HERITWIN

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Digital twins for the places to intend to keep

HERITWIN PROJECT

Hafenstrom will coordinate HERITWIN, a European cultural heritage project that will test whether digital twin methods, semantic data and participatory workflows can help heritage institutions manage real sites, collections and risk.

Hafenstrom has been selected to coordinate HERITWIN, a European project on cultural heritage and digital innovation (HORIZON-CL2-2025-01). It is scheduled to start in September 2026, run for 30 months and open with a consortium kick-off meeting in Brussels on 7–8 September 2026.

The project's practical question is narrower than the phrase "digital innovation" can suggest. HERITWIN is not being presented as a general technology showcase. It will test how heritage institutions can organise existing documentation, create or validate cultural digital twins, connect data through semantic methods and involve users who are responsible for the heritage environment after a pilot ends.

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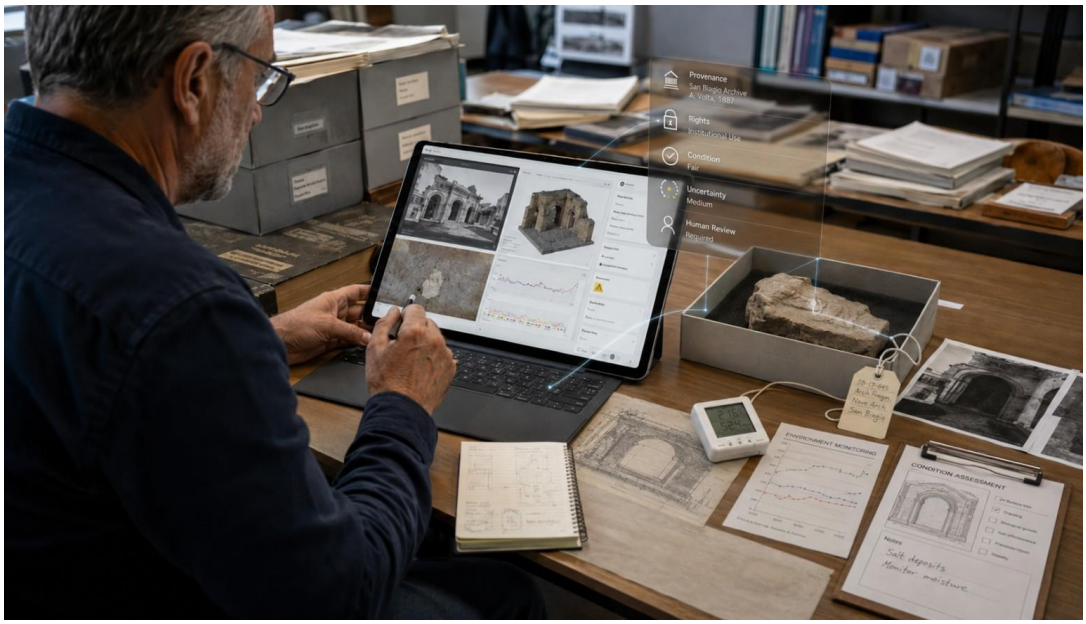
The work will be tested through five pilot settings in Sweden, Norway, Spain, the United Kingdom and Greece. These pilots cover different heritage contexts, from archival reconstruction and archaeological documentation to micro-climate monitoring and preparedness. Their value will depend on whether the consortium can compare evidence across sites rather than produce five separate demonstrations.

Hafenstrom, as a coordinator, must keep the pilots aligned, support reporting and quality assurance, help partners use comparable evidence records, and make sure local results can be read as part of a European validation effort. That includes tracking what data was used, which assumptions were made, which users tested the workflow and which limits became visible during implementation.

The Norwegian connection gives the project a clear local anchor. The Telemark Canal pilot will examine how digital twin methods can support preparedness and predictive conservation in a living heritage environment. The canal is both infrastructure and cultural landscape: it connects Skien and Dalen, includes historic lock systems, and remains part of tourism, maintenance, public access and regional identity.

HERITWIN's first months should therefore be used to settle practical foundations: pilot plans, technical baselines, data responsibilities, rights and access conditions, stakeholder involvement and reporting routines. The expected outputs should be treated as targets to be tested, not as achievements already delivered. By the end of the project, the consortium should be able to show what worked, what failed, what evidence was collected and what other heritage organisations can realistically reuse.



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HERITWIN will test whether cultural digital twins can help heritage organisations connect scattered records, monitoring data and local knowledge without replacing professional judgement.

Cultural heritage organisations often hold information in many forms: photographs, catalogues, maps, inspection notes, conservation records, 3D scans, environmental readings and local knowledge. The problem is rarely a complete lack of data. More often, the material sits in different systems, follows different vocabularies, has uneven metadata or carries access restrictions that make reuse difficult.

HERITWIN starts from that operational problem. In this project, a digital twin should not be understood only as a visual model. It should be a structured representation of a heritage object, site or environment that can connect spatial data, documentation, metadata, sensor information and, where relevant, preparedness or conservation scenarios.

