

BRIEFING PAPER OF THE WORKSHOP FOR ARCHAEOLOGISTS

ENIGMA PROJECT

PLACE: Hybrid Event (online and in person at the Archaeological Research Unit of the University of Cyprus, located at 12 Gladstone Street, 1095, Nicosia, Cyprus)

DATE: Wednesday, February 5th, 2025

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ILLICIT TRAFFICKING OF CULTURAL PROPERTY: AN ARCHAEOLOGICAL PERSPECTIVE

I. WORKSHOP OVERVIEW

The workshop entitled “Illicit Trafficking of Cultural Property: An Archaeological Perspective” was a collaborative effort between the ERATOSTHENES Centre of Excellence, and the major archaeological players in Cyprus. It was co-organized in collaboration with the Archaeological Research Unit (ARU) of the University of Cyprus, the Association of Cypriot Archaeologists (ACA), and the Cyprus American Archaeological Research Institute (CAARI). The event was also supported by the Department of Antiquities of Cyprus (DoA), ICOMOS Cyprus, and the Cyprus Police.

Tailored for archaeologists and other field experts, this workshop aimed at providing participants with a unique opportunity to explore the ENIGMA project in greater depth, exchange insights, and offer valuable feedback. Held in a hybrid format on Wednesday, February 5, 2025, the workshop ran from 09:00 am to 12:00 pm CET (10:00 am to 1:00 pm Cyprus/Greece time). Participants had the flexibility to attend either in person at the Archaeological Research Unit of the University of Cyprus, located at 12 Gladstone Street, 1095, Nicosia, Cyprus, or to join virtually. This inclusive format ensured broad participation and enriched discussions, blending local expertise with international perspectives to address the pressing issue of cultural heritage protection.

Through productive discussions and exchange of ideas, participants contributed with their valuable knowledge and experiences to the fight against the illicit trafficking of cultural property. Experts provided insightful feedback and observations, which will help to improve the ENIGMA tools and shape effective strategies for protecting cultural heritage. The insights collected will guide the refinement of user requirements and tool

functionalities to ensure operational relevance and effectiveness in integrating new digital technologies into standard authorities' *modus operandi*.

II. WORKSHOP OBJECTIVES

- Present the tools developed under ENIGMA, including the Unique Authenticity Identifier (UAI), Provenance Research Tool, Earth Observation Toolkit, Scenario Building Engine, 3D CG Reconstruction Tool, and the ENIGMA platform.
- Identify operational challenges and opportunities for tool integration in archaeologists' workflows.
- Prioritize tools based on feedback from participants and address technical, legal, and interoperability concerns.

III. PARTICIPANTS

Invitations were distributed to stakeholders across a diverse range of institutions, including archaeological research units, law enforcement agencies, and cultural organizations, through multiple channels. A key driver of this outreach was Eratosthenes CoE, which leveraged its extensive networks and strategic connections to ensure broad representation of expertise and operational roles. Additionally, several esteemed institutions outside the ENIGMA consortium—such as ARU, DoA, CAARI, ACA, and ICOMOS Cyprus—were invited to co-organize the workshop. Their involvement significantly contributed to the event's dissemination, enhancing its visibility and encouraging greater participation. As a result of these coordinated efforts, a total of 168 participants from around the world registered for the workshop in advance. This milestone marks a significant step in strengthening the visibility and impact of the ENIGMA project.

The workshop was held at the ARU of the University of Cyprus in Nicosia, drawing a dynamic and diverse group of participants both on-site and online. Eventually, a total of 21 attendees were present in person, while at least 51 others joined virtually through a dedicated teleconferencing platform, facilitating broad international engagement and accessibility. In total, the event welcomed 72 participants. Participants represented a wide spectrum of countries, including Cyprus, Greece, Belgium, the Netherlands, France, Italy, Germany, Hungary, Spain, Malta, the USA, the UK, Lebanon, Poland, Egypt, Saudi Arabia, and beyond, underscoring the event's truly global reach.

