

Safeguarding the Past: Blending Digital and Traditional Tools to Combat Illicit Excavations and Cultural Property Trafficking

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Abstract

Illicit excavations and the trafficking of cultural property remain serious transnational threats, often linked to organized crime and conflict-related instability. Addressing this challenge requires interdisciplinary collaboration and the integration of innovative digital tools. The Safeguarding the Past workshop, held within the REVITALISER project activities, explores the use of Earth Observation, AI, and 3D technologies alongside legal and criminological frameworks. It brings together researchers, professionals, and authorities to strengthen cultural heritage protection.

1. Introduction

“With the trafficking of works of art we support our family” was a message found in the den of the last Italian Mafia Boss Matteo Messina Denaro, arrested after 30 years in-the-run in January 2023 [ARC24] highlighting the historic connection of illicit trafficking of cultural property and organised crime. Contemporary research shows that the structures that support the contemporary trade in cultural property is perhaps even more complex, spanning the grey space between the legal and illegal, licit and illicit, and encompassing crime far beyond traditional mafia patterns [TSI16, YAT16, MBYT19]. The illicit trade is transnational, digital, and largely opaque [REP23]. Efforts to control the illicit trade have changed its nature but have not managed to eliminate it.

The UN Security Council views such trafficking as a threat to global peace, infringing on the right to enjoy cultural heritage. It also challenges the 2030 Sustainable Development Goals, especially SDG16 and SDG11.4.

The European Commission's 2022-25 action plan [EC22] and the MONDIALCULT2022 declaration [MON22], endorsed by 150 states, both advocate international efforts against illicit excavations and trafficking of cultural property.

Conflicts in countries rich in cultural property amplify the trade in questionable antiquities, potentially linking it to illicit financial flows connected to money laundering and terrorism financing. Reports and policies, like the EUROPOL's assessment [EUR25], the EU Policy Cycle, and EMPACT's platform [EUR21], highlight the urgent need for academic and research support to Law Enforcement Agencies and Authorities on this topic. The *Safeguarding the Past: Blending Digital and Traditional Tools to Combat Illicit Excavations and Cultural Property Trafficking* workshop, organized in the framework of REVITALISER project (Preventive Protection of Archaeological Sites in the EMMENA Region) [REV25], aims to gather researchers and practitioners to discuss and exchange positions on the use of advanced digital technologies blended with traditional approaches in Cultural Property Protection.

2. Workshop structure and target groups

The proposed workshop will deepen topics like Earth Observation, Artificial Intelligence, 2D and 3D data collection, social and legal frameworks which regulate the activities of all the actors involved in safeguarding heritage sites and preventing the trafficking of cultural goods.

The workshop will be structured around multidisciplinary presentations, technology demonstrators and interactive Q&A sessions (Figure 1). It is designed for a diverse audience involved in cultural heritage protection, including archaeologists, heritage professionals, remote sensing and AI researchers, technology providers, legal experts, criminologists, and policymakers. It also targets law enforcement agencies, customs authorities, and cultural institutions involved in monitoring and combating illicit trafficking. Additionally, the event welcomes PhD students, early-career researchers, and practitioners seeking to expand their knowledge on the integration of digital tools with heritage protection strategies.

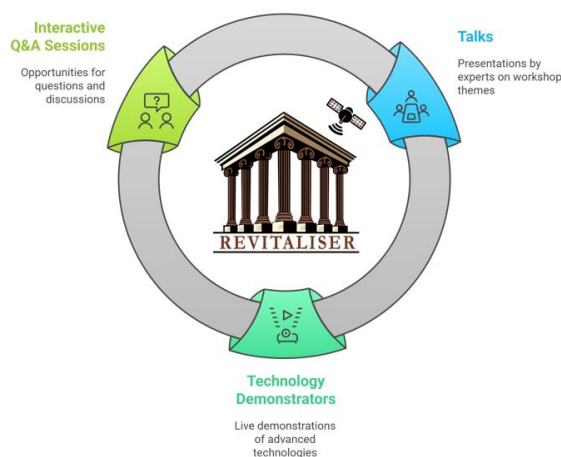


Figure 1. Cultural Property Protection workshop outline.

