## CELTIC-NEXT
### Σ eureka Cluster

## COA~CFD
Cloud-based Online Access to **Computational Fluid Dynamic Simulations**

# COA-CFD

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## Partners:

AUDI AG, Germany

Citkar GmbH, Germany

Engineering Software Steyr, Austria

IONOS SE, Germany

MYB Yzilim Muhendislik A.S. Turkey

Scientific Solutions Systems, Poland

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## Project Website

www.celticnext.eu/project-coa-cfd

www.coa-cfd.com

## Cloud-based Online Access to Computational Fluid Dynamic Simulations

### Main focus of COA – CFD

CFD simulations require great expertise often unavailable for small or medium enterprises (SMEs). This restricts their competitiveness as vendors for manufacturing industries.

The goal of the Cloud-based Online Access to Computational Fluid Dynamic Simulations (COA-CFD) consortium is to democratize CFD simulations. This will enable non-expert users and opening this field for wider audiences and markets. Our target group is primarily small and medium -sized companies (SME) from the automotive supply industry. This encompasses around 90% of the automotive CFD market, as the current products are not tailored to their suitability. With COA-CFD, we will enable the rest 90% of the automotive CFD market to access CFD simulations.

### Our approach

Democratization will be achieved via hybridizing different solvers and by improving/ simplifying the human interaction interface. This will enable an on-demand cloud solution. Furthermore, a design optimization framework will be integrated into the solution by the University of Kaiserslau-

tern (TUK) for an even better user experience and outcome.

COA-CFD aims to remove all boundaries for companies joining the worldwide ongoing digitalization process with physical simulations:

- Users do not require any upfront knowledge in CFD – COA-CFD offers intuitive usage for the whole process from design to simulation result

- Users do not need to take care of hardware – the cloud provides everything accessible through the easy-to-use GUI

### Main results

The democratization of CFD technology eliminates the need for CFD experts and costly hardware; both of which are rarely to be found in small and medium sized enterprises. The removal of these boundaries will allow thousands of SME's in the European Union to catch up with large companies and to increase their competitiveness.

Not only will their revenue increase, but also the quality of their products. Their time to market will decrease drastically, as the CFD simulations from ESS can be performed early on in the design phase.

Human Interaction Experience

Cloud Platform Framework

Software as a Service (SaaS)

Optimization Framework

Use Cases:
Water and dirt-particle management
Sonar & Suction Atomizer
High Rotational Atomizer

Hybridization of CFD Solvers

This will heavily reduce the need for physical prototypes and save money, time and resources, which in turn will also positively impact the environment.

COA – CFD features use-cases with the companies **CITKAR GMBH, AUDI AG and MYB Yzilim Muhendislik A.S.**

**CITKAR** produces last-mile vehicles with innovative designs to improve urban mobility. They will receive the first draft of the applications, which will be tested for its usability and feedback will be collected. This will considerably help them in reducing their product development time and costs, and focus mainly on product innovation. One of the use cases developed for COA-CFD, focuses on a technical problem encountered by CITKAR. In this project, ESS will help to develop corrosion prediction software based on water management, which directly assists CITKAR's loadster development. With the help of COA-CFD in the future, CITKAR will drop their needs to prototyping drastically, since physical simulations help to detect the problems within the virtual world.

**AUDI** is looking forward to optimizing the top coating process in their manufacturing process. This application is very complex and physical simulations by today can only simulate small sections and take a very long time. The goal is, that with help of the physical simulation, correct settings for the manufacturing process can be detected far upfront. This would allow to optimize by reducing materials and process time. With the help of AU-

DI, we will develop and test new CFD capabilities with the current top coating technology used in automotive industry. This specific use case developed with AUDI will benefit them in improving the top coating process in the early-stage development of new car bodies to improve quality and save material and energy.

**MYB** is developing a novel top coating applicator. If successful, this technology can disrupt the market by giving a better control on the process, achieving higher quality by homogenous application and a huge potential on material savings. The second use case of top coating for the project will be developed and tested with MYB. As a project partner, MYB will greatly benefit from the application as it will speed up their demonstrator development for their new coating technology using CFD simulations. It is expected that the demonstrator will reduce the overspray of toxic material in the coating process from 60% to 10%, reducing the energy consumption by more than 270kW per unit.

The cloud is going to be developed by Scientic Solutions Systems (SSS), IONOS and Engineering Software Steyr (ESS). IONOS is heavily focusing on integrating GAIA-X technology into the cloud, while SSS is testing various configurations of hardware and ESS develops the physical software solutions and interactive user interfaces so as front and back end of the cloud. Both IONOS and SSS are service providers who specializes in cloud services & infrastructure, and Network & IT

infrastructure consultations respectively.

## Impact

The impact of COA-CFD will be noticeable in various ways. Competitiveness and equal baselines for small and medium enterprises will increase the overall market revenue. The democratization of simulation technology will shorten the time to innovation.

## About CELTIC–NEXT

CELTIC-NEXT is the EUREKA Cluster for next-generation communications enabling the digital society. CELTIC-NEXT stimulates and orchestrates international collaborative projects in the Information and Communications Technology (ICT) domain.

The CELTIC-NEXT programme includes a wide scope of ICT topics based on new high-performance communications networks supporting data-rich applications and advanced services, both in the ICT sector and across all vertical sectors.

CELTIC-NEXT is an industry-driven initiative, involving all the major ICT industry players as well as many SMEs, service providers, and research institutions. The CELTIC-NEXT activities are open to all organisations that share the CELTIC-NEXT vision

of an inclusive digital society and are willing to collaborate to their own benefit, aligned with their national priorities, to advance the development and uptake of advanced ICT solutions.

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