

CIVIL AND ENVIRONMENTAL ENGINEERING

DM 629/Transizioni digitali e ambientali - Revolutionizing Infrastructural Asset Management: Enhancing Sustainability, Resilience, and Efficiency

Funded By	MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [P.iva/CF:97429780584] Politecnico di TORINO [P.iva/CF:00518460019]
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Context of the research activity	The primary objective of this research is to develop and implement a system that utilizes Blockchain technology and smart contracts for the efficient management of infrastructural assets. This system will monitor the current state of assets, integrate data for damage detection and maintenance, and certify evolving data via Blockchain. The goal is to enhance asset management with a focus on sustainability, employing Life Cycle Assessment (LCA) and Life Cycle Costing (LCC), as well as resilience to environmental and structural challenges. This research addresses significant issues in infrastructural asset management, such as payment delays and inefficient maintenance practices, by introducing a secure, automated, and transparent system. Blockchain technology will ensure the reliability and traceability of information, while smart contracts will automate critical processes, reducing human error and expediting response times. Progetto finanziato dal PNRR a valere sul DM 629/2024 - Transizioni digitali e Ambientali - CUP E14D24002230006
Objectives	In recent decades, the construction sector has seen profound digital innovation, driven by the need for greater sustainability, efficiency and automation. Technologies such as IoT sensors and Digital Twin models have facilitated the development of intelligent systems that can adapt to evolving conditions, as environmental changes, thereby improving the management and control of infrastructural assets. The proposed research seeks to build on these advancements by integrating Blockchain technology and smart contracts to manage these assets more effectively. This research is aimed at revolutionizing infrastructural asset management through the application of Blockchain technology and smart contracts,

enhancing sustainability, resilience, and efficiency in the construction sector by leveraging cutting-edge digital technologies.

**Skills and
competencies
for the
development of
the activity**

Candidates should have a degree in civil engineering, environmental engineering, building engineering, or traffic/transportation engineering, aligned with the research topic. Essential qualifications include basic coding knowledge in MATLAB and Python, GIS, as well as a keen interest in developing advanced skills in implementing numerical platforms integrated with AI approaches, blockchain technology, and smart contracts. This should ideally be demonstrated (in whole or reasonably in part) through work done during the M.Sc. thesis.