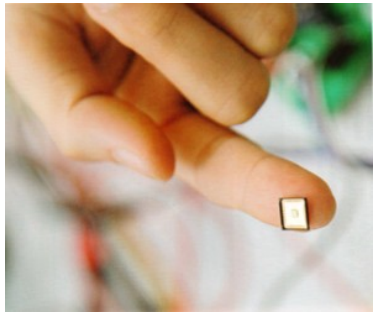
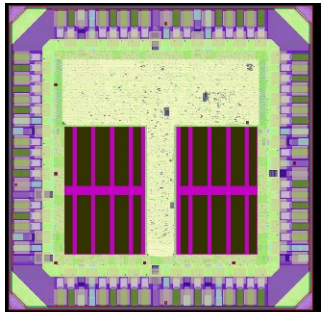
VIETNAM NATIONAL UNIVERSITY HANOI
VNU INFORMATION TECHNOLOGY INSTITUTE

CICA

International Cooperation in Semiconductor Technology Transfer and Application in Vietnam

Xuan-Tu Tran, Duy-Hieu Bui

Research Center for Integrated Circuits & Applications

Vietnam National University, Hanoi (VNU) - Information Technology Institute

Outline

- Vietnam Ambitions to develop Semiconductor Industry
- VNU-ITI's Semiconductor Research & Development Activities
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Vietnam's readiness for semiconductor industry

2.1. Political determination and international cooperation

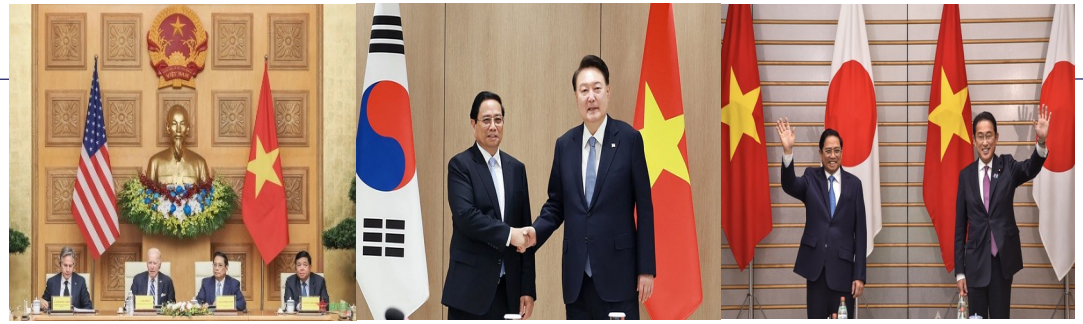
*"Vietnam has a **strategic geopolitical position**, a **large electronics industry, potential rare earth reserves, a young workforce**, and can participate in all stages of **the global semiconductor supply chain**." –Prime Minister*



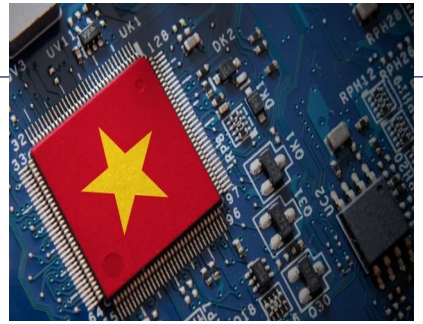
The Vietnamese **Government's strong determination** in developing the semiconductor industrial ecosystem



In 2023, Vietnam upgraded its relationship to **"Comprehensive Strategic Partnership" with the US and Japan.**



Improve **multilateral cooperation**, enhance strategic partnerships with leading countries in the semiconductor field such as Korea, Taiwan, Japan, EU, etc.



Establishment of **the National Steering Committee on the Semiconductor Industry** chaired by the Prime Minister

Vietnam's readiness for semiconductor industry

2.2. Policy mechanism

Vietnam's semiconductor industry has many great opportunities thanks to a favorable environment, preferential policies, abundant technical labor resources, ...