That distinction matters. A conservation decision may depend on physical condition, weather exposure, visitor pressure, earlier repairs, legal protection, staff capacity and available budgets. A digital twin cannot make those decisions on its own. Its role is to organise evidence so that curators, conservators, public authorities, researchers and local actors can see relationships that would otherwise remain spread across documents and databases.

The project will need to test the full workflow, not only the final interface. That means identifying the source data, preparing it for use, mapping it to recognised heritage standards where appropriate, connecting it to Cultural Heritage Cloud workflows, involving users, and recording where the method breaks down. The test is not whether a dashboard looks convincing; it is whether the information behind it is traceable, maintained and useful for a real decision.

Semantic data is central to this work because interoperability in cultural heritage is not just file exchange. A photograph, scan or sensor reading is useful only when users can understand what it represents, who created it, what rights apply, how accurate it is and how it relates to other records. HERITWIN should therefore preserve provenance, version history, rights information and uncertainty markers alongside the visible output.

The project's decision-support theme should also stay disciplined. Claims about preparedness, predictive conservation or AI-assisted monitoring must be tied to defined use cases: for example, humidity patterns, flood exposure, structural stress, inspection planning or documentation quality. Where a model produces a suggestion rather than a verified fact,

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the output should be labelled as such and reviewed by people with the relevant heritage responsibility.

HERITWIN's strongest contribution may be practical evidence about limits. A cultural digital twin may help institutions organise information and discuss risk, but it can also create new maintenance burdens.

If a workflow depends on specialist staff, proprietary tools, unclear data rights or constant manual updates, it may not be adoptable after the funded period. The pilots should make these constraints visible rather than hide them behind polished demonstrations.

HERITWIN will test its approach in five heritage settings across Europe, using different data types and institutional contexts to see which digital twin workflows can be reused beyond one site.

HERITWIN will not test cultural digital twins in a single laboratory setting. The project is built around five pilots in Sweden, Norway, Spain, the United Kingdom and Greece. That spread matters because cultural heritage work does not follow one standard operating model. A museum archive, a canal landscape, a pilgrimage route, a fragile prehistoric monument and an archaeological interpretation setting create different data, staffing, rights and maintenance questions.

The Swedish pilot concerns the Stockholm Exhibition of 1930. The editorial focus should be on fragmented historical design and exhibition material: how archival sources, metadata and

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digital reconstruction can be connected so that institutions can interpret a temporary event whose buildings and displays no longer exist in their original form. The case is relevant because the 1930 exhibition is widely recognised as an important moment in Swedish modernism and functionalism.

The Norwegian pilot focuses on the Telemark Canal. It will test preparedness and predictive conservation in a heritage landscape where water, weather, infrastructure, tourism and public access intersect. The pilot should show whether GIS, building or infrastructure models, LiDAR, photogrammetry, sensor data and local knowledge can be connected in a way that supports inspection, risk assessment or maintenance planning.

The Spanish pilot is connected to the Camino de Santiago. Its role is platform validation: testing practical routes into digital heritage infrastructure for organisations that work with distributed cultural routes, community contribution, interpretation and tourism pressure. The pilot should make clear which users are being served and what evidence they need before digital outputs can be trusted.

The United Kingdom pilot concerns Knockmany Passage Tomb, also known as Annia's Cove, in Northern Ireland. Public heritage information identifies it as a Neolithic passage tomb whose chamber stones include characteristic passage-tomb art. In HERITWIN, the pilot will test a sensor, edge and cloud workflow with attention to micro-climate monitoring and digital twin integration. That creates a useful stress test: environmental data must be collected and interpreted without adding unsustainable burdens for site managers.

The Greek pilot is based in Aphytos, Halkidiki. It will focus on archaeological documentation, semantic enrichment and XR interpretation. The editorial risk here is to overstate public-facing immersion before the evidence exists. The stronger framing is that the pilot will test how documentation and interpretation workflows can serve both expert use and public understanding, while keeping provenance and uncertainty visible.

Across all five pilots, the shared validation question is the same: can heritage data be prepared, connected, checked and reused in ways that remain meaningful outside the local pilot? HERITWIN's answer should depend on evidence records, not presentation quality. Each pilot should document the data used, standards or mappings applied, user groups involved, rights constraints, maintenance needs and failures encountered.

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The Norwegian HERITWIN pilot will use the Telemark Canal and the Skien area to test whether digital twin methods can support risk awareness, maintenance planning and predictive conservation in a living cultural landscape.

The Telemark Canal is a useful HERITWIN case because it is not a sealed museum object. It is a working cultural landscape connected to waterways, locks, settlements, tourism, maintenance, public access and regional identity. The official canal information describes a 105-kilometre waterway from Skien to Dalen, with eight lock systems and a total lift height of 72 metres.

The Norwegian pilot will examine preparedness and predictive conservation. In practice, that means testing whether information about the canal environment can be gathered, structured and used when heritage managers need to understand risk, plan maintenance or prepare for changing conditions.

