

HORIZON-CL3-2021-FCT-01-08  
**RITHMS – Research, Intelligence and Technology for Heritage and Market Security**  
**GA 101073932**

## **Deliverable 7.3**

# **Report on RITHMS social benefits and risks**

WP 7 – Ethical, societal and legal issues

**Authors:** Ignacio Díaz Castaño (UDC), Patricia Faraldo Cabana (UDC)

**Lead participant:** UDC

**Delivery date:** 30<sup>th</sup> September 2023

**Dissemination level:** Public

**Type:** Report



## Revision History

<b>Author Name, Partner short name</b>	<b>Description</b>	<b>Date</b>
Nacho Díaz Castaño, Patricia Faraldo Cabana (UDC) (UDC)	Draft deliverable	26/09/2023
Michela De Bernardin (IIT), Madison Leeson (IIT)	Revision	29/09/2023
Arianna Traviglia (IIT)	Final version	30/09/2023



## Contents

<b>Executive Summary</b> .....	4
<b>List of abbreviations</b> .....	5
<b>List of figures</b> .....	5
<b>List of tables</b> .....	6
<b>1 Introduction</b> .....	7
1.1 Scope.....	7
1.2 Structure .....	8
1.3 Relation to other deliverables .....	8
1.4 Methodological notes.....	9
<b>2 Social impact of the use of AI for the combating trafficking of cultural heritage</b> .....	11
2.1 Social impact of trafficking in cultural goods .....	11
<b>3 Expected impacts of RITHMS</b> .....	27
3.1 The Nominal Group Technique: Methodological considerations .....	27
3.2 Benefits of RITHMS for citizens .....	29
3.3 Risks of RITHMS for citizens.....	32
3.4 Benefits of RITHMS for LEAs.....	33
3.5 Risks of RITHMS for LEAs .....	35
3.6 Benefits of RITHMS for suspects .....	37
3.7 Risks of RITHMS for suspects .....	39
<b>4 Conclusions</b> .....	41



## Executive Summary

The purpose of this deliverable is to identify the expected social impact of the technological tools that will be generated within the RITHMS project. For this purpose, the social, economic, and cultural costs of crimes against cultural heritage have been quantified, since a better fight against this form of crime could help to reduce these costs to a certain extent. We have also identified the benefits of using predictive policing tools and other Artificial Intelligence tools in crime prevention, improving detection capabilities and accuracy, reaction times, and the ability to perform predictive analysis and we have explored the impact they can have in the fight against CH crimes. At the same time, we have identified the most frequent risks identified in the literature, such as concerns about surveillance, data protection, freedom of expression or bias. To try to better understand the impact that these technologies can have when used in the fight against CH crimes, we have carried out a systematic review of the literature on this subject, but the results are scarce, since the research does not address the social impact of the tools they present. This is why we have obtained direct information from LEAs, through the nominal group technique, which has allowed us to identify some expected social benefits and risks of RITHMS, such as safe online markets, working time reduction, having a stable system that allows gathering information, on the one hand, or the adaptation of criminals, problems of system preparation, or problems concerning software certifications, on the other hand.



## List of abbreviations

AI	Artificial Intelligence
CH	Cultural Heritage
EU	European Union
ICH	Intangible Cultural Heritage
LEA	Law Enforcement Agency
NGT	Nominal Group Technique
WP	Work Package
PCA	Principal Component Analysis
RRI	Responsible Research and Innovation
SNA	Social Network Analysis
UAV	Unmanned Aerial Vehicle
VHR	Very High Resolution

## List of figures

Figure 1: Distribution of scores for expected benefits of RITMHS for citizens.	31
Figure 2: Distribution of votes for expected benefits of RITMHS for citizens	31
Figure 3: Distribution of scores for expected risks of RITMHS for citizens	32
Figure 4: Distribution of votes for expected risks of RITMHS for citizens	33
Figure 5: Distribution of scores for expected benefits of RITMHS for LEAs	34
Figure 6: Distribution of votes for expected benefits of RITMHS for LEAs	35
Figure 7: Distribution of scores for expected risks of RITMHS for LEAs	36
Figure 8: Distribution of votes for expected risks of RITMHS for LEAs	37
Figure 9: Distribution of scores for expected benefits of RITMHS for LEAs	38
Figure 10: Distribution of votes for expected benefits of RITMHS for Suspects	38
Figure 11: Distribution of scores for expected risks of RITMHS for suspects	39
Figure 12: Distribution of votes for expected risks of RITMHS for suspects	40