Submit to the Prime Minister for approval the National Strategy and Project on human resource development for the semiconductor industry to 2030, with a vision to 2050.

1. **Enjoy the highest investment incentives under the Vietnam Investment Law 2020.**

2. **There are specific mechanisms in localities**
The Capital Law, Resolution 98/2023/QH15 of the National Assembly on piloting specific mechanisms and policies for the development of Ho Chi Minh city, Resolution on piloting a number of specific mechanisms and policies for the development of Da Nang City on tax exemption and reduction for experts, scientists, and people with special talents in priority fields, etc.

3. **Decree 94/2020/ND-CP** stipulates mechanisms and preferential policies for the National Innovation Center, ...
Resolution 110/2023/QH15 on promulgating a Decree on the establishment of an Investment Support Fund, including projects in the semiconductor sector.
The Ministry of Planning and Investment has submitted to the Government a **draft Decree on the establishment, management and use of the Investment Support Fund.**

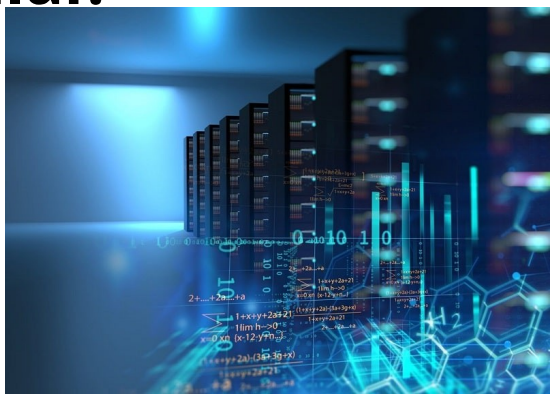
Vietnam's readiness for semiconductor industry

2.3. Infrastructure

Infrastructure plays a particularly important role in socio-economic development in general and the development of the semiconductor industry in particular.



Investing in road infrastructure **(North-South expressway),** waterways, airways and upgrading infrastructure for production.



Digital infrastructure continues to develop with impressive Internet growth, playing an important role in maintaining and ensuring operations serving economic development.



Implementing **the National Power Development Plan for the period 2021 - 2030, with a vision to 2050 (Power Plan VIII) to prepare transport infrastructure**



Establishment of **the National Innovation Center (NIC) and 03 high-tech parks in Ho Chi Minh City, Hoa Lac (Hanoi) and Da Nang**

Vietnam's readiness for semiconductor industry

2.4. Human resources

Vietnam's semiconductor industry is poised for great opportunities thanks to its golden population period with a young, tech-savvy workforce.



Many prestigious research and training units in the semiconductor field: **Vietnam National University (VNU), Hanoi University of Science and Technology (HUST), Ho Chi Minh City National University (VNU-HCM), Danang University...** are ready to connect with





... domestic business partners: **Viettel, VinGroup, FPT, VNPT, VNG, Momo.**



... with a large network of domestic and foreign experts.

Vietnam currently has more than 240 universities, of which nearly 160 have majors in engineering technology. At the same time, each year Vietnam has about 134,000 students entering the engineering industry.

NIC's semiconductor ecosystem promotion activities

Strategic Partner (signed MOU)

SAMSUNG, SIEMENS, MARVELL, NYCU, intel, SK, qorvo, VIET NAM NATIONAL UNIVERSITY HO CHI MINH CITY, ĐHQGHN, imec, arm, FPT, cadence, SYNOPSYS, VNPT, ASU, ĐẠI HỌC BÁCH KHOA

Active Partner (Already Coordinated)

semi, SIA SEMICONDUCTOR INDUSTRY ASSOCIATION, KSIA 한국반도체산업협회, COHERENT, FOXCONN, viettel, KEYSIGHT, NVIDIA, Tektronix, Qualcomm, Lam RESEARCH, PHENIKAA, infineon

Potential partners (connected)

Ansys, 東京大学 THE UNIVERSITY OF TOKYO, VERI LUX TAS MEA, RENESAS, soitec, HANA MICRON VINA, Amkor Technology



