



IN2P3
Les deux infinis

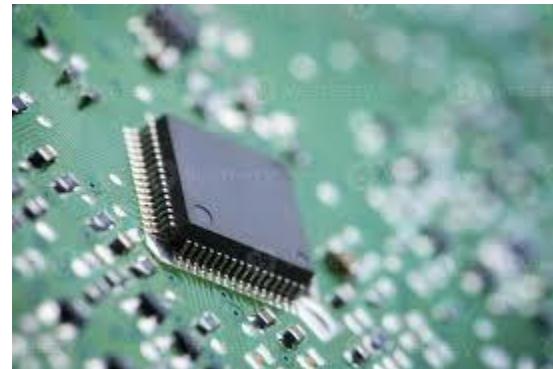
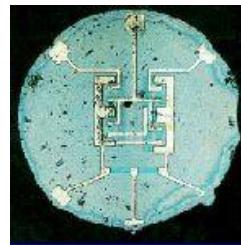


The European Chips Act from a university's perspective

Organization for Micro-Electronics desiGn and Applications

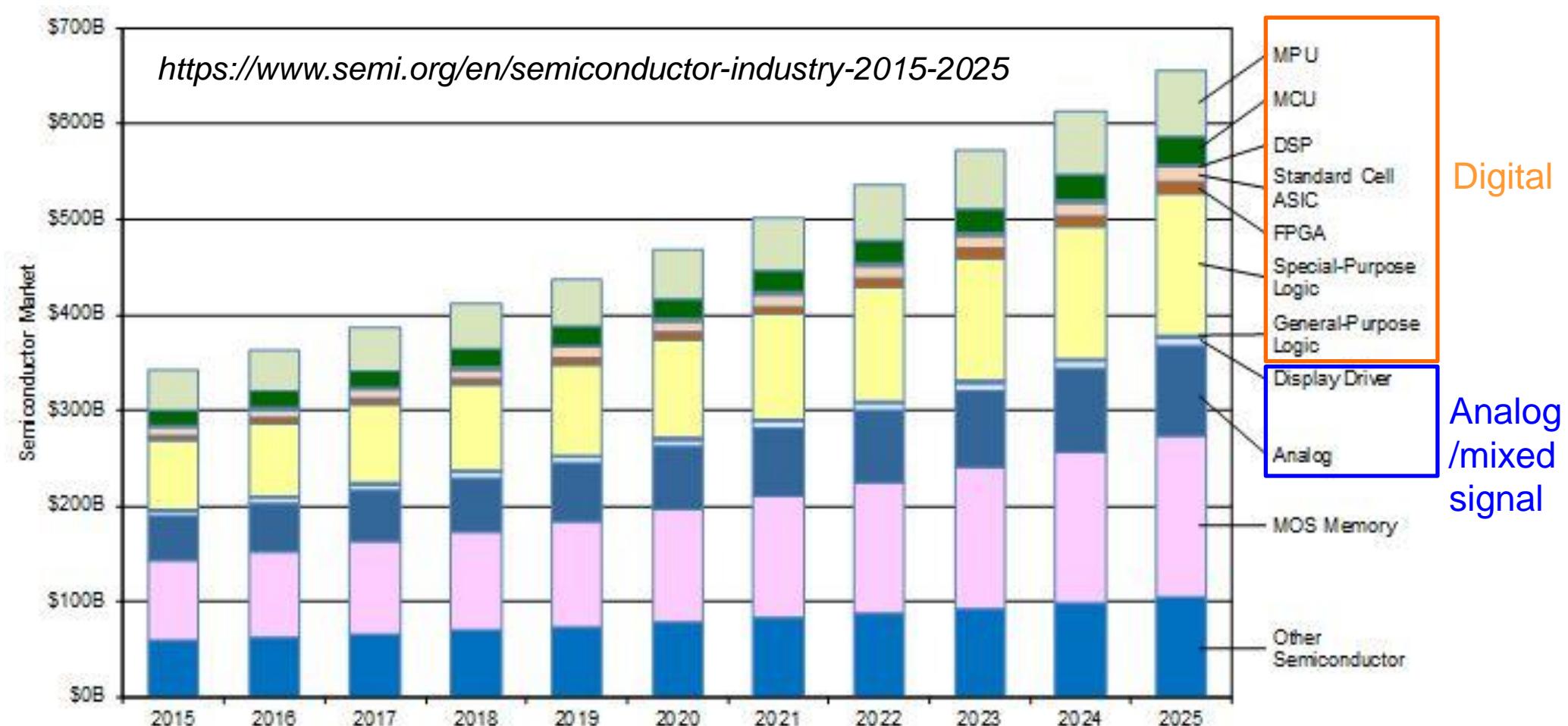
- Chips = Integrated Circuits= ASIC (Application Specific integrated circuit)