The pilot is expected to work with several data types. Project-related material refers to digital twin development for heritage risk preparedness, AI-based predictive monitoring for humidity, flooding and structural stress, and integration of GIS/BIM, LiDAR and IoT telemetry. These claims should be treated as work-plan elements until the pilot has produced test evidence.

The value will not come from collecting data for its own sake. The test is whether different records can be connected around decisions that matter to the canal environment. Which structures should be inspected more often? Which areas are exposed to flooding or humidity risk? Which maintenance records are reliable enough to inform planning? Which model outputs are only hypotheses and need human review?

Skien gives the pilot a practical local anchor. The city is closely connected to the canal's history and to the wider heritage landscape addressed by the pilot. It also makes stakeholder work easier to organise around concrete responsibilities: heritage management, maintenance, emergency preparedness, tourism, interpretation and public use.

The pilot will need to balance technical ambition with heritage responsibility. Digital twin work must respect conservation duties, public safety, data governance, institutional capacity and local knowledge. A model that performs well in a project demonstration but cannot be updated by the responsible organisations would not be a sufficient result.

For Hafenstrom, the Norwegian pilot should also feed the project's cross-pilot learning. The canal case can show what digital twin methods require when heritage is exposed to weather,

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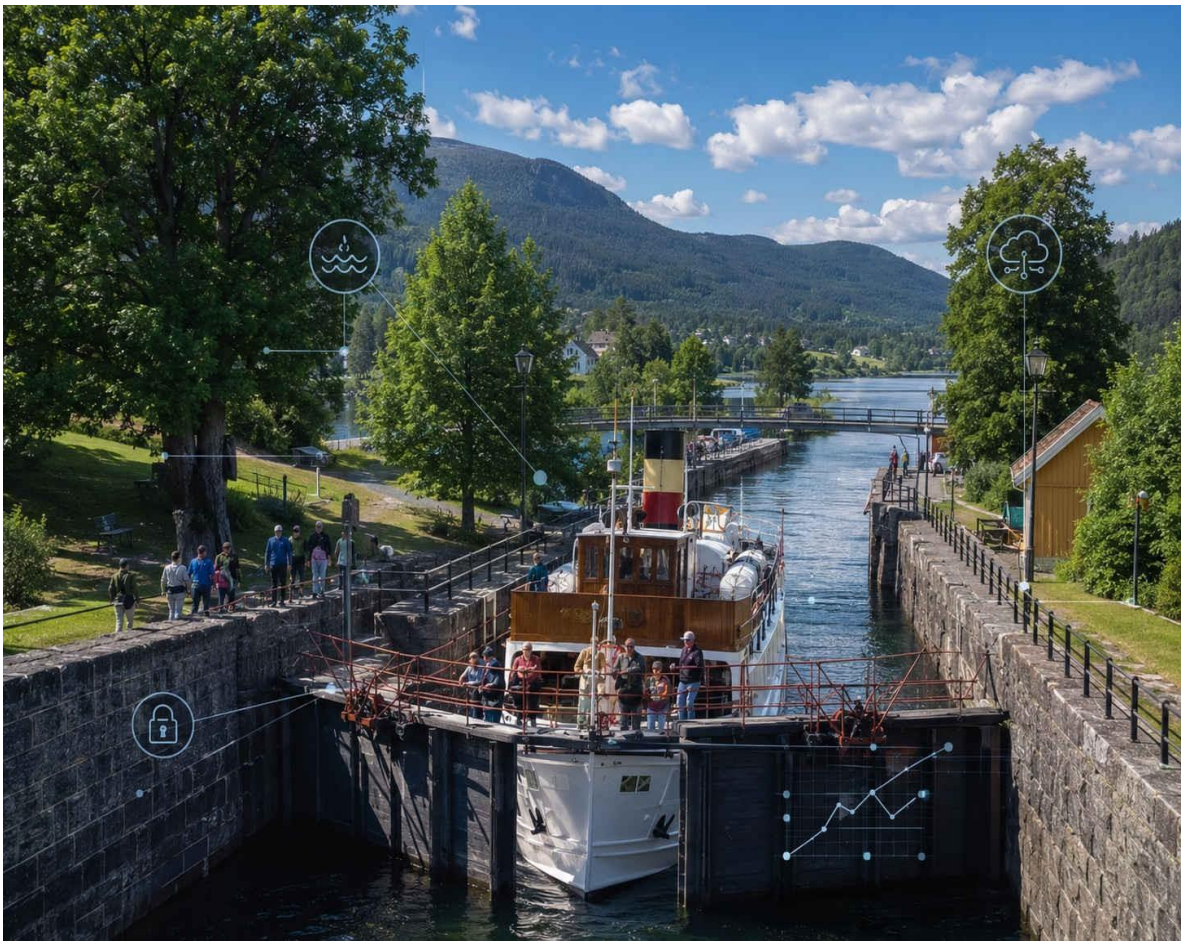
water, public use and operational constraints. Other pilots will test archive reconstruction, platform validation, micro-climate monitoring and XR interpretation. The project's European value depends on comparing those results honestly.



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