Viettel started to build a wafer fab in Jan. 2026

- Target tech node: 28nm
- Targeted Industries:
  - Telecommunications/Aerospace
  - medical equipment
  - automotive manufacturing
- Location: Hoa Lac Hi-Tech Park
- Area: 27ha
- Development Roadmap:
  - 2026–2027: Construction
  - By end of 2027: Expected trial production.
  - 2028–2030: Process optimization
- Many difficulties in Human resources, buying equipment & building facilities





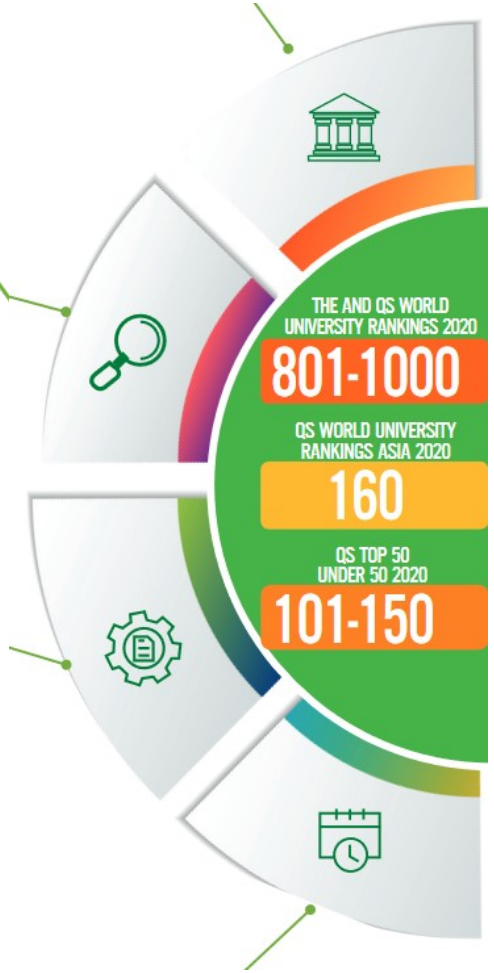
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Vietnam National University, Hanoi

34 ĐƠN VỊ - VNU members

- **09** Trường đại học thành viên / Universities
- **04** Khoa trực thuộc / Affiliated Schools
- **07** Viện nghiên cứu thành viên và trực thuộc / Research Institutes
- **02** Trung tâm đào tạo và nghiên cứu / Training and Research Centres
- **13** Đơn vị phục vụ và dịch vụ / Service Units



5.459 CÁN BỘ - Staff

- **2.921** Cán bộ khoa học cơ hữu / Academic Staff

78.678 NGƯỜI HỌC - Students

- **63.283** Sinh viên / Undergraduate students
- **7.120** Học viên cao học và nghiên cứu sinh / Graduate students
- **2.294** Sinh viên quốc tế / International students