First ASIC (1961)



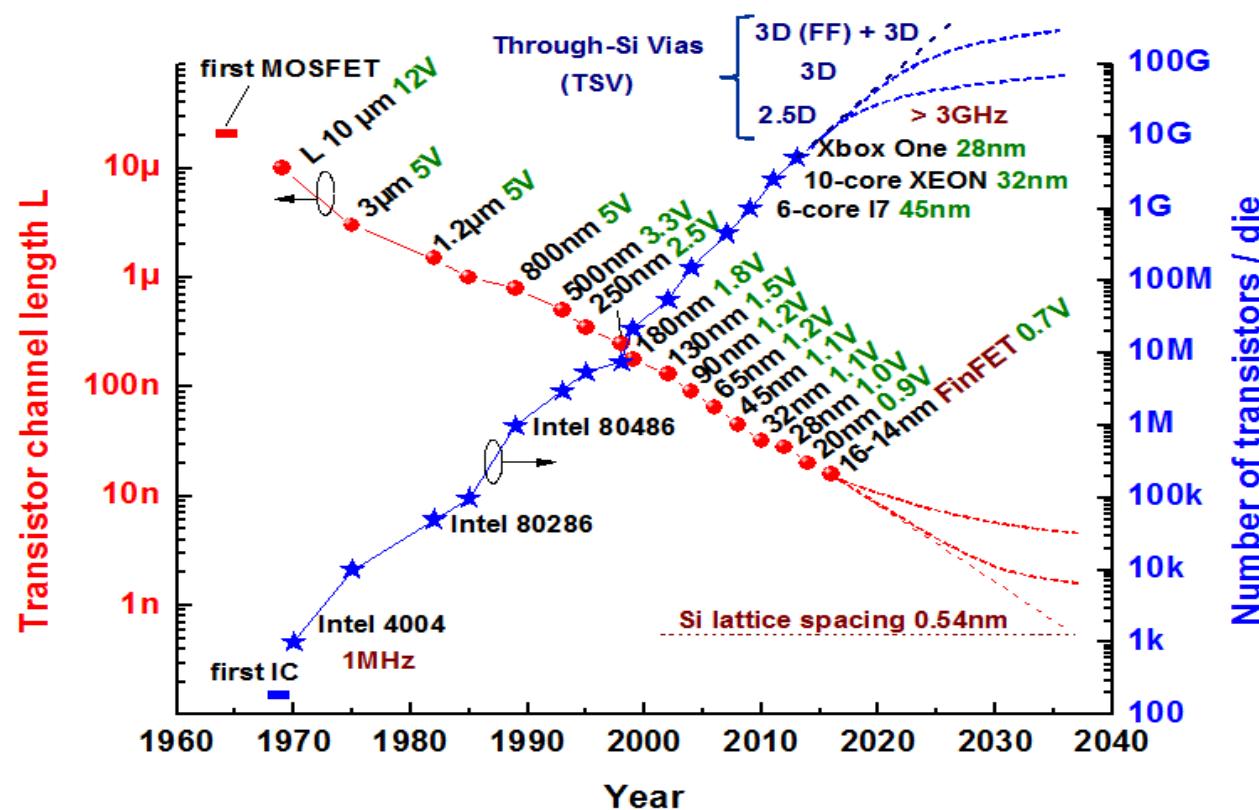
Different types of chips (semiconductors market)

- Cyclic activity, currently under great pressure
- The most common chips that equip current electronic devices - computers, cell phones, DVD players - and that are subject to massive production are **digital chips**
- **Analog/mixed-signals chips: 5G, medical imaging, cars etc... and for High Energy Physics research**



