BISCARRI CONSULTORIA SL (BCSL) is a consulting and engineering company, based in Barcelona, devoted to numerical simulation and know-how transfer of CAE technology to Industry.

Our activity started in 2006 providing consulting and engineering services to industry, in the filed of computational mechanics and its application to product and process engineering projects.

We develope this activity using **Open Source CAE Tools**, including know-how transfer to companies interested in the implementation of such codes.

We investigate on the possibilities offered by **Supercomputing** and **Computational Mechanics** in terms of the feasibility of multi-physics simulation of complex big models, in reasonable computation cycles. We have experience in the use of Cloud Computing hardware resources, which are an interesting alternative to have computing power on demand.

We develope **automated simulation processes** using **Python scripting**, providing our Cients with **parametrized numerical models** that allow to perform the analysis of multiple design options in an easy and fast way, promoting **Design Optimization**.

In addition, Open Source CAE Codes allow to access HPC (High Performance Computing) resources without the barrier of the high cost of commercial CAE licenses running in massive parallel hardware environments. Barcelona region offers important HPC hardware resources located at BSC (Marenostrum) and CSUC.

BCSL is collaborating with Barcelona Supercomputing Center (www.bsc.es) in the testing and documentation of the Open Source version of the code Alya, whis is developed in this research center.

We believe that **HPC + Computational Mechanics** is a strategic element in the engineering processes of main industry sectors: **Energy**, **Aerospace**, **Automotive**, etc. Real world physical problems concerning engineering projects are, in general, multiphysics, so that the availability of computational mechanics software with this capabilities is relevant. In addition, this codes must be parallel in order to run efficiently in massive parallel machines (HPC), because of the increase of computing power arising from numerical models complexity and size.

The present scope of CAE or Computational Mechanics tools shows that most recent codes incorporate more eficiently new sofware parallelization technologies (OpenMP, MPI) and, consequently, are the best in terms of scalability. Among them, we highlight the tools we use at Bicarri Consultoria: ***Code_Aster, openALYA, Elmer, OpenFoam***.

Traditional CAE tools, intrinsically sequential in their origins, are not so efficient in terms of scalability yet, they cannot take all the advantatge of parallel HPC computing power available today. And last but not least, the general licence price policy of commercial software vendors makes it very expensive to run this codes on massive parallel HPC hardware.

In short, the **most efficient solution** to implement Multi-Physics Computational Mechanics and Supercomputing in cutting edge engineering processes are Open Soure codes.

Biscarri Consultoria strategy has taken the direction of **spreading the use of Open Source CAE tools**, applying them to industry engineering problems.

Open Source tools have the ability to create ecosystems of users who **share knowledge** through user forums, **accelerating technological evolution** of everyone and generating significant synergies.

New technologies applied to engineering have enabled the development in recent decades of full digital methods in product and process engineering projects. This has **dramatically shortened development cycles**, while **improving the quality and level of product and process optimization**.

CAD/CAM integration, along with **Product Lifecycle Management** tools, has now reached a level of maturity that the capacity of innovation arising from these technologies, moreover widespread, is scarce.

However, **Computational Mechanics and Supercomputing**, still have a long road ahead. Vectors that determine the innovation of this technology are, on one hand, the use of **multi-physics tools** capable of solving coupled problems (Fluid-Structure, Thermo-Mechanical, etc.). Secondly, the use of **HPC platforms** or **Cloud Computing**, allowing to solve large-sized numerical simulations in reasonable computation cycles. These vectors constitute a microscope able to deepen the understanding of the physical world in which engineering and science are being developed.

BISCARRI CONSULTORIA SERVICES

Engineering	Structural Analysis	Linear, Non-Linear, Transient, Thermal Loading, NVH, Fatigue, Fracture	Code_Aster Elmer	EDF CSC
	Fluidynamics	Compressible and Incompressible Flow, Heat Transfer	openALYA Elmer OpenFoam	BSC CSC ESI
	Heat Transfer	Conduction, Convection, Radiation	Elmer OpenFoam	CSC ESI
	Multi-Physics	Thermo-Mechanical Fluid-Structure	Code_Aster Alya Elmer	EDF BSC CSC
	Design Optimization	Python Scripting – Model Parametrization	Code_Aster	EDF
Consulting	Know How Transfer	Application and Use of CAE Open Source Tools		
	Training	Tutorials based on Client cases		
	Knowledge Management	HTML Documentation and Information Organization	doxygen	