## List of tables

Table 1: Overview of costs of CH crime	15
Table 2: Results obtained by source	21
Table 3: Selected studies	23
Table 4: Analysis of needs and values of society.	24
Table 5: Analysis of social benefits	25
Table 6: Analysis of risks	26
Table 7: Expected benefits of RITMHS for citizens.	30
Table 8: Expected risks of RITMHS for citizens.	32
Table 9 Expected benefits of RITMHS for LEAs.	34
Table 10: Expected risks of RITMHS for LEAs.	35
Table 11: Expected benefits of RITMHS for suspects.	37
Table 12: Expected risks of RITMHS for suspects	39



## 1 Introduction

### 1.1 Scope

Every action can yield both favourable and unfavourable consequences, and research is no different in this regard. Following Burgess (2012: 3), we can categorise the outcomes of security research concerning the society in which it takes place and the dissemination of its findings into two categories: risks and benefits, positive and negative. When it comes to societal security, debates and disagreements regarding what might be considered beneficial or detrimental for a given society often become particularly intense. This is because issues of security frequently revolve around fundamental questions about what a society cherishes, considers essential, or is willing to compromise on. It delves into matters like what the potential consequences of losing a particular way of social existence might be and, equally importantly, the collective awareness of the way of life members of a society share. Assuming that the objective of applied security research is to contribute to enhancing societal security, the positive outcome of such research is a more secure society — a heightened level of societal security achieved through research efforts, which, translated into the field we are working on, means a better protection of cultural property. In RITHMS, for that it is intended:

1. an overall better understanding of the criminal phenomenon of cultural heritage trafficking, including the interdependencies with other forms of organised crime, methodologies adopted by traffickers, and best practices for addressing the obstacles faced by national criminal justice systems;
2. the provision of a new technological tool (i.e., an innovative SNA-based, AI-equipped digital platform) to boost LEAs' capability of tackling the illicit trade in cultural goods;
3. the operationalisation of the collected knowledge and the developed technologies to enhance the ability of security practitioners to identify criminal networks and prevent organised crime from affecting cultural heritage;
4. the de-compartmentalisation of information on illicit trafficking of cultural goods, fostering international collaboration and knowledge-sharing among the end users and stakeholders, but also encouraging an updating of anti-trafficking EU policy informed by accurate data on the illicit trade in cultural goods.

However, this definition of the positive societal impact of security research on cultural heritage crimes brings about a fresh set of concerns in its wake. In fact, an important class of detrimental impacts of this sort of research is that secondary effects may be generated that entail the violation of fundamental rights and values. A second concern is that certain measures may impact disproportionately upon certain social groups or unduly discriminate against them. A third concern has to do with the development of technological tools that go beyond the limitations enshrined in the legal framework, including the future AI-Act. Some of these concerns have been already addressed in



other deliverables (see subsection 1.3 of this document). The main scope of this deliverable is to contribute to the task of giving guidance for responsible research and innovation by mapping RITHMS's societal expectations, benefits, and risks, in order to assess the lawfulness, as well as the socio-ethical aspects of the application of the technologies developed by RITHMS.

## 1.2 Structure

After this first section, Section 2 describes the social impact of the use of AI-based tools in the fight against cultural heritage crime. First of all, though, it is important to understand the social impact of the crime itself, since the negative impact of cultural heritage trafficking and related crimes can be somewhat reduced with better policing measures and control of this phenomenon, being this the main goal of RITHMS. In a second step, an exploration of the social impact of AI for the gathering of criminal intelligence is conducted, seeking to elucidate the impact that these tools can have on the investigation and fight against cultural heritage crime. Thirdly, a systematic literature review of the social impact of AI-based tools in the fight against cultural heritage crime allows us to identify the main preoccupations and mitigation measures in the literature. Finally, we used the nominal group technique to identify the opinions of the LEAs regarding the impact that RITHMS could produce.