IV. KEY HIGHLIGHTS

Participants engaged in in-depth discussions on the effectiveness of the ENIGMA tools, providing valuable insights into their usability, interoperability, and operational impact. Key tools such as the Unique Authenticity Identifier (UAI), Provenance Research Tool, and Earth Observation Toolkit were highlighted as essential for improving artifact traceability and site monitoring. The workshop emphasized the need for seamless data integration across multiple databases, real-time monitoring capabilities, and enhanced user interfaces to facilitate adoption by law enforcement agencies and archaeologists.

In addition to refining the ENIGMA tools, the workshop underscored the importance of collaborative efforts between cultural institutions, law enforcement, and policymakers. Recommendations included targeted training programs, the development of user-friendly guides, and outreach initiatives to raise awareness about provenance research and illicit trafficking risks. The consensus among participants was that fostering cross-border cooperation and enhancing technological capabilities would be instrumental in strengthening cultural heritage protection. The discussions and action points outlined during the workshop will play a crucial role in shaping future developments, ensuring that the ENIGMA platform remains a vital resource in safeguarding global heritage.

- **Tool Presentations**

Detailed presentations highlighted the functionality and application of six ENIGMA tools: the Unique Authenticity Identifier (UAI), Provenance Research Tool, Earth Observation Toolkit, Scenario Building Engine, 3D CG Reconstruction Tool, and the overarching ENIGMA platform. Each tool was showcased with its potential impact on improving cultural heritage management and combating illicit trafficking. Below are the highlights and key components of each tool, as presented:

- Unique Authenticity Identifier (UAI): A "DNA" for cultural goods, enabling structured documentation and enhanced traceability
- Provenance Research Tool: Aids in cross-border investigations with similarity checks, remote sensing, and crowd-sourced data.
- Earth Observation Toolkit: Monitors and identifies at-risk areas using GIS integration with satellite data.
- Scenario Building Engine: Models workflows for investigations, enhancing decision-making and efficiency.
- 3D CG Reconstruction Tool: Reconstructs fragmented cultural artifacts, providing critical insights for LEAs.
- ENIGMA Platform: Integrates the tools into a unified system for operational efficiency.

- **Feedback Summary**

- **Highest Rated Tools:** The highest-rated tools from the ENIGMA workshop were the Provenance Research Tool, the Earth Observation Toolkit, and the 3D CG Reconstruction Tool, all receiving strong scores

for their usefulness and operational enhancement. These tools were particularly valued for their potential in real-time site monitoring, provenance verification, and artifact reconstruction, which are critical in combating illicit trafficking. Participants also highlighted the Unique Authenticity Identifier (UAI) for its role in documenting cultural heritage objects but noted that its interface could be more user-friendly.

- **Suggestions for Improvement:** Key recommendations for improving the ENIGMA tools and platform included enhancing interoperability between databases, refining user interfaces for better accessibility, and integrating real-time monitoring capabilities. Participants also emphasized the need for training programs, collaborative data-sharing frameworks, and standardized workflows to streamline investigative processes. Addressing these areas will ensure the ENIGMA platform remains an effective tool in protecting cultural heritage.

V. KEY STATISTICS

The tools were prioritized based on feedback, with the Provenance Research Tool, Earth Observation Toolkit and 3D CG Reconstruction Tool ranked as the most critical for operational needs. Participants emphasized the importance of interconnectivity and seamless integration between tools to maximize their effectiveness in real-world scenarios. Feedback on the tools was collected via a structured scoring system (1–5 scale). Below are the average ratings:

Tool		Usefulness	Operational Enhancement	Completeness
Provenance Research Tool		4.3	4.1	4.3
Earth Observation Toolkit		4.3	4	4.2
3D CG Reconstruction Tool		4.3	3.6	3.8
Unique Authenticity Identifier (UAI)		3.8	4.7	4
Scenario Building Engine		3.8	3.5	3.7

The following bar chart represents the average ratings of ENIGMA tools, for comparing how participants rated the usefulness, operational enhancement, and completeness of each tool. The visualization is a bar chart showing the average ratings for each tool across the three categories.

