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The ECHOES of Distant Data. Willowing Across ECCCH

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(to) willow: “To clean (wool, cotton, etc.) by means of a machine (a willow) that beats out dust and impurities.”

In our case, it’s a metaphor for evoking a **meticulous process of data enrichment, in which “distant” or “raw” fragments and data are cleansed and connected through the tools provided by AUTOMATA and the ECCCH to preserve what is valuable.**

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What kind of data?

- AUTOMATA processes a wide variety of ceramic and lithic artefacts from excavations, labelled with context information.
- 3D models created through photogrammetry, LiDAR, laser scanning, and structured light, used for morphometric and spatial analysis.
- Archaeometric data, such as chemical, physical, and mineralogical compositions (e.g. Raman spectroscopy, p-XRF).
- Hyperspectral imaging (HSI) for surface analysis and material identification.
- Contextual data (findspots, associations, stratigraphy) and rich metadata.
- RIS3D platform data, combining 3D models with analytical results, stored in PostgreSQL and JSON formats.

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In what quantity?

The project involves the digitisation and analysis of approximately 10,000 fragments, ceramics and lithics, processed through automated pipelines.

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Connection with ECCCH: Interoperability and FAIRness

AUTOMATA ensures alignment with ECCCH goals via:

- Full implementation of FAIR principles (Findable, Accessible, Interoperable, Reusable).
- Use of persistent identifiers (DOIs, ORCID, WikiData) and rich metadata standards (DCMES, RDF/XML).
- Data sharing through ADS, compliant with Linked Open Data practices and integrated into Europeana, DataCite, and ARIADNEPlus.
- Interoperability supported by controlled vocabularies (e.g. Getty TGN, Historic England, PREMIS).

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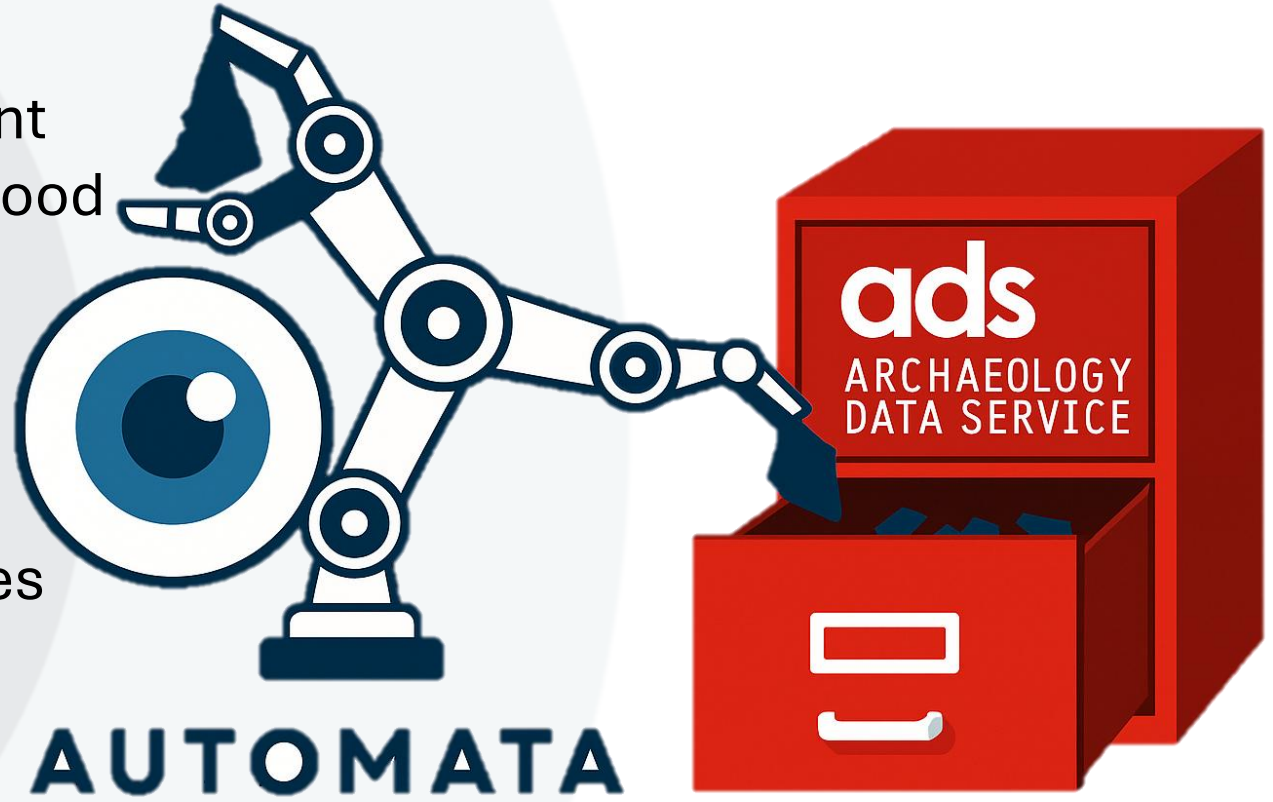
What potential for reuse?