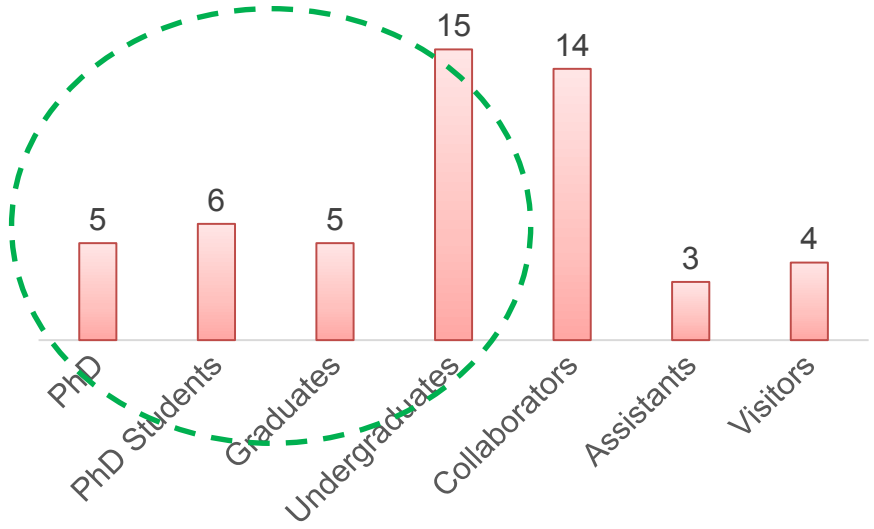
Vietnam National University, Hanoi



Vietnam National University, Hanoi – new campus in Hoa Lac

(1000 ha; 30 km from the center of Hanoi)

CICA working group



- Research Interests
  - Hardware security & security hardware
  - Domain specific accelerators:
    - Artificial intelligence
    - Image & Video processing
    - FPGA cloud accelerators
  - RISC-V & opensource Ecosystems
  - Analog Mixed Signal
  - HW/SW co-design


Xuan-Tu Tran, Prof.


Duy-Hieu Bui, PhD


Khanh N. Dang, A/Prof.


Duy-Anh Nguyen, PhD


Manh-Hiep Dao
Lightweight ECC for RFID


Trang Nguyen
Edge AI Accelerators


Van-Trung Hoang
Autonomous UAVs


Dong-Khoi Pham
HW security


Ngo-Doanh Nguyen
System Design & IP integration


Duc-Manh Tran
Analog-Mixed Signal


Dinh-Toi Nguyen
Analog-Mixed Signal


The-Anh Nguyen
FPGA Designs


Hoang-Long Pham
HW Security


Quang-Vinh Truong


Thien-Duy Ho

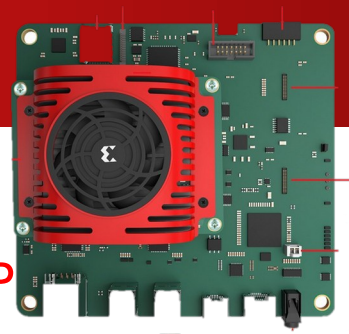

Thao-Nguyen Tran-Ha

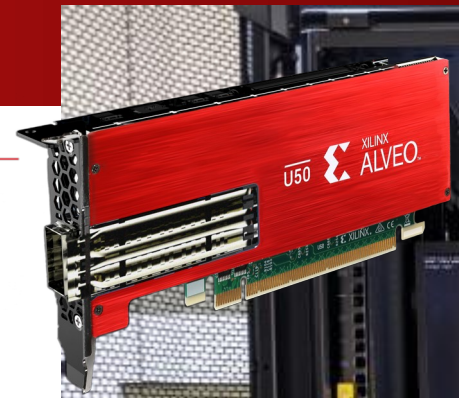

Duc-Trung Pham
FPGA designs


Thanh-Hoang Chu
FPGA designs

Facilities

- ARM Academic Access (May 2025)
  - ARM cortex M0/A53 + SoC IPs & Physical IP
- Design tools
  - Synopsys/Cadence/Siemens (ASIC + Mixed-signal)
  - Xilinx Vivado & Vitis (FPGA)
  - Opensource tools
- Technology
  - TSMC 65nm/28nm/22nm/**16nm (Finfet)**
  - Global Foundry 180nm/130nm/**22nm FDSOI**
  - OpenPDKs: GF180mcu, skywater 130, IHP SG13
  - Cadence Artisan Physical IP (previously ARM)
- FPGA development kits;
  - Artix-7/UltraSoC ZCU-106
  - Kira SOM Vision & Alveo U50/U200









Collaborations

- **Universities & Research institutions**

- **Industrial collaborators**

- **Societies**

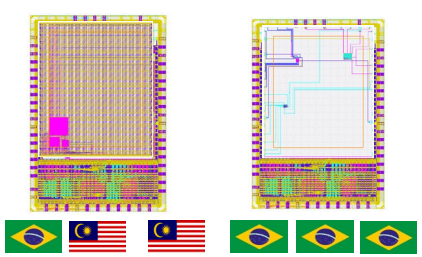
UNIC-CASS Design-to-tapeout mentoring program