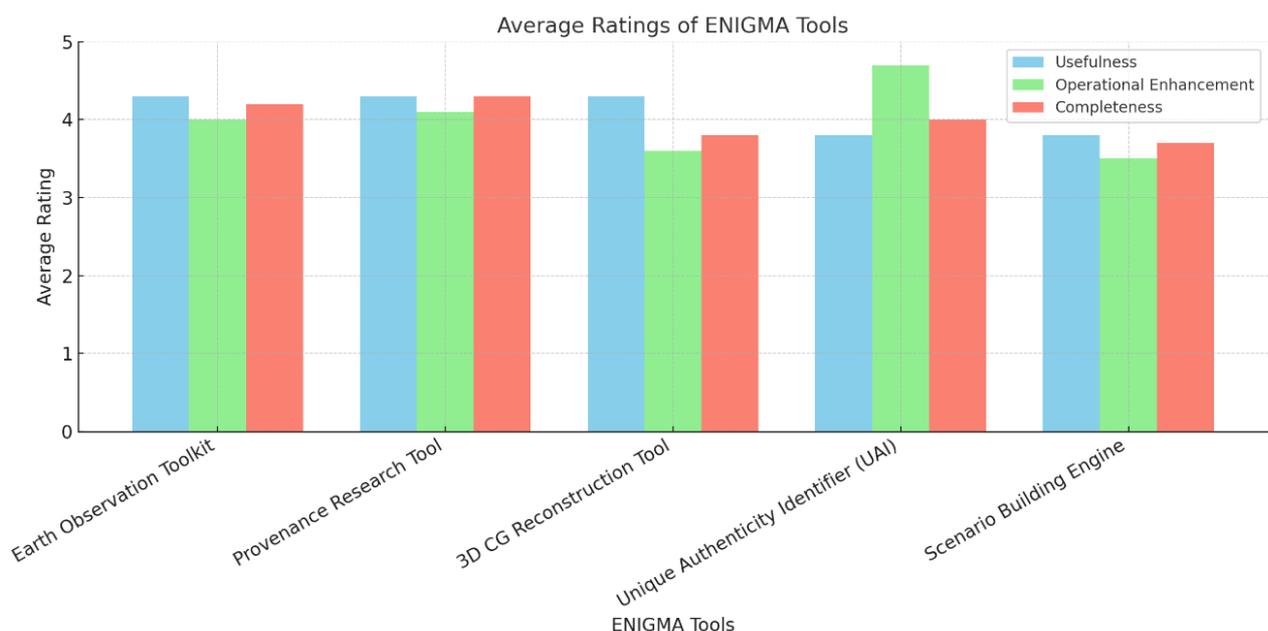


Figure 1. The average ratings of ENIGMA tools

- **Tool Prioritization Based on Operational Needs**

Prioritization of the presented tools by the participants:

- Earth Observation Toolkit
- Provenance Research Tool
- Unique Authenticity Identifier (UAI)
- 3D CG Reconstruction Tool
- Scenario Building Engine

The following pie chart represents the Tool Prioritization, highlighting which tools were ranked as the highest priority by participants. This visualization is a pie chart showing the percentage of participants prioritizing each tool.

