Real-world example:
DEMONSTRATION AT MALTA INTERNATIONAL AIRPORT

Fig. 1 *Border Control screening passenger luggage*

CASE STUDY

In May 2025, the ENIGMA project carried out a live demonstration at Malta International Airport to test the platform's ability to support cultural heritage detection at border security points. This Malta Demonstration simulation included participants from Malta International Airport, Heritage Malta, The Superintendence of Cultural Heritage and ENIGMA. They represented a variety of people including law enforcement and CH experts.

The test scenario simulated a situation where airport security identified a suspicious artefact-like object within the luggage of a passenger (Figs. 1-2). Two suitcases were prepared for the demo, one containing replicas, and another housing authentic heritage items from the National Museum of Archaeology. The selected objects had well-documented provenance and varying material densities (wood, metal, plastic) to test visibility under CT scanning. The case assumed that the existing airport CT scanners are not designed to recognize cultural goods, nor that are staff sufficiently trained to identify potentially stolen items. In real-life this mostly results in missed detections of illicitly trafficked goods. The case demonstrates how ENIGMA's tool can support border control with data input, expert review, and object verification. The case indicates that the ENIGMA platform can enhance border protection for cultural goods, preventing illicit trafficking, and integrating heritage protection into standard airport protocols.

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Fig. 2 *The authentic object (left) and replicas (middle and right) used during the demo.*

WALKTHROUGH

Before the demo, all participants were granted secure access to the scanner lanes. Two pre-packed suitcases were scanned in a controlled session, with live guidance from security staff and real-time documentation by the ENIGMA team.

Step 1: A suspicious object is flagged by the CT scanner (replicas with high-density profile) (Fig. 3).

Step 2: Security personnel open the ENIGMA interface and begin entering available data, including basic object description (size, shape, material), uploaded the CT scan images, added some observations.

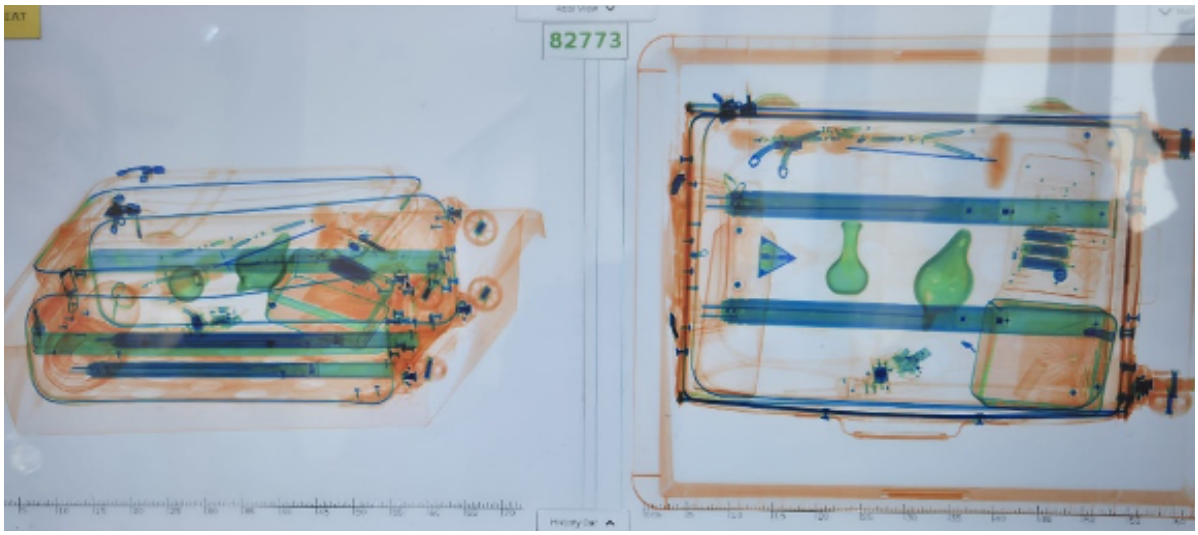

Fig. 3 *Screenshot of the scanned suitcase showing the replicas*

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Step 3: The form is digitally transferred to an expert (simulated archaeologist), who edit incorrect data fields, adds verified metadata and utilizes ENIGMA's AI for similarity checking, that cross-references data from external databases (e.g., Europeana).

Step 4: The system returns visual matches and paradata, reinforcing the assessment that the object is a licensed replica.

Step 5: All edits are logged in ENIGMA's change-tracking system for auditing (Fig. 4).