- VNU team: Mentoring & Top-Level Integration
- 2023:
  - 4 Chips taped out
  - 16 designs completed in 2.5 months
- 2024:
  - 5 chips to be taped out (One from VNU)
  - 17 designs completed in 3 months
- 2025/2026:
  - 6 Chips to be tapped out
  - 24 teams (2 VNU's design)

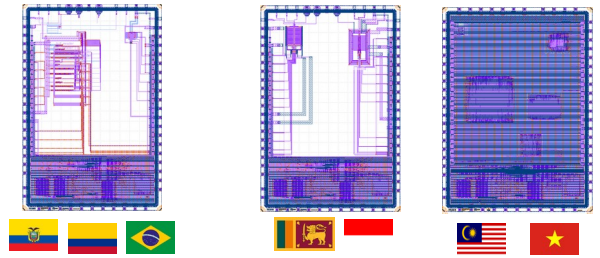
Materials:
https://ieee-cas.org/universalization-ic-design-cass-unic-cass

CASS Microlearning (https://ml.ieee-cas.org)

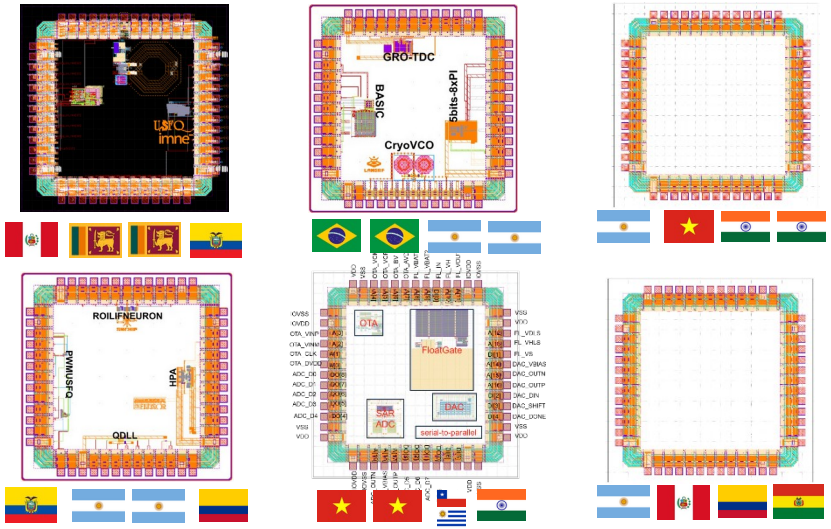
2023, Skywater130



2024, Skywater130

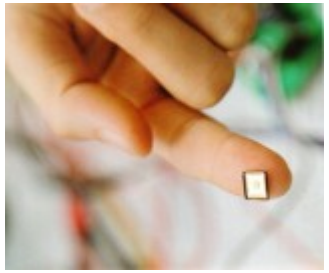


2025/2026, IHP 130

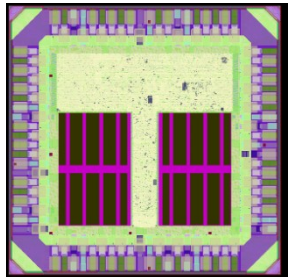


SISLAB tape-out plan

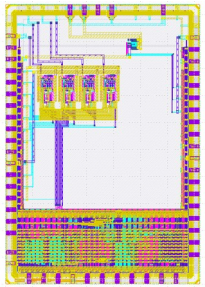
SNACk testchip
ST FDSOI 28nm

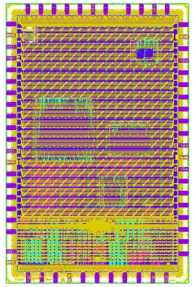


ADEN4IoT
TSMC 65nm



