

Vania Virgili

Director General
of E-RIHS ERIC

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From Physical to Digital: Advancing Heritage Science through E-RIHS

The digital transformation of heritage science is reshaping how cultural assets are analysed, preserved, and shared. The European Research Infrastructure for Heritage Science (E-RIHS, www.e-rihs.eu) spearheads this shift by integrating physical and digital access to advanced techniques and resources across Europe. Its mission is to create a cohesive environment where research infrastructures, tools, and data enable collaboration and innovation in cultural heritage. Established as a European Research Infrastructure Consortium (ERIC) in March 2025, E-RIHS integrates diverse scientific disciplines – ranging from chemistry and physics to art history and archaeology – to promote open, data-driven approaches for heritage conservation and research.

E-RIHS provides physical and virtual access to four complementary research platforms. ARCHLAB offers access to scientific archives and reference collections; FIXLAB to large-scale analytical facilities for advanced diagnostics and archaeometry; MOLAB to mobile, non-invasive instrumentation for in situ investigations; and DIGILAB, the newest platform, enables access to digital data, semantic tools, and cloud-based services. DIGILAB's architecture follows FAIR principles and the heritage digital-twin model, linking research questions, instruments, data, and knowledge through interoperable workflows.

The development of DIGILAB marks a significant evolution from physical to digital services within E-RIHS. The E-RIHS Catalogue of Services federates more than one hundred European services and collections under a unified access framework and introduces new digital services, such as ATON for 3D visualisation, Movida for data integration, and aioli.espadon for semantic annotation. Together, these tools allow researchers to conduct heritage science directly within virtual environments, promoting data reuse, transparency, and collaboration across disciplines and institutions.

E-RIHS aligns with the European Cloud for Heritage OpEn Science (ECHOES, www.echoes-eccch.eu) to build the European Collaborative Cloud for Cultural Heritage (ECCCH). This ecosystem connects infrastructures, data spaces, and open-science communities, advancing Europe's leadership in digital heritage. By bridging physical and digital access, E-RIHS fosters a sustainable, interconnected

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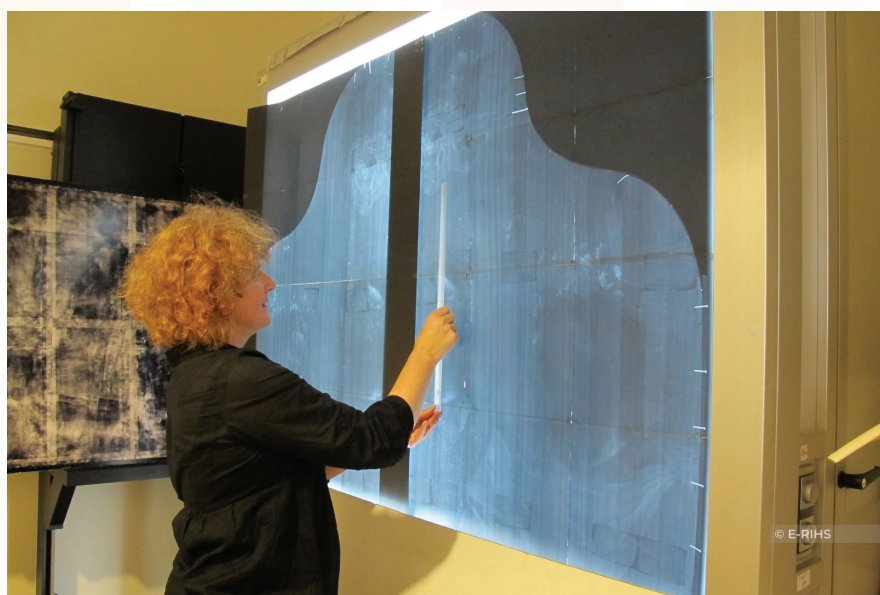
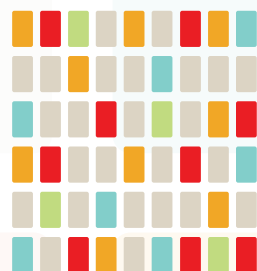


Figure 1 ARCHLAB (Prado archives, Madrid)

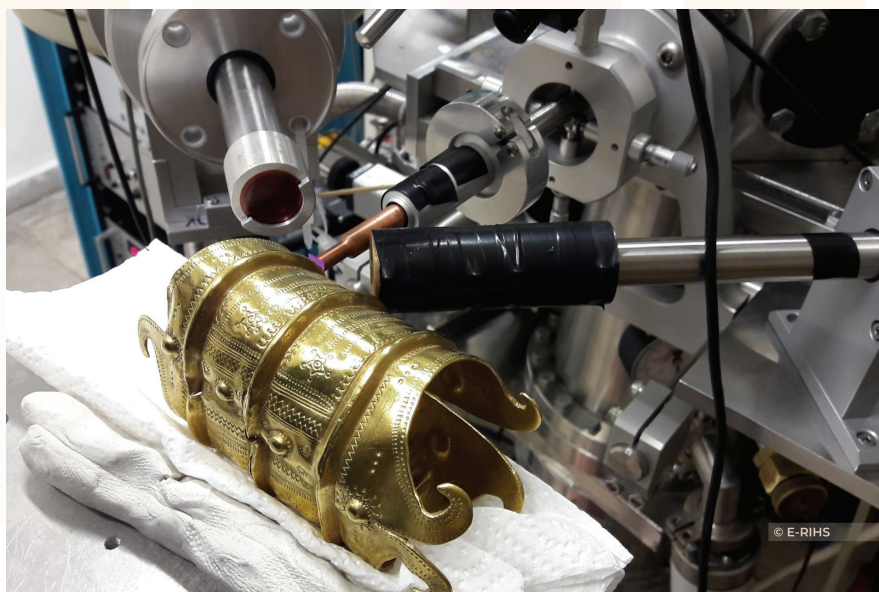


Figure 2 FIXLAB analysis (MTA Atomki, Hungary)

model for cultural-heritage science, ensuring that knowledge remains accessible, reusable, and impactful for future generations.

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