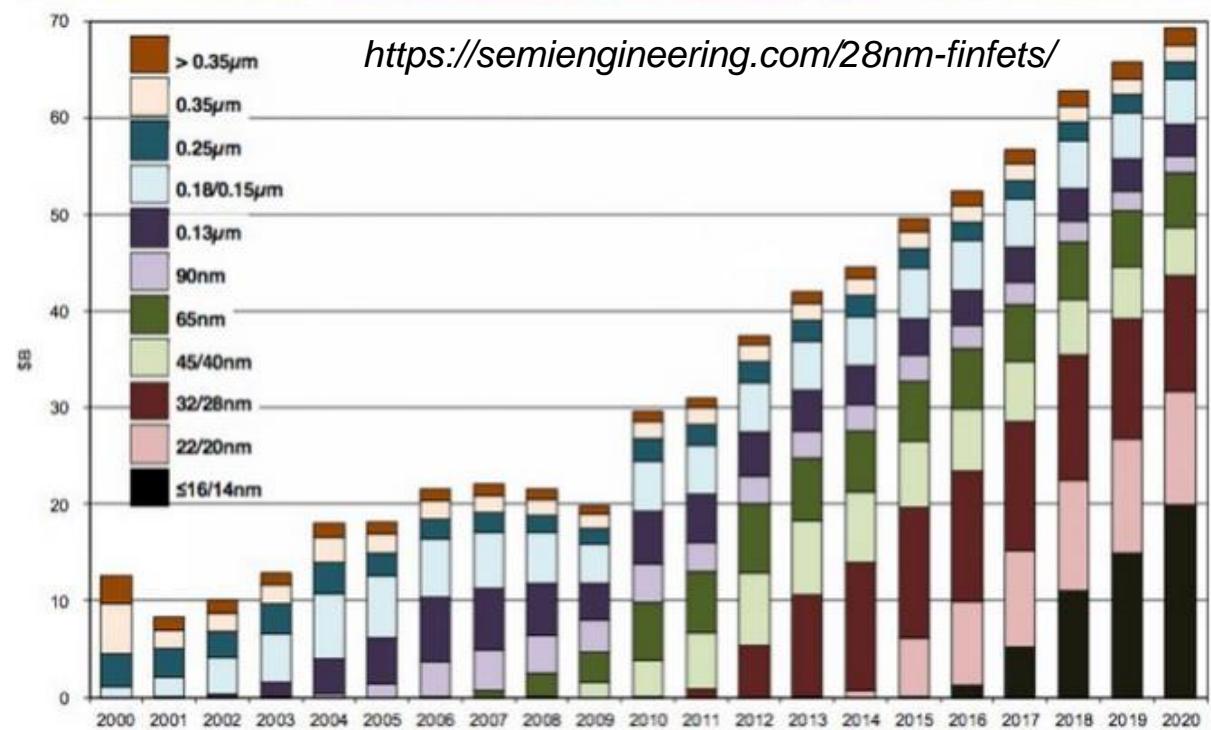
Fabrication process nodes

- Moore's law= Number of transistors per chip is doubled every 2 years



- Strategic nodes:
 - Nodes smaller than 10 nm are crucial for high speed, low power digital circuits
 - But larger nodes remain crucial for analog/mixed signals circuits (medical imaging, autonomous cars, industrial automation, aerospace ..)

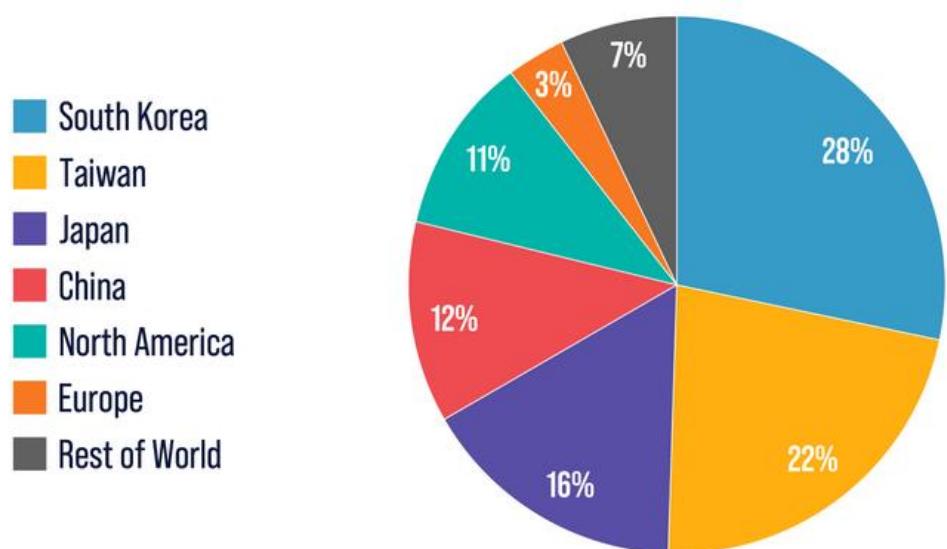
FOUNDRY MARKET BY FEATURE DIMENSION



Semiconductors fabrication (foundries)

