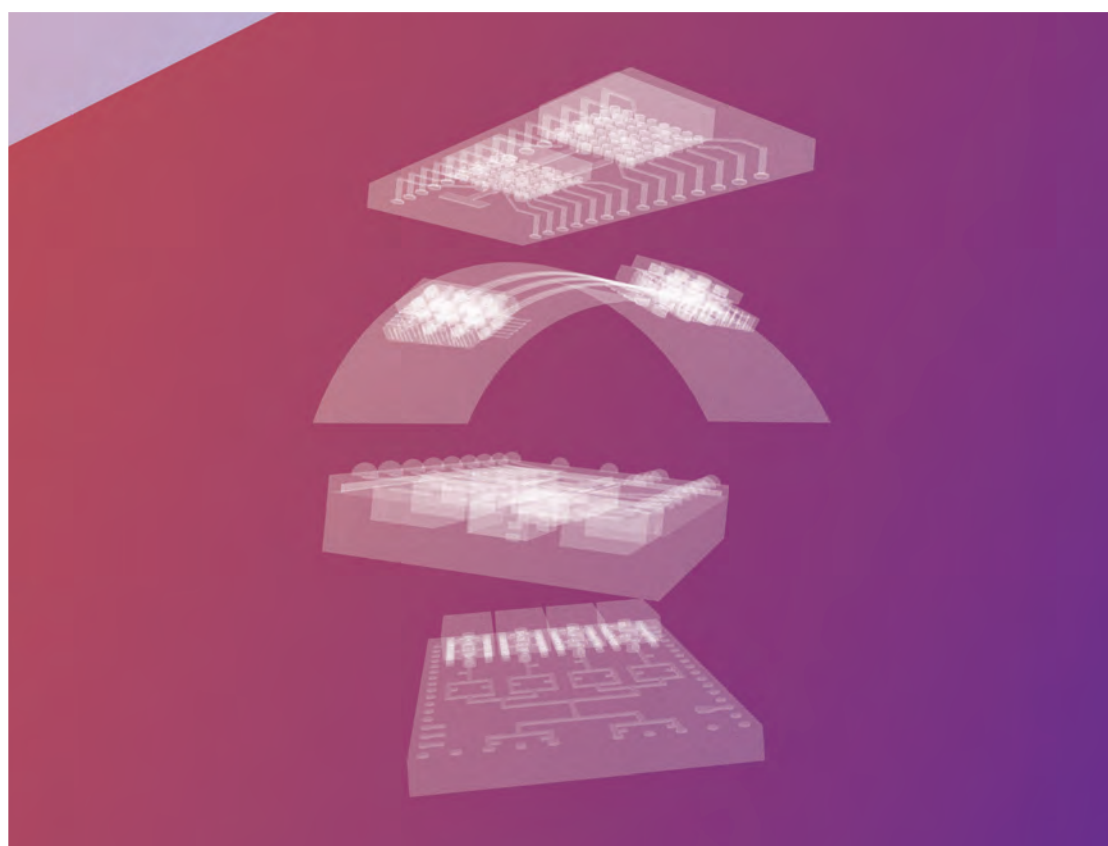


Radio Frequency (RF) Chiplets



Areas of Application



Industry & Automation



Security



Aviation & Aerospace



Communications

High Performance Computing

Multi-Material Sensor

Photonic Integration

Radio Frequency Solutions

coordinated by

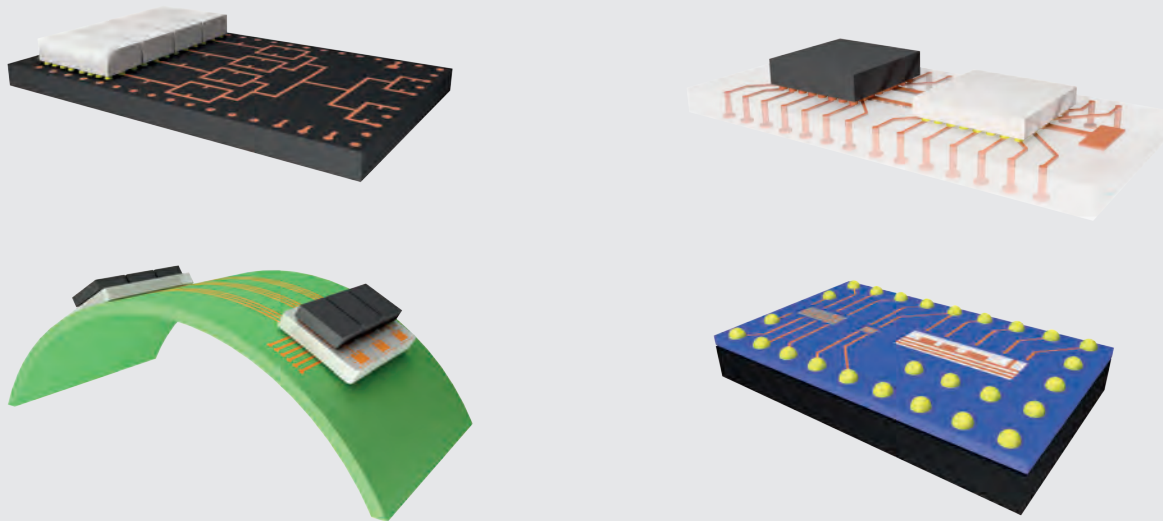


implemented by



**Co-funded by
the European Union**

The work presented was carried out in the framework of the APECS Pilot Line of the Chips Joint Undertaking, funded by Horizon Europe and Digital Europe Programmes and national funding authorities of Austria, Belgium, Finland, France, Germany, Greece, Portugal, Spain.



The **Radio Frequency (RF) demonstrator** addresses next-generation high data-rate mobile communication, wireless links, as well as advanced radar and sensing system applications to showcase the potential of the APECS pilot line in the field of complex, highly integrated RF systems up to 300 GHz. It combines the advantages of different semiconductor technologies using advanced heterogeneous integration techniques to enhance system performance, delivering highly integrated modules with state-of-the-art solutions with proven performance.

Four technology sub-demonstrators, including 6G wireless communications and radar sensing, D-Band flex-radar, and D-Band long range communication module are developed.

InP-on-BiCMOS transceiver (TRx), using 6G D-Band transceiver for high data-rate wireless communications. The heterogeneous integration of state-of-the-art SiGe BiCMOS chiplets together with high performance InP HBT chiplets will boost output power and efficiency at D-band, thus extending range and energy efficiency.

Sub-THz BiCMOS-mHEMT TRx on Interposer targets the heterogeneous integration of sub-THz chiplets and interposer technologies for high-resolution sensing above 200 GHz. Ultra-high-resolution radar sensing based on state-of-the-art SiGe BiCMOS and mHEMT chiplet technologies are highlighted.

D-Band Multi-Module-Radar on Flex Interposer will be a remarkable testcase of the pilot line's capabilities in integrating a multi-module radar system onto bendable and/or non-planar surfaces. The concept is based on a heterogeneously integrated D-band (110 – 170 GHz) radar transceiver based on SiGe BiCMOS mounted on an RF-glass interposer with high efficiency antennas.

D-band communication module demonstrates the integration of multiple chiplets based on different semiconductor technologies. Heterogeneous integration of CMOS and III-V technologies and Fan-out Wafer-level Packaging (RDL last approach) are combined.

For each RF sub-demonstrator, the STCO (System-Technology Co-Optimization) process is used to achieve the highest possible system performance within a short development timeframe for highly integrated RF systems that combine different integration and semiconductor technologies.

