**ENIGMA**

# BRIEFING PAPER OF LEA WORKSHOP

## ENIGMA PROJECT

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| **PLACE** | Online (Teleconference) |
| **DATE** | Thursday, January 9th, 2025 |
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# ENIGMA CONSORTIUM

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Eratosthenes Centre of Excellence (ECoE), Cyprus

Cellock LTd (CLK), Cyprus

Turun Yliopisto (UTU), Finland

Koninklijke Musea voor Kunst en Geschiedenis (KMKG), Belgium

Kentro Meleton Asfaleias (KEMEA), Greece

Hellenic Police (HPOL), Greece

Heritage Malta (HM), Malta

Neuraltech IKE (NOE), Greece

Anysolution SL (ASOL), Spain

Miralab Sarl (Mlab), Switzerland

# WORKSHOP OVERVIEW

The ENIGMA LEA Workshop brought together experts from law enforcement agencies (LEAs), cultural heritage institutions, and ENIGMA project partners to address challenges related to combating illicit trafficking in cultural heritage. The workshop aimed to present ENIGMA's innovative tools, gather feedback, and refine their functionalities to align with operational requirements and enhance user experience.

# 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 LEA workflows.
Prioritize tools based on feedback from participants and address technical, legal, and interoperability concerns.

# PARTICIPANTS

The workshop brought together representatives from diverse organizations, including law enforcement agencies, cultural heritage institutions, and project partners from various countries. Participants included experts in cultural heritage protection, database management, and legal frameworks, ensuring a multidisciplinary approach to the discussions.

The workshop featured representatives from:

- **Countries Represented**: Austria, Belgium, Cyprus, France, Greece, Italy, Malta, Netherlands, Spain, United Kingdom, and Australia.

- **Organizations**: United Nations Office on Drugs and Crime (UNODC), police forces, cultural heritage authorities, and academic institutions.

# KEY HIGHLIGHTS

Participants provided structured feedback on the tools, rating them on usefulness, operational enhancement, and completeness. The UAI and 3D CG Reconstruction Tool emerged as the highest-rated tools, while suggestions for improvement included enhanced user interfaces, better database integration, and additional training for end-users.

## I.   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.

## II. FEEDBACK SUMMARY

- **Highest Rated Tools**: UAI (4.6 average rating) and 3D CG Reconstruction Tool (4.8 average rating).

- **Suggestions for Improvement:**
  - Enhanced interconnectivity with existing databases.
  - User-friendly interfaces and additional training materials.
  - Improved visualization for EO Toolkit and clear differentiation for reconstructed parts.

# KEY STATISTICS

The tools were prioritized based on feedback, with the UAI 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).

## I. TOOL RATINGS

- **UAI:** Usefulness (4.6), Completeness (4.2).

- **3D CG Reconstruction:** Usefulness (4.8), Completeness (4.6).

- **Provenance Research Tool:** Usefulness (4.5), Completeness (4.0).

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.
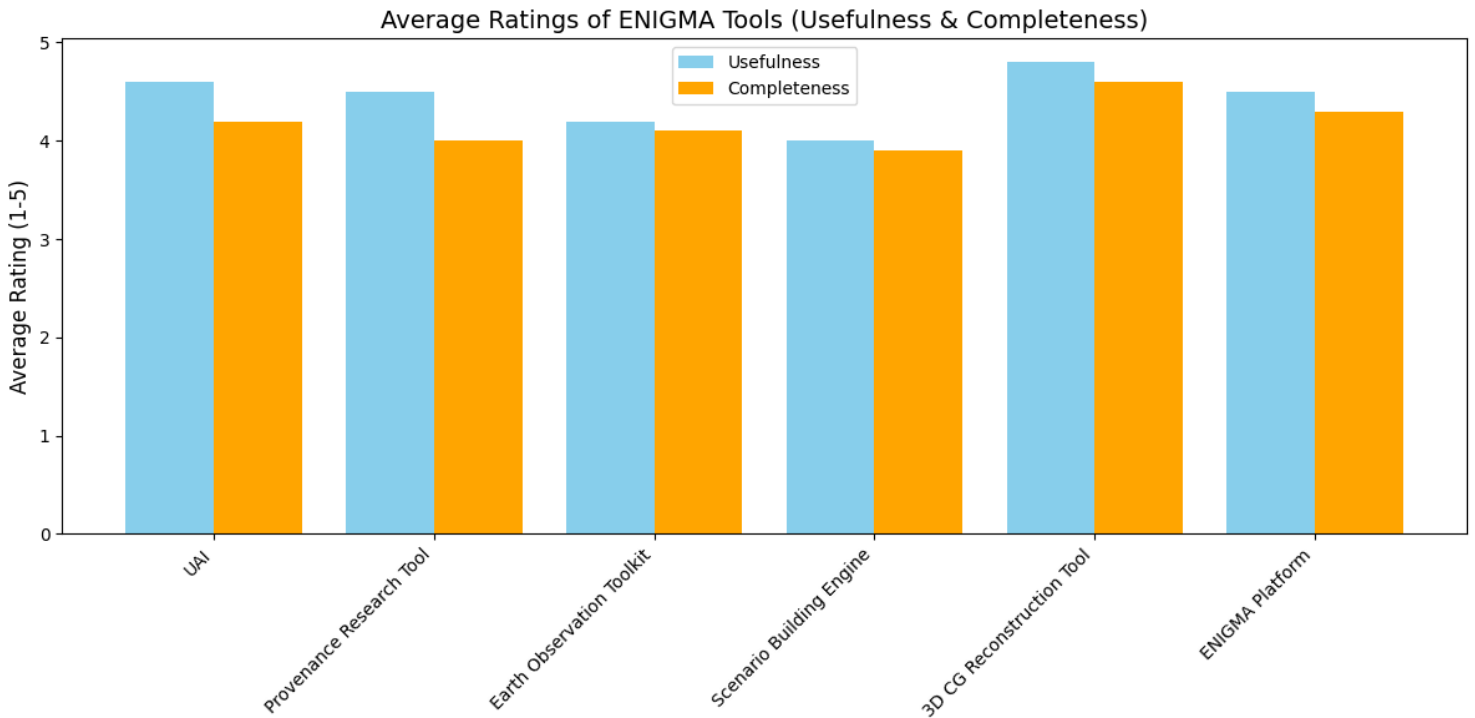
*Figure 1. Bar chart of Average Ratings of ENIGMA Tools*