Step 6: A final report is generated and returned to airport security, clearing the object and allowing the traveler to proceed.

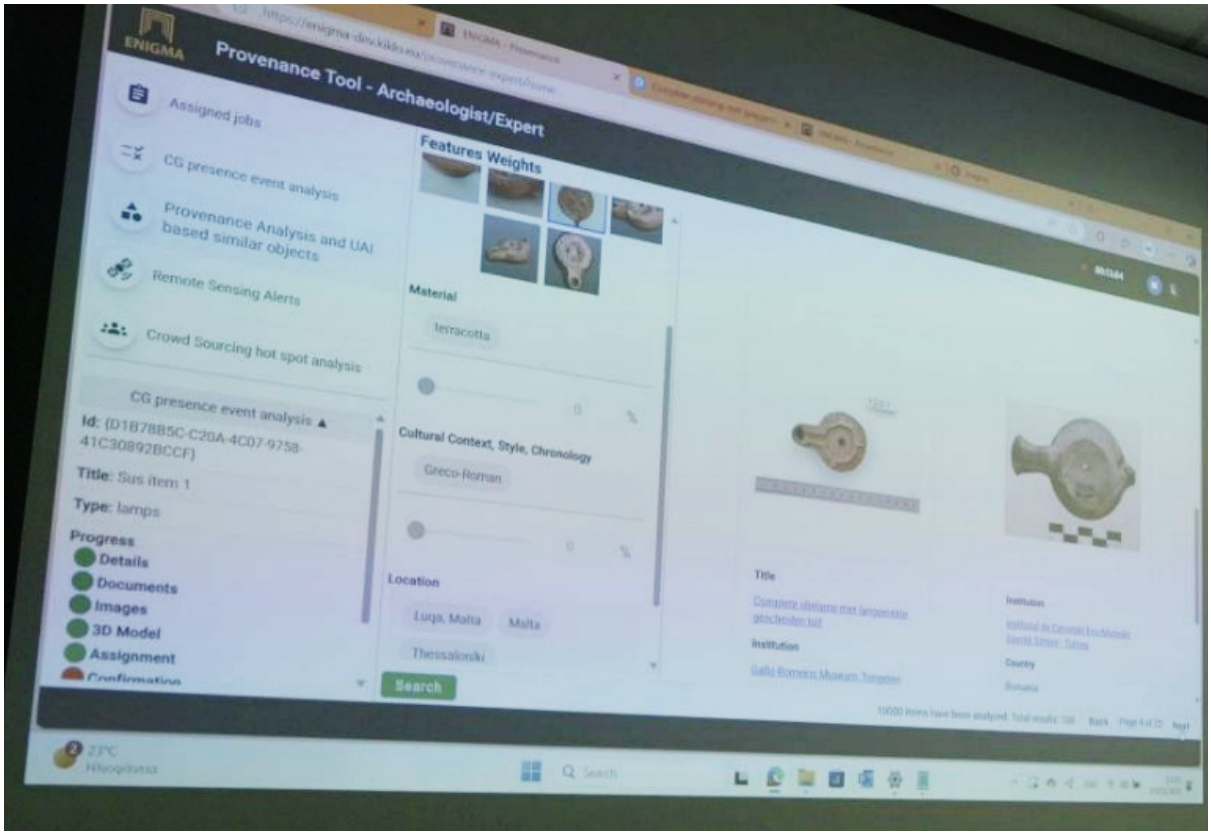

Fig. 4 *Impression of the ENIGMA platform*

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LESSONS LEARNED

The demonstration showed that ENIGMA effectively supports collaboration between airport security and cultural heritage experts. The tool's intuitive interface and AI-aided recognition streamlined the documentation and verification process, even for non-specialists. However, integration with existing scanner infrastructure remains a technical challenge, and additional staff training is needed to improve the accuracy of initial data input and procedural adoption across airport workflows.

- **Outcome 1:** Faster and more accurate identification of cultural heritage objects using expert validation and AI cross-referencing tools.
- **Outcome 2:** Improved communication and accountability through transparent audit trails and clearly logged data modifications across stakeholders.

FURTHER RESOURCES

APPLIED ENIGMA TOOLS:
- ENIGMA Provenance Tool
- ENIGMA Scenario Building Engine
- ENIGMA Similarity Report

RELATED BEST PRACTICES:
- Provenance Tool
- Similarity Report
- Photographing Details for LEAs
- Handling CG Objects for LEAs
- AI and Critical Reflection

FURTHER ONLINE TRAINING:
https://eu-enigma.eu/training/

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