UNIC-CASS
BEC, VCO-ADC2, ADC/DAC

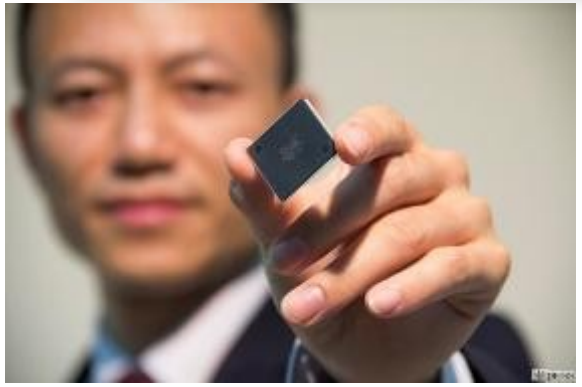




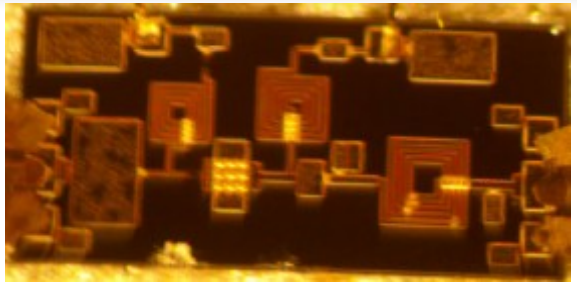


AI-Camera chip?

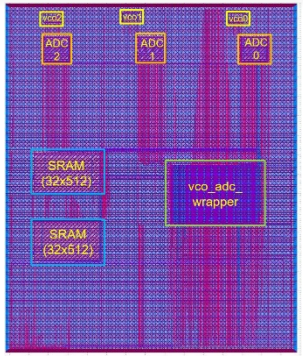
2015 2017 2018 2020 2022 2023 2024 2025 2026 2027



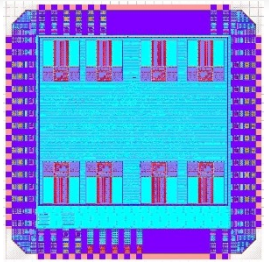
VENGME
Global Foundry 130nm



Power Amplifier
at 2.4GHz (GaAs)



VCO-based ADC
Skywater 130nm
(Sponsored by SSCS PICO Program)



VNU Energy-Harvesting IoT Chip

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VNU Semiconductor project: IC Design + Clean Room Fab

- 2 Working Clean Rooms:
  - One in UET: Nanomaterial research
  - One in HUS (5M USD investment)
    - Nanomaterial + packaging
    - Sensors
- New Investment
  - 60M USD (1,500B VND)
  - Not enough for World-Class Clean-Room





