Smart grids

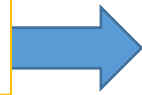


Health

Chips for AI, HPC, Distributed Intelligence, connectivity beyond 5G, Cyber security



In the field of trustworthy chip/ server fabrication



Defense & Security



HPC



Industry 4.0

Industry 4.0



# Next Framework Programme: Request for a European Technology Infrastructure for Next Generation Computing

- **NGC Alliance: European Chips for Embedded AI, Neuromorphic Computers and Quantum Computers**
  - **Joint distributed pilot lines** (research fabs) covering the entire technology value chain
    - Develop the technologies needed to achieve **technological sovereignty**
    - Grant access to **tomorrow's technologies** to Europe's SMEs and its big systems houses
    - Enable **pilot production**: Demonstrators, Prototyping and Small volume manufacturing
  - Cooperate with **systems houses** to enable new applications and to address the needs of industry
- Cooperate with **IDMs and Foundries** to make processes available for **mass production**



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Deutschland**