ICT PHD

Research project for a PhD curriculum in ICT – Computer Engineering and Science

**Tutor**: prof. Domenico Beneventano

**(\*) Italian [Industrial] Co-tutor:** Prof. Sonia Bergamaschi

 **(\*\*) Foreign Co-tutor:**

**Proposed Title of the research:**

High Performance Computing and New Industries: Analysis of Application Areas and Effects on Regional Supply Chains

High performance computing e nuove industrie: analisi degli ambiti di applicazione ed effetti sulle filiere regionali

**Keywords: (5)**

Big Data Integration; Privacy-Preserving Data Integration; Artificial Intelligence; High-Performance Computing.

**Research objectives: --(max 10 rows)**

The evolution of digital technologies is changing the methods of design, production, marketing, and value generation starting from related products and services. Technological advancements such as Artificial Intelligence (AI), Big Data, and High-Performance Computing (HPC) are transforming products, processes, and business models across all industries, creating new industrial paradigms. There is a digital transformation underway in the productive system of companies, with models that encourage the adoption of digital technologies, the generation, collection, and processing of Big Data, access to HPC, and the use of AI. This digital transformation must be centered on the integration of high-quality big data, ensuring privacy and confidentiality. Only with this foundation can techniques of AI be applied for accurate and meaningful data analysis and predictions.

This work was supported by the

**Proposed research activity -- (max 10 rows)**

In the first part of the research activity, the following will be explored, studied, and implemented:

* Big Data Integration techniques to provide a unified virtual access to data of multiple sources.
* Privacy-Preserving Data Integration techniques to integrate high-quality big data, ensuring privacy and confidentiality, and enabling the processing of sensitive data in a secure manner.
* AI techniques for data analysis.
* High-Performance Computing techniques to make the aforementioned techniques effective and efficient on large volumes of data.

In the second part, the focus will be on analyzing the application areas and effects on regional supply chains. The supply chain primarily affected by the project is that of the Health and Wellness industries, where the impact will be on both manufacturing companies and those providing services to individuals. Companies gain access to a compatible data collection and management platform, enabling advanced data analysis methods to enhance the functionality of their products and services..

**Supporting research projects (and Department).**

Scholarship DM 118/2023, co-funded by the Emilia Romagna Region.

**Possible connections with research groups, companies, universities.**

(\*) optional

(\*\*) optional/to be completed on the second year