VNU's strategy: Win-Win Cooperation



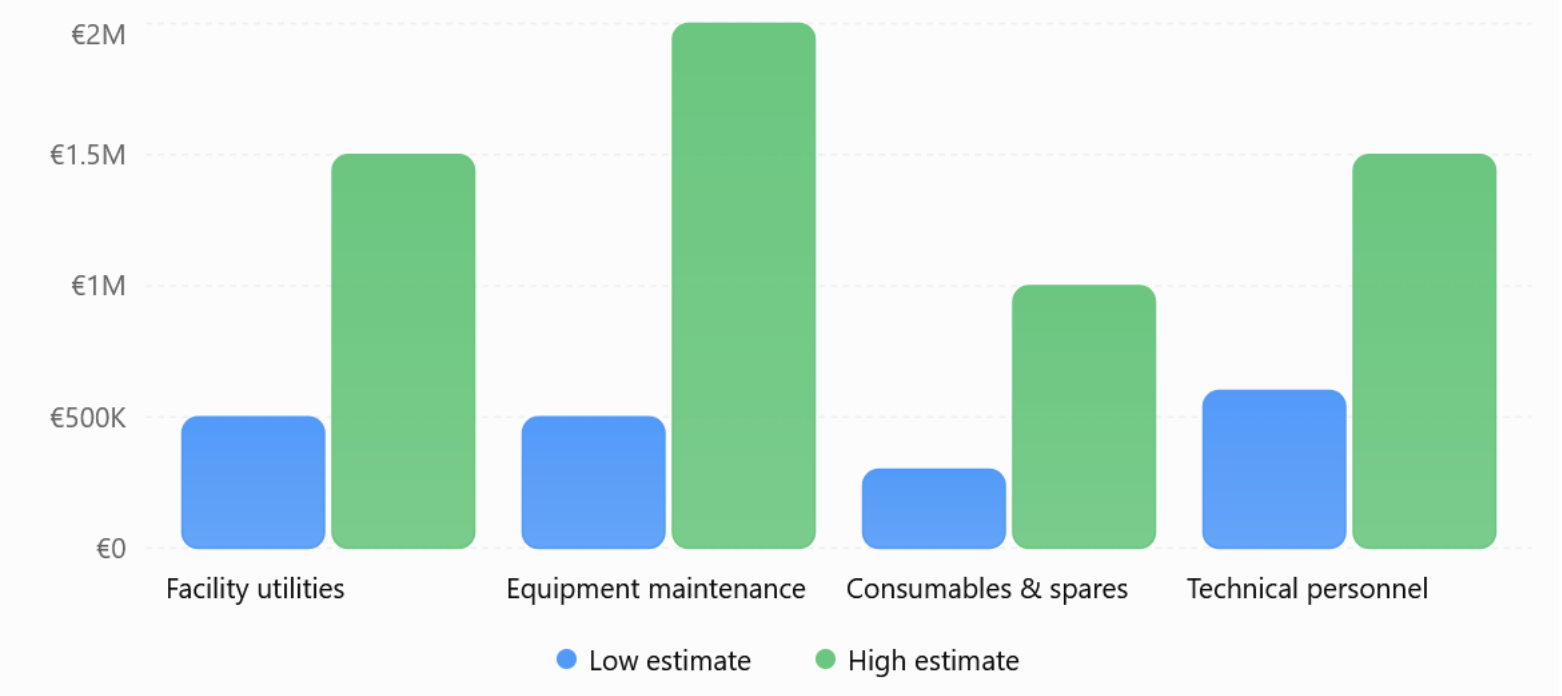
- Focusing on Equipment & process that complements to the research partners
- Supporting Educations & Research for certain steps in Semiconductor Process
- Strategic partners
  - C2N, Paris-Saclay, France
  - CEA-Leti, Grenoble, France





The problem: Running cost per year

- Running cost: 2-6M EUR/year
- Not counting equipment & material spending



Annual Cost range by Category for a University-Clean Room (estimated by ChatGPT)

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International Collaboration in Vietnam

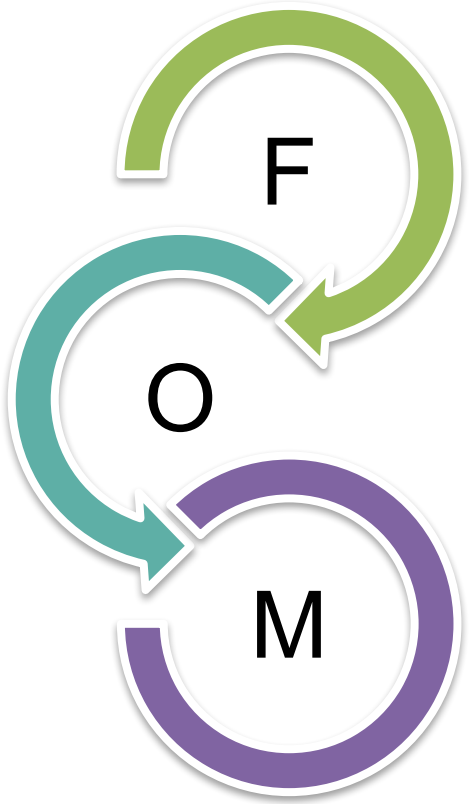
- Human resources
  - Mostly sending students/researcher to the collaboration partners
  - Lacks of professors/experts/engineers
- Funding
  - Project-based; no long-term direction
- Facility
  - Far from the state of the art
- Investment
  - One time: no plan for upgrade, maintenance



