The proposed PhD research at the University of L'Aquila focuses on managing data generated by the internal activities of Decentralized Autonomous Organizations (DAOs) using Artificial Intelligence (AI) techniques. This project explores interactions within human organizations, emphasizing the essential logical elements codified in Italy's business network sector, which can be extended internationally. The research aims to include additional domains like services and administrations, leveraging the benefits of blockchain technology for identity certification, trust management, and data immutability.

The PhD candidate will conduct her/his research activities primarily at the University of L'Aquila (DISIM@UnivAQ-IT), the Computer Engineering Department at the University of Salamanca (DIUS@UniSAL-ES), and the company BCC Studio. The doctoral candidate will spend at least six months at the company and six months abroad at DIUS@UniSAL-ES, with the remaining time at DISIM@UnivAQ-IT. The candidate will produce annual reports detailing activities and progress throughout the three-year period. From the second year onward, conferences and scientific journals shall be identified for open-access publication submissions. Development activities at BCC Studio will follow the company's knowledge-sharing methodologies, and the candidate will participate in customer interactions.

The research is highly innovative, as no companies in Italy specialize in this sector. BCC Studio holds a patent for automating the management of business network contracts using blockchain, which can be extended to other business aggregation tools. The PhD faculty covers most disciplines related to blockchain and distributed ledger technology. DISIM@UnivAQ-IT hosts experts in cryptography, cybersecurity, algorithmic and computational aspects of distributed systems, AI and multi-agent systems, edge and distributed computing, software engineering, and human-computer interaction. DIUS@UniSAL-ES provides expertise in blockchain-based methods, while BCC Studio offers practical knowledge applicable to the Italian market.

The research aligns with SDG Goal 9, focusing on building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation. The PhD student will initially study the state of the art and necessary background, focusing on blockchain and DAO management technologies suitable for low-power, low-compute edge and cloud computing devices. The candidate will also learn about the functioning and regulation of business networks in Italy and receive training in multi-agent systems and AI. The research will involve collecting human-machine interaction requirements, proposing modifications to existing solutions, and potentially developing new models to meet the required specifications. The final phase of the course will include a six-month period at the University of Salamanca, where the candidate will finalize the design and development of identified prototypes. The last year will focus on consolidating scientific and applied results for the doctoral thesis.

The candidate will identify best practices for enhancing the efficiency of DAOs through intelligent blockchain analysis and observation of human-operator interactions. The goal is to automate performance improvements for DAOs. The research at the University of Salamanca will align with the general program and activities at the University of L'Aquila. Salamanca is motivated by addressing rural depopulation issues, known as "Empty Spain," which affect agriculture and sustainable development. The project will benefit from the diverse expertise of the partners to ensure successful execution.

The candidate will also participate in specialized seminars, workshops, and international congresses organized by academic and private entities. BCC Studio will regularly follow the candidate's work abroad through online meetings and webinars. The proposal addresses the growing demand for blockchain technologies in industrial and agricultural sectors, responding to an increasing need for skilled professionals.

The selection process for doctoral candidates at the University of L'Aquila ensures equal opportunities, including accessibility for disabled students. The project proponents are committed to adhering to current legislation on equal opportunities and accessibility, ensuring the candidate's individual needs are met through regular meetings with the supervising professor.