## 1.3 Relation to other deliverables

This deliverable belongs to WP7 - Ethical, societal and legal issues. WP7 supports partners in monitoring and complying with the ethical and legal requirements of the project; adhering to the principles of RRI; anticipating and mitigating against potential negative implications and evaluating societal expectations, benefits, and risks; taking into account LEAs' needs and counterbalancing them with the need to respect fundamental rights and ethical principles, data protection regulations, and European and national legal regimes. The analysis of the legal framework was the objective of Task 7.1, which provides an integrated analysis of the legal aspects concerning the technologies developed in WP3-4. D7.1-Report on the legal framework (UDC, PU, M8) mapped the European and national legal framework regarding RITHMS technological outputs and the implied methodology, including an extensive exploration of the GDPR and the LED, as well as the national instruments envisaged by each country in the Consortium. This document considered current legal norms and requirements that the Consortium must comply with when researching and developing the RITHMS platform, as well as the ones that the final product must comply with in order to be deployed for law enforcement. Most of them were already mentioned in D1.1-Initial Legal Requirements (UDC, SEN, M6). D7.2-Ethics Protocol (UDC, SEN, M6) provided an overview of all planned data collection and processing operations; the identification and analysis of the ethics issues that these operations raise; and an explanation of the requirements that should be complied with to reduce risks. D9.3-AI Requirement N.3 contained a detailed explanation of the technical and non-technical implementation of mitigation measures and methods to realise Trustworthy Technology and AI (IIT, M6). Together, these deliverables considered the legality and ethics of using open-source and publicly available data in





research, as well as of using the RITHMS platform by LEAs. They articulated a framework for achieving Trustworthy Technology and AI based on fundamental rights. Now, Task 7.3 gauges the societal expectations, benefits, and risks of the technologies developed, including process automation, fusion of datasets, and communication of early crime-solving search results to investigators. D7.3-Report on RITHMS social benefits and risks (UDC, PU, M12) contributes to the anticipation and mitigation against potential negative implications by assessing the interaction of new technological capacities with societal and ethical issues of informativity and privacy, human dignity, and the presumption of innocence, as well as wider issues around justice, to develop the technology responsibly; analysing drivers, and needs/concerns, from the perspective of end-users (LEAs); and analysing the implications for criminal justice processes from rapid, and wider, data availability, to anticipate operational and governance needs for new methods.

#### 1.4 Methodological notes

As indicated, according to the task description the elaboration of this report would involve: i) the assessment of the interaction of new technological capacities with societal and ethical issues of informativity and privacy, human dignity and the presumption of innocence, as well as wider issues around justice, to develop the technology responsibly; ii) the analysis of drivers, and needs/concerns, from the perspective of end-users (LEAs); iii) the analysis of implications for criminal justice processes from rapid, and wider, data availability, to anticipate operational and governance needs for new methods. UDC would collect data on LEAs within the Consortium partners, which would provide their knowledge/insight and facilitate access to their workforce. Focus groups with experts would also help to identify a wide variety of issues for an initial analysis, including how to enable LEAs easier access to the data and a more accurate understanding of criminal networks' capabilities.

According to these instructions, the methodology for the analysis of social expectations, risks, and benefits followed a three-phase structure:

- In the first phase a literature review on the social impact of cultural heritage crime allowed us to identify the documented needs that the RITHMS research intends to address. In order to ensure that the research appropriately addresses these needs, a literature review on risks and benefits of automation processes, database sharing and Artificial Intelligence tools for crime analysis, prevention, and response has been conducted to identify and organise into a taxonomy the main benefits and risks common to the use of these technologies and processes in policing.
- In the second phase, the specific risks and benefits of tools and processes applicable to the fight against cultural heritage trafficking were identified. For this purpose, a systematic review has been conducted, following the PRISMA 2020 protocol (Page et al., 2020). The objective of systematic reviews is to identify, evaluate and summarise the results of all relevant studies on a given topic in a transparent way and thus extract the existing evidence, allowing decision-



makers to take evidence-based decisions. The identified risks and benefits are organised according to the taxonomy proposed in the first phase.