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New funding mechanism: Block funding

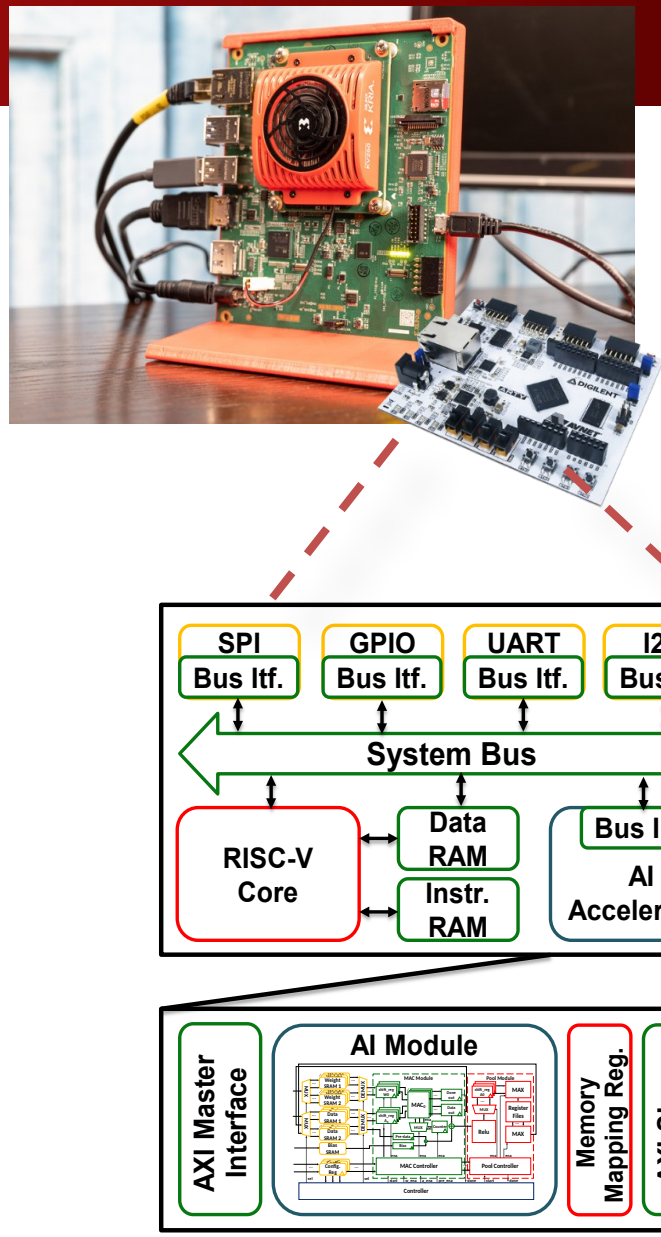


- **Multi-year funding** (3 ÷ 5 years) based on agreed outcomes
  - Eligible recipients: research centers of excellence recognized against established criteria.
- **Autonomy in the use of funds:** Salaries (competitive to the market), international collaboration, technology transfer activities, small-scale investments and operating costs … *without requiring approval for each expenditure item.*
- **Results-based monitoring and evaluation:** scientific publications, technological products, patents, industry collaboration and contributions to policymaking.

FOM: Fund – Operate – Monitor
Also: Figure-Of-Merit

Performance Evaluation Criteria

- **Scientific and technological outputs:** scientific publications, patents and technology products ready for transfer…
- **Contribution to workforce development:** training highly qualified and skilled professionals.
- **Funding utilization:** ratio of funds spent to funds allocated.
- **Ability to attract additional funding:** funding secured beyond the block grant, measured as the ratio of additional funding attracted to funds allocated.



Thank you for your attention!

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Research Center for Integrated Circuits & Applications
Website: https://iti.vnu.edu.vn