

Tampere University urges the European Union to take a strategic, long-term approach in revising the Chips Act by prioritizing investments in chip design competence, reinforcing existing pilot lines, and ensuring sustainable funding for research and education. The foundation of a resilient semiconductor ecosystem begins with design. Manufacturing success depends on a strong base of skilled designers and design companies, especially in fabless models where design is decoupled from fabrication. This model is particularly viable for smaller EU countries like Finland, which can leverage their strengths in communications, quantum technologies, and specialized microelectronics.

Europe's competitive edge lies in its application domain expertise. To maintain and grow this advantage, the EU must invest in design competence first. Without a robust design ecosystem, investments in advanced CMOS manufacturing facilities are premature and risky. The EU currently has only a handful of companies designing the most advanced CMOS nodes, with Nokia being one of the few. Therefore, building up design capabilities is essential to attract fabless companies and eventually justify large-scale manufacturing investments.

Pilot lines established under the first Chips Act must be continuously supported and upgraded. These lines serve as platforms for innovation, enabling companies to prototype and commercialize new technologies. However, their success depends on ensuring that design companies have the resources and tools to access and utilize them effectively. Bridging the gap between design and manufacturing through improved design kits and integration is critical. On top of that, more European companies should be exploiting own chips in their portfolios. Currently many companies use off-the-shelf components or programmable general-purpose chips manufactured outside EU as they do not have expertise and understanding for designing their own chips. To encourage companies to design their own chips, there should be financial support for pilot projects. Successful company pilots with the European pilot lines will show the companies that they can rely on European design competence and manufacturing capability. This is essential for securing the European self-sufficiency in semiconductors.

In addition to this, the EU must place greater emphasis on advanced packaging and system integration. These areas are increasingly central to semiconductor performance, enabling compact, energy-efficient, and high-speed solutions. Packaging and integration are no longer peripheral concerns—they are strategic technologies that determine competitiveness in domains such as AI, communications, automotive, and edge computing. Europe must invest in infrastructure and R&D for heterogeneous integration, chiplet architectures, and photonic interconnects to remain globally relevant.

Tampere University emphasizes that current funding mechanisms—both at the EU and national levels—are too short-term and overly focused on immediate industrial needs. Academic research and education, which are vital for long-term competence development, are underfunded and lack strategic support. The university calls for stable, long-term funding that spans multiple election cycles and supports doctoral programs, competence centers, and academic-industry collaboration. Doctoral education must be rigorous and forward-looking; three-year programs are insufficient for producing the highest level of expertise needed in industrial and academic settings.

Europe must also balance its investments between advanced CMOS and specialized technologies such as photonics, RF, MEMS, quantum, and advanced materials. These areas offer significant growth potential and global competitiveness. By supporting both emerging and established

sectors, the EU can build technological sovereignty and resilience across the semiconductor value chain. In addition, the manufacturing capability alone is not sufficient as technology without design tools will be useless. New tools are also essential for unconventional computing paradigms, e.g., quantum and neuromorphic. Advances are also needed to support software/hardware co-design.

Ultimately, Tampere University advocates for a coordinated European strategy that pools the strengths of different Member States, scales up education and research efforts, and commits to a long-term vision for microelectronics. This approach will enable the EU to reduce its dependency on non-EU countries, strengthen its supply chains, and secure its position in critical sectors like AI, communications, and automotive.