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TITLE: **The European Research Infrastructure for Heritage Science (E-RIHS) as a strategic hub to support the energy and environmental improvement of historic buildings**

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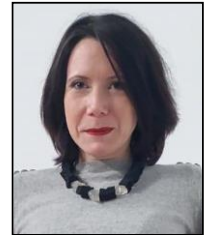
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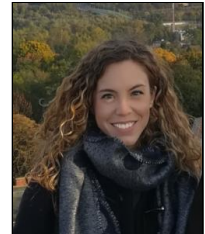ISPC Institute of Heritage Science, National Research Council, Italy

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SUB-THEME: Documentation and re-documentation

ABSTRACT: (400- 500 words)

Within Heritage Science (HS), simulation-based studies are key to support the energy and environmental improvement of historic buildings and to implement the recommendations included in the standard EN 16883:2017 for conservation-compatible energy-efficient solutions. These studies, although effective, are still not widespread due to the lack of homogeneity in approaches and objects of study, difficulties in data management, and different sensibilities of the actors involved. Given its multidisciplinarity, the built heritage energy and environmental improvement needs to be addressed in terms of procedures, data availability, and standardisation of data representation, following FAIR (Findability, Accessibility, Interoperability, and Reuse) principles. Moreover, attention must be paid to enhance interoperability across HS data and methods, and towards more effective, collaborative, and adaptable approaches capable of addressing the inherent complexities of historic buildings.

Building Information Modelling (BIM) and Building Performance Simulations (BPS) are valuable to foster interdisciplinarity, efficient processes and feasible analysis and design solutions for the energy and environmental improvement of built heritage. Advanced pipelines integrating BIM and BPS are being tested to properly address this challenge, but further research is urged in terms of input data and its management strategies. An improved knowledge-base of the thermophysical characterisation of the envelope materials of historical buildings for simulation could greatly reduce time and cost of interventions contributing to scale up to the market workflows that are still limited to highly specialised teams.

The mission of the European Research Infrastructure for Heritage Science (E-RIHS) is to deliver integrated access to interdisciplinary HS expertise, data and cutting-edge technologies, integrating world-leading facilities into a strong cohesive organisation, overcoming the barrier of accessibility to advanced diagnostics and siloed processes and skills. Within E-RIHS, the MObile LABoratory (MOLAB) platform provides to HS researchers and professionals a comprehensive set of mobile instrumentation. In particular, the MOLAB facility for energy and environmental analyses supplies scalable and accessible diagnostic support for data-driven improvement interventions on historical buildings, making available know-how and instruments for high-resolution thermography (also drone-based), IoT environmental monitoring, heat flux meter analyses, blower door test, supported by quick geometric SLAM and photogrammetric survey systems. MOLAB is working with the ongoing E-RIHS DIGItal LABoratory (DIGILAB), dedicated to digital documentation and data management, to ensure that data gathered during technical examinations is FAIR, defining robust and sustainable procedures based on controlled vocabularies also for architectural applications and materials. In addition, E-RIHS operates the HS Academy, offering advanced training including doctoral summer schools, onsite training camps, webinar and lecture series. Designed for students, researchers, and professionals in the HS field, it targets both the users and providers of tomorrow, aiming to equip them with the knowledge and skills needed to advance research and take full advantage of E-RIHS access services.

The article explores how E-RIHS can act as a strategic hub for facilitating the exchange of knowledge and experience within the HS community involved in energy and environmental improvement of built heritage, leveraging the power of BIM and simulation-based approach, fostering enhanced awareness of best practices and innovation, interdisciplinarity and interoperability, and addressing educational gaps.