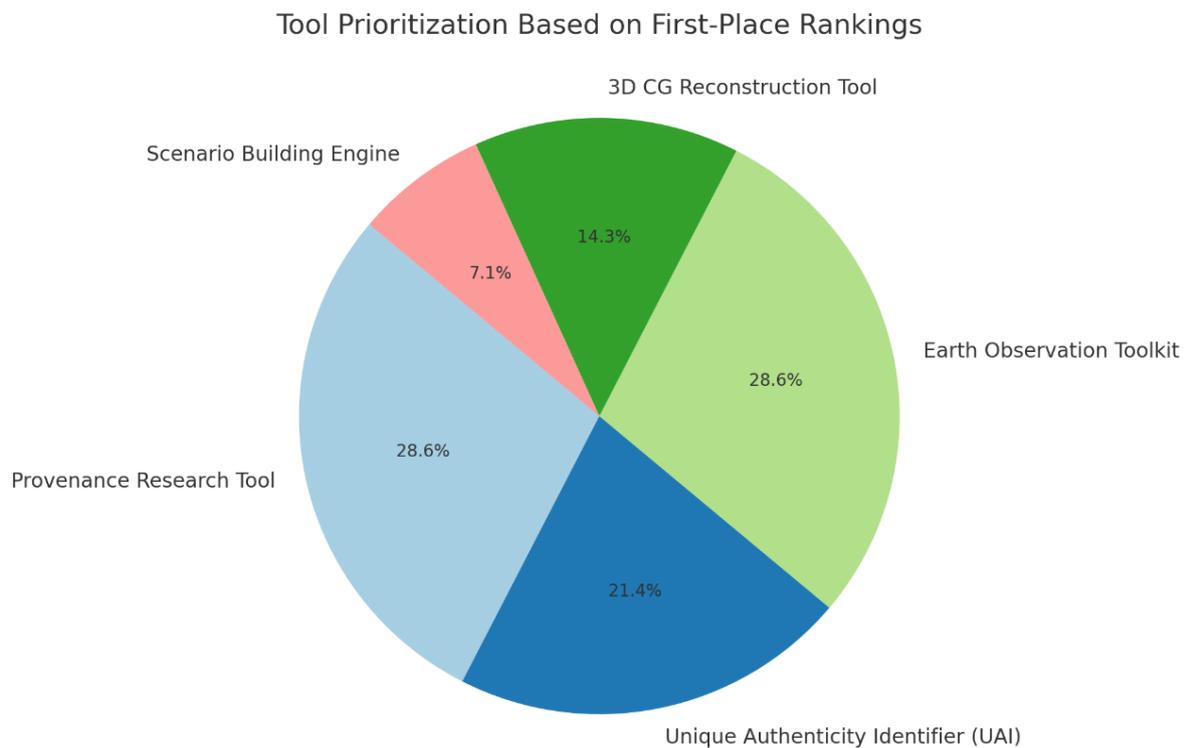


Figure 2. Pie chart represents the Tool Prioritization

VI. ACTION POINTS

Based on the discussions and feedback collected during the ENIGMA workshop for archaeologists, the following action points have been identified to enhance the effectiveness and usability of the ENIGMA tools and platform:

- **Tool Refinement – Improve user interfaces, enhance interoperability with databases, expand real-time monitoring, and refine 3D imaging capabilities.**
- **Training & Capacity Building – Conduct targeted training, create user-friendly guides, and run simulation exercises.**
- **Collaboration & Data Sharing – Strengthen partnerships, address legal barriers, and integrate crowd-sourced data for better monitoring**

VII. CONCLUSION

The ENIGMA workshop for archaeologists provided a valuable platform for discussing innovative solutions to combat the illicit trafficking of cultural property. The interactive sessions allowed stakeholders to engage with the ENIGMA tools, share insights, and provide constructive feedback that will guide the project's next steps.

Key takeaways from the workshop include the necessity for enhanced interoperability between ENIGMA tools and existing databases, the importance of user-friendly interfaces to facilitate adoption, and the growing need for real-time monitoring capabilities. The discussions also emphasized the significance of interdisciplinary collaboration and data-sharing mechanisms to strengthen cultural heritage protection efforts.

Moving forward, the ENIGMA consortium will focus on refining the tools based on user recommendations, organizing training sessions to increase operational proficiency, and strengthening partnerships with cultural institutions and law enforcement agencies. The

continued engagement of archaeologists, law enforcement officers, and heritage professionals will be critical to ensuring the effectiveness and sustainability of the ENIGMA platform.

By integrating technological advancements with expert knowledge, ENIGMA aims to establish a robust framework for provenance research, artifact authentication, and heritage site monitoring. The outcomes of this workshop will contribute significantly to shaping future strategies for safeguarding cultural heritage, reinforcing the shared commitment to preventing illicit trafficking and preserving historical artifacts for future generations.