The next chart represents the feedback on tool features, showing the distribution of feedback types for each tool (e.g., recommendations for improvement, operational needs, or ease of use). This visualization is a stacked bar chart categorizing feedback (e.g., "Ease of Use," "Integration," "Feature Suggestions").
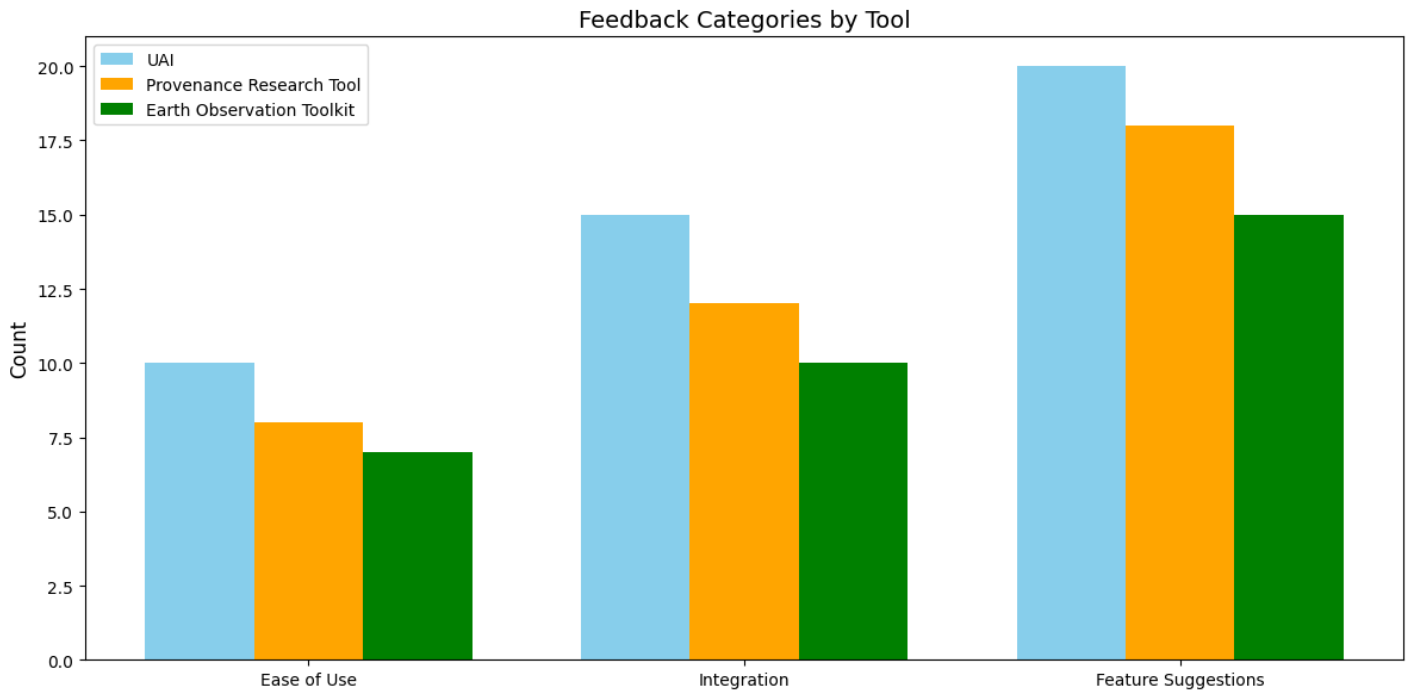
*Figure 2. Bar chart of Feedback categories  by ENIGMA tool*

# II.   TOOL PRIORITIZATION

- **Top Priority**: UAI and 3D CG Reconstruction Tool.