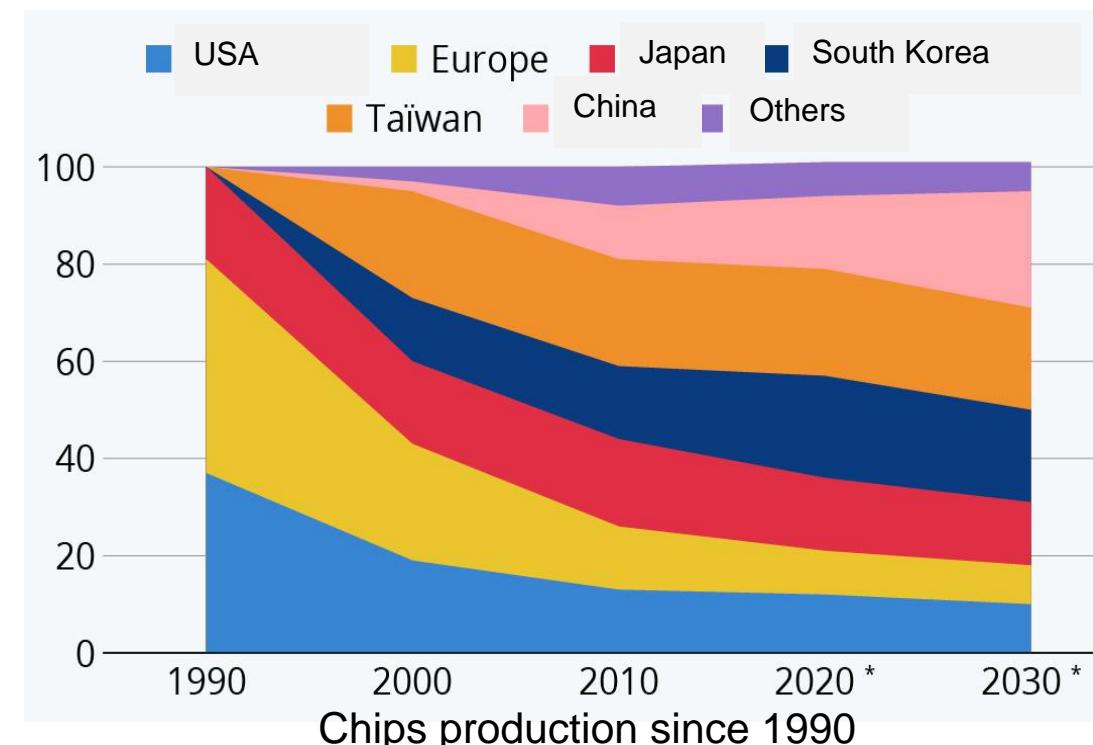
- 75% of the fabrication located in Asia

GLOBAL SEMICONDUCTOR FABRICATION CAPACITY (2019)



<https://www.statista.com/chart/25552/semiconductor-manufacturing-by-location/>

- Europe and US production high in 1990, low in 2020:
→ Companies and research labs mostly use TSMC
- Important to understand and analyze mistakes of the past:
 - Why foundries that use little manpower have been so successful in Asia and not in Europe?
 - Why have the links between European foundries and European universities been so tenuous ?



<https://www.rpc.senate.gov/policy-papers/semiconductors-key-to-economic-and-national-security>

1. Strengthen research and technology leadership
2. Reinforce Europe's capacity to innovate in the design, manufacturing and packaging of advanced chips
3. Increase substantially Europe's production capacity by 2030
4. Address the skills shortage, attract new talent and support the emergence of a skilled workforce
5. Develop an in-depth understanding of global semiconductor supply chains

https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/european-chips-act_en

Universities and research labs' role

- To have strong European semiconductor industries, it is mandatory to have talented and highly specialized engineers
- High level education in micro-electronics design relies on the universities and research/microelectronics labs
 - Teachers must also be at the cutting edge of the state of the art thanks to their design activity for research
- Microelectronics public labs train students (teaching, internships, PhD), but it's important to be able to keep some of the trained engineers in research labs, otherwise the system can't work
 - Attractiveness of research labs for engineers to be improved (careers, salaries ...)
- European industries (wafers fab, packaging) who will benefit from the Chips Act funds should be required to forge strong links with the research labs and universities