2.1 Remote Sensing and archaeological analysis

Satellite and aerial images are now frequently used by archaeologists to systematically document archaeological sites affected by illegal excavations and related human impact on cultural properties. In parallel, remote sensing scientists are increasingly developing processing methods with a certain degree of automation to quantify looting using this kind of imagery.

In this context, remote sensing has been used so far to address several questions regarding:

- **Site detection and looting identification:** Most looting prey in unknown or unprotected sites. Can large-scale site catalogues be automatically produced? Are there newly looted heritage sites? If so, where are they located?
- **Substantiation:** Is there evidence corroborating reports of looting incidents?
- **Monitoring and quantification of damage:** Is there evidence that looting is continuing at sites that were already looted? If so, at what rate and how is looting spatially spreading? To what extent has the site been damaged?

The increasing accessibility to a wider spectrum of space data, particularly very high resolution (VHR) images from commercial optical and synthetic aperture radar (SAR) satellite missions, aerial LiDAR, and unmanned aerial vehicles (UAV)-based data, has encouraged the research community to test new image processing techniques for identification, extraction, counting, and analysis of looting features, to complement analyst-driven methods of image interpretation and looting mapping.

2.2. Artificial Intelligence and Machine Learning

Artificial Intelligence and Machine Learning algorithms are particularly powerful in enabling the rapid identification, classification, and monitoring of archaeological features and artifacts across large spatial and temporal scales. This capability is especially valuable in tackling the growing challenges of illegal archaeological excavations and the illicit trafficking of cultural property.

By automating the detection of suspicious activities (e.g., undocumented site disturbances visible in satellite or drone imagery or LiDAR data), identifying illegal excavations under dense canopy cover, and supporting predictive models of high-risk areas, these tools are becoming critical assets in heritage protection.

- **2D data (e.g., satellite-, aerial- and UAV-based images, historical data / time series):** AI can detect anomalies, patterns of disturbance, and changes over time that may indicate illicit excavations, even in remote or inaccessible areas.
- **3D data (e.g., terrestrial, UAV- or aerial-based photogrammetric or LiDAR datasets):** AI-powered analysis of 3D data enables detailed classification/semantic segmentation, comparison, and monitoring of site integrity. These AI solutions and algorithms can support the identification of illegal activities under challenging environmental conditions.

2.3. Cultural Property Policy Development and Criminology

An essential dimension of the workshop lies in the intersection of Cultural Property Policy Development and Criminology, which provides the legal, institutional, and sociological frameworks

necessary to effectively address illicit excavations and trafficking as well as proper management of collected data.

Criminological perspectives help unpack the motivations, networks, and socio-economic conditions that drive heritage crimes, while policy analysis supports the design of effective regulatory and preventive measures at both national and international levels. By examining legal instruments, enforcement challenges, and the roles of different actors—from local communities and law enforcement to museums and international agencies—this component of the workshop will highlight how evidence-based policy and criminological insights are essential to building sustainable and coordinated responses to cultural property crimes. These discussions will complement the technological and archaeological aspects of the workshop, promoting a holistic, cross-disciplinary approach to heritage protection.

3. Conclusions

The *Safeguarding the Past: Blending Digital and Traditional Tools to Combat Illicit Excavations and Cultural Property Trafficking* workshop will offer a platform for archaeologists, technologists, criminologists, and policymakers to come together and explore integrated approaches to Cultural Property Protection. By showcasing the synergy between cutting-edge digital technologies—such as Earth Observation, Artificial Intelligence, and 3D data analysis—and traditional heritage management and legal frameworks, the workshop aims to foster innovative solutions and strengthen collaboration with law enforcement and institutional actors. Ultimately, the workshop will contribute to a broader effort to safeguard cultural heritage and propose innovative solutions to disrupt the illicit trade networks that threaten it.

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