- **Secondary Priority**: Provenance Research Tool and Earth Observation Toolkit.

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.
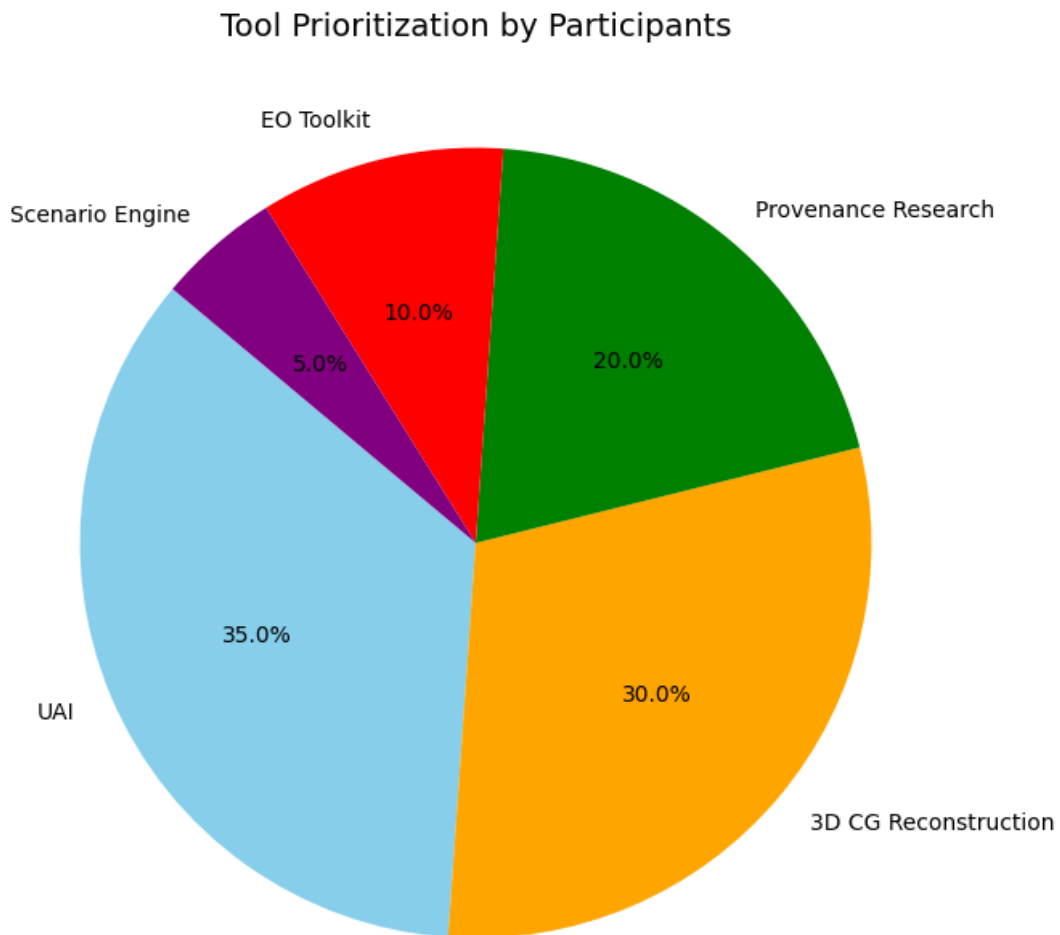
*Figure 3. ENIGMA's Tool Prioritization from Participants*

# ACTION POINTS

Action items included refining tools based on LEA feedback, enhancing training materials, and addressing technical and legal challenges for system integration. Further pilot testing and stakeholder engagement were recommended to validate tool functionalities and align them with end-user needs.

- **Tool Refinement**:

  o Develop intuitive interfaces and expand automation capabilities.

  o Integrate GIS features in the EO Toolkit.

- **Database Integration**:

  o Collaborate with international organizations to ensure interoperability.

- **Training and Engagement**:

  o Provide targeted training sessions for LEA users.

  o Schedule webinars for hands-on demonstrations.

- **Pilot Testing**:

  o Conduct scenario-based testing for the Scenario Building Engine and EO Toolkit.

# CONCLUSION

The workshop successfully provided a platform for valuable discussions and actionable insights. Feedback from LEA experts will guide the ENIGMA project's future development, ensuring the tools meet real-world requirements and enhance the protection of cultural heritage.