Data will be archived with the Archaeology Data Service (ADS), ensuring:

- Open Access under licences such as Creative Commons Attribution 4.0.Compliance with domain-relevant standards (Dublin Core, Guides to Good Practice).
- Reusability for research, teaching, heritage management, museum curation, and public outreach.
- Broad accessibility through interfaces like the ARIADNE Portal, enabling discovery across over four million archaeological resources



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Educational and Research Applications

Students and researchers can engage with digital replicas of artefacts, facilitating remote learning and collaborative research without the constraints of physical access. This democratises education and promotes inclusive knowledge-sharing.

Community Engagement and Citizen Science

The accessible nature of AUTOMATA's data allows for community involvement in cultural heritage projects. Citizen scientists can contribute to data analysis, annotation, and dissemination, promoting public engagement and fostering a collective sense of ownership over cultural heritage.

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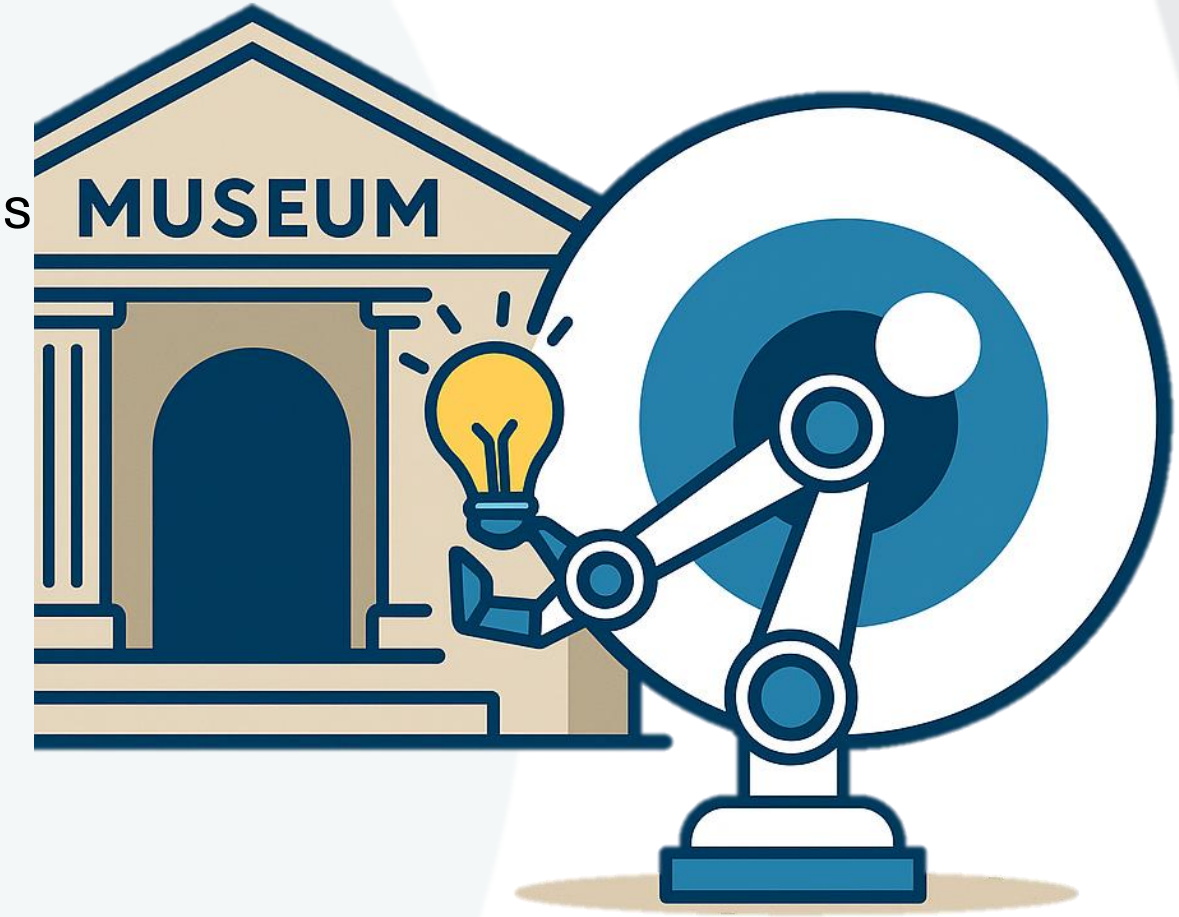
Museum and Exhibition Enhancements

Museums can incorporate the 3D models into interactive displays, offering visitors immersive experiences. Virtual exhibitions can be developed, allowing global audiences to explore artefacts digitally, thus extending the reach and impact of cultural heritage institutions.



Cultural Heritage Preservation and Restoration

Conservators and restorers can use the enriched 3D models to plan and execute preservation and restoration strategies with more accuracy.

AUTOMATA

Mass-scale AI-driven Analysis and Archaeological Big Data

By training algorithms on AUTOMATA's annotated 3D models and archaeometric signatures, researchers can:

- Identify emerging typological patterns beyond traditional categories.
- Detect regional and chronological signatures through material composition and manufacturing traits.
- Predict cultural or functional associations between fragmentary artefacts using multimodal data fusion (geometry + chemistry + context).
- Automate comparative analysis across sites and periods, fostering large-scale synthesis.

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Time is gone, the song is over
Thought I'd something more to say

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