- In the third phase, direct information was obtained and analysed from those LEAs partners of the Consortium working in the fight against cultural heritage crime. The information from the LEAs allowed, on the one hand, to analyse the concrete risks and benefits of RITHMS and, on the other hand, to fill a potential gap in information on the risks and benefits identified in the literature. The methodology used for the collection and analysis of information was the nominal group technique. This mixed methodology allows qualitative information to be collected and subsequently quantified. Its structured, democratic, and transparent character reduces the impact of the researcher on the group, avoids the leader effect that can occur in other group methodologies and allows obtaining a consensus, which can be disseminated clearly and concisely to policy makers (Harvey & Holmes, 2012). This technique has already been used for risk-benefit analysis in other contexts, such as the healthcare system (Naude & Bornman, 2021; Kueper et al., 2022).



## 2 Social impact of the use of AI for the combating trafficking of cultural heritage

### 2.1 Social impact of trafficking in cultural goods

According to UNESCO,<sup>1</sup> cultural heritage encompasses artefacts, monuments, groups of buildings and sites, as well as museums, including tangible heritage (movable, immovable, and underwater) and intangible cultural heritage (ICH) interwoven with cultural and natural heritage artefacts, sites, or monuments, such as cave paintings that hold a variety of values, including symbolic, historical, artistic, aesthetic, ethnological or anthropological, scientific, and social significance. It is a tangible manifestation of human creativity, ingenuity, and expression, encapsulating the stories, traditions, and values of civilizations that have come before us. Cultural artefacts, whether ancient manuscripts, sculptures, paintings, or archaeological remains, are repositories of knowledge and memories that provide invaluable insights into the evolution of societies and cultures.

The inherent value of cultural heritage has also made it a prime target for illegal trade. The illicit trafficking of cultural goods has emerged as a global crisis, driven by the insatiable demand for antiquities, artworks, and historical artefacts in the underground market. This nefarious trade not only threatens the physical integrity of these artefacts but also erodes the fabric of societies by stripping them of their heritage, identity, and historical narrative. To comprehend the impact of RITHMS tools in combating illicit trafficking in cultural goods, one should begin by gaining insight into the inherent risks and the profound damage inflicted by such trafficking activities. It is with great expectation that RITHMS is anticipated to play a pivotal role in diminishing illicit trade and mitigating its far-reaching impact on cultural heritage. The illicit trafficking of cultural heritage inflicts a triad of profound and interconnected cultural, economic, and social costs, thereby weaving a complex web of repercussions that reverberate globally. This section identifies the multifaceted consequences of cultural property crime, underscoring its role in the degradation of the collective human heritage, financial integrity, and societal cohesion.

#### **Cultural costs**

- **Loss of identity and heritage:** Cultural heritage stands as a testament to the historical continuity, traditions, and identities of societies. However, the illegal trafficking of cultural artefacts severs the vital connection between these objects and the cultures from which they emanate, thus inducing a profound cultural cost. The removal of artefacts from their cultural and historical contexts results in a loss of identity and heritage for affected communities and nations (Brodie et al., 2000; Passas & Proulx, 2011; Campfens, 2022). This deprivation impedes the capacity of present and future generations to comprehend, cherish, and draw inspiration from their own cultural legacies. It creates a void in the cultural narrative, making it challenging

<sup>1</sup> Definition available at: <https://uis.unesco.org/en/glossary-term/cultural-heritage>.



for societies to maintain their continuity and self-identity. As a consequence, individuals and communities are deprived of their cultural foundations, hindering the transfer of cultural knowledge and traditions to successive generations (Mackenzie & Yates, 2016; Campfens, 2022).

- **Destruction of cultural landscapes:** Simultaneously, the illegal excavation and looting of archaeological sites engender the destruction of cultural landscapes, amplifying the cultural costs. Archaeological areas not only harbour invaluable artefacts but also serve as repositories of historical knowledge and relics of ancient civilisations. Nevertheless, looting is often executed hastily and devoid of proper documentation, resulting in irrevocable damage to the historical and archaeological context of these artefacts. This destruction manifests as a twofold loss. Firstly, it deprives future generations of the opportunity to glean insights into the lives and civilisations of their ancestors. Secondly, it hampers the endeavours of archaeologists and historians, who seek to conduct rigorous research and gain a profound understanding of the significance of these sites (Mackenzie & Yates, 2016; Brodie et al. 2000). Consequently, a wealth of knowledge concerning human history and culture is irrevocably erased, undermining our collective comprehension of our shared past.
- **Erosion of cultural diversity:** When cultural artefacts are pilfered and subsequently funnelled into international markets the visibility of the cultures of origin diminish, leading to a pervasive homogenisation of cultures (Zagato, 2021). This homogenisation stems from the replacement of authentic representations of various traditions with a more commercialised and, at times, distorted version of cultural heritage (Arizpe & Arizpe, 2015). This dilution compromises the authenticity of cultural expressions, rendering them less diverse and dynamic. The world subsequently becomes culturally impoverished, as the distinctive perspectives and insights offered by each culture are marginalised or lost.

### ***Economic costs***

The economic costs of cultural heritage trafficking constitute a profound layer of consequences, influencing both legitimate and illicit economic systems. This encompasses the proliferation of illicit art markets, the devaluation of legal art markets, adverse effects on tourism, and broader repercussions tied to organised crime.

- **The illicit trade and underground economy:** This market has spawned a clandestine and lucrative sector. Operating beyond the boundaries of legal oversight, this covert marketplace thrives on the surreptitious exchange of stolen cultural artefacts, art objects, and antiquities. Within this domain, the provenance of trafficked items is frequently obscured through a convoluted network of intermediaries. The illicit art market not only sustains cultural heritage trafficking but also serves as a conduit for money laundering (Patias & Georgiadis, 2023), exacerbating the economic complexities. Estimates suggest that the illicit art market comprises a multi-billion-dollar industry (Campbell, 2013; Hardy, 2016, but see also on the lack





of reliable data, Yates & Brodie, 2023), posing economic consequences that span from the direct sale of stolen cultural artefacts to the laundering of illicit proceeds through legitimate channels. These activities undermine the financial integrity of legal financial systems, underscoring the economic costs of cultural property crime. Concurrent with the rise of the illicit market is the devaluation of legitimate art markets. The infiltration of stolen cultural artefacts into these legal markets distorts prices and values (Kar & Spanjers, 2017; Suárez-Mansilla, 2018; Brodie et al., 2019), often driving down the perceived worth of legitimate art and cultural items. Buyers and collectors may inadvertently acquire stolen artefacts, which subsequently may be subject to repatriation efforts or legal actions, resulting in financial losses and legal entanglements. This devaluation also impacts artists, galleries, and legitimate art dealers who operate within the bounds of the law. Their works and legitimate transactions can be eclipsed by the sensationalised stories of high-profile art heists and illegal acquisitions, ultimately dimming the economic prospects of the art and cultural industries.

- **Impact on tourism:** The economic repercussions of cultural heritage trafficking extend to the tourism sector, particularly in regions abundant in cultural history and heritage sites. Cultural tourism often represents a pivotal pillar of many local economies, yielding substantial revenue and employment opportunities. However, when cultural artefacts and heritage sites fall prey to looting, theft, or degradation through illegal excavation, the appeal of these destinations diminishes (Pasikowska-Schnass, 2016; Warnke, 2019; Chainoglou, 2019). Tourists are less inclined to visit locales where the authenticity and integrity of cultural sites are compromised. This reduction in tourism footfall translates into decreased revenues. Furthermore, the negative publicity associated with cultural property crime tarnishes the reputation of regions or countries, discouraging potential visitors and negatively impacting the livelihoods of those reliant on the tourism sector (Warnke, 2019; Chainoglou, 2019).
- