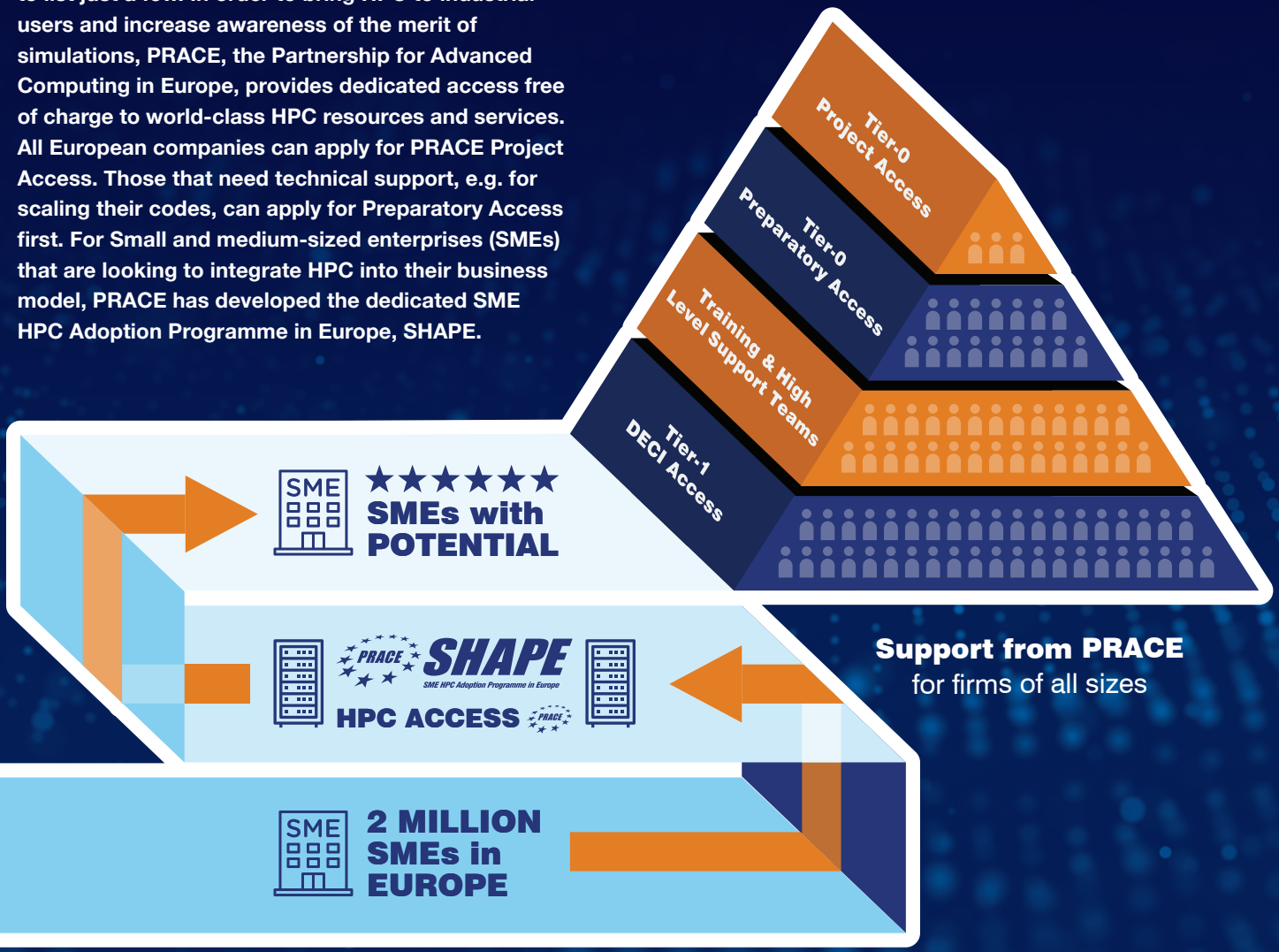
PRACE for European Industry

THE PARTNERSHIP FOR ADVANCED COMPUTING IN EUROPE

High Performance Computing (HPC) is an essential tool for companies in different industrial domains, including agriculture, healthcare, energy, finance, to list just a few. In order to bring HPC to industrial users and increase awareness of the merit of simulations, PRACE, the Partnership for Advanced Computing in Europe, provides dedicated access free of charge to world-class HPC resources and services. All European companies can apply for PRACE Project Access. Those that need technical support, e.g. for scaling their codes, can apply for Preparatory Access first. For Small and medium-sized enterprises (SMEs) that are looking to integrate HPC into their business model, PRACE has developed the dedicated SME HPC Adoption Programme in Europe, SHAPE.



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for firms of all sizes

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This is what industry project partners are saying:

"During the SHAPE project we gained knowledge in new Intel based heterogenous architectures (MIC). The MPI based version of the KOPPA code has been ported and optimised for the target platform."
Haysam Telib, CEO of Optimad engineering Srl.Project: RAPHI (Rarefield Flow Simulations on Xeon Phi Architectures)

"Thanks to the expertise of the IDRIS team, we were able to increase the parallel capabilities, and hence the speed, of our post processing suite." **Oliver Oldrini, founder & CEO of AmpliSIM. Project: DEMOCRatic Air quality SIMulation**

"We are grateful to PRACE and the SHAPE programme for providing these resources, and we know that we will continue using BSC as we keep developing our technology", **Raúl Martín Yunta, co-CEO of Vortex Bladeless S.L. Project: Parallel multi-code coupling for Fluid-Structure Interaction in Wind Energy Generation.**

Small and Medium-sized Enterprises

SMEs are the backbone of the European economy: 99 out of every 100 businesses are SMEs. SHAPE assists SMEs in taking advantage of HPC and supports them in increasing their competitiveness by reducing the time-to-market, improving reliability and safety of their products, and developing innovative industrial processes. The support is all-encompassing, including free training and code development support.

Successful SHAPE project:

Numerical Modelling of 3D-Printed Cranial Orthoses

Cranial orthoses are used in children age 4 to 18 months to correct asymmetry in the skull, caused by external forces applied to an infant's malleable skull during prenatal/ postnatal development or at birth. During infancy, a child's head grows and changes at an astonishing rate. At this time, the head support provided by the cranial orthosis is very effective. The orthosis is designed for the individual head shape of the child based on a non-invasive scan. The objective of the project "Numerical Modelling of 3D Printed Cranial Orthoses", from the company Invent Medical Group from Ostrava, Czech Republic, is to eliminate the necessity of physical testing of each and every new design of cranial orthosis to ensure its proper behaviour. Stiffness of a cranial orthosis will be evaluated by means of numerical modelling and simulation during development of a new cranial orthosis design. "Thanks to our project in PRACE, we were able to create products with higher added value to make life of our little patients much easier." **Jirí Rosický, CEO Invent Medical Group**.

Successful Industry Access project:

"R2Wall Resolved LES to support wall-model development"

Turbulence is present in all practical aeronautical flows. For an aeroplane, the turbulent flow features may range from metres down to microns. Computing all turbulent structures together with the mean flow, an approach dubbed Direct Numerical Simulation (DNS), is to this day impossible for most practical applications. Industrial users rely on so-called Reynolds Average Navier-Stokes (RANS) simulations, in which only the mean flow is computed but turbulence is modelled. As ever larger computational resources become available, industry users are interested in Large Eddy Simulation (LES) to predict off-design performance, for which RANS is not very reliable. Nevertheless, when considering complex geometries, the cost of these simulations is still high. Therefore also the boundary layer region near the wall is not captured but modelled, leading to the so-called Wall-Modelled LES.

Scientists from Cenaero, a research centre for simulation technologies in Belgium, performed unexpected high-resolution LES of the NACA4412 airfoil. "The simulations are close to DNS", says Koen Hillewaert from Cenaero. "R2Wall has generated highly resolved reference data for developing and calibrating wall models for LES." The lesson learned on this academic case is not only important for science, but it is of direct industrial use, Hillewaert is convinced: "The wall model technique enables us to perform LES of complete turbomachinery components. Currently such computations are underway in collaboration with academia and the Safran group, a major aircraft engine manufacturer."

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