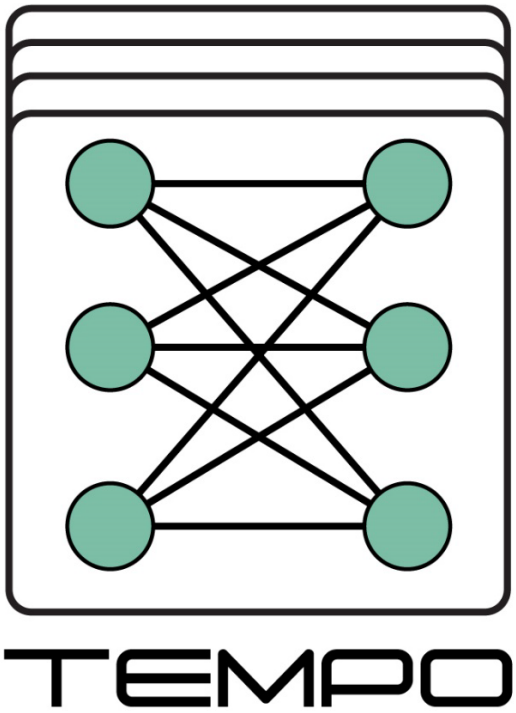
Technology & Hardware for nEuromorphic coMPuting

- ECSEL Research and Innovation Actions (RIA*) –



Deliverable 5.5
– Projected infrastructures needs –

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Responsible Partner	CEA
Name	Yannick Le Tiec
Contact Information	yannick.letiec@cea.fr

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1 Publishable summary

The main objective of TEMPO is to build a **European eco-system** around the development, production and application of neuromorphic hardware through an **efficient cross-fertilization** between major European foundries, chip design, system houses, application companies and research partners. TEMPO is a first step in the direction of creating an implementation plan that supports the creation of a **pan-European research infrastructure** for advanced computing technologies. A major goal of the project is to bring together the world-class expertise and infrastructures of CEA (Leti), IMEC and Fraunhofer-Verbund Mikroelektronik (FhG), and together with semiconductor companies and system houses to explore the possibilities of the developed technologies. The goal of this Work Package (#5) is "*Technology Alignment and Road-mapping*". The deliverable D5.5 *"Projected infrastructures needs"* belongs to the work started and realized so far in T5.3 with the objective of giving a roadmap on the future European infrastructure that will support the neuromorphic hardware targeting higher TRL. Thus, a synchronization of the RTOs, and more specifically IMEC, Fraunhofer and CEA-LETI, around their 300 mm capabilities which relies wafer exchange method and check, automatic data exchanges (lot tracking and related process steps or module) and obviously a common vision on process and flow assessments.

In that context, the three RTOs established a specific methodology to define and use several Key Performance Indicators ("KPI") in a **new approach to "score" the different AI hardware process flows**. Each process step has been evaluated using five KPIs and the scoring suggests two values (on a scale from 0 to 100): the first one representing somehow the **technical performance** (from a fabrication prospective) taking into account maturity, uniformity and repeatability concerns during each operation, the second one representing somehow the **cycle time** integrating both equipment and process availabilities. Each step being scored, it is then possible to score the successive modules and then a given process flow. It also allows to identify weaknesses so that corrective action plans can be set, in particular in the perspective of highlighting new investment needs. Each RTO contributed to that exercise so that gap analysis can be shared and cross-fertilization can be discussed to help each other and justify smart CAPEX investments in the future. The methodology also enables to anticipate (to project) how the score should involve if weaknesses are adjusted (low KPIs being corrected). This D5.5 deliverable outlines all these concepts in sections 3, 4 and 5.

In D5.5 data exchange philosophy and its roadmap leading to a smooth flying wafer without the RTOS that will be deployed in TEMPO project is reported in section 6. Actually, the goal is to exchange the data allowing to automatically track the lots and keep their process steps or module history without breaking the confidentiality of each RTO nor changing the proper way of managing and tracking the lots internally. Contamination classes or contamination check request will also be part of the desired information we would need.

Starting in 2021, the European Commission is deploying new calls in the frame of the new Digital Europe program called "Test and Evaluation Facility" (TEF) **to support next generation hardware(s) in Europe**. This work is definitively very useful to identify the technical needs so that the three RTOs can anticipate and join forces to deploy one common 300mm European facility to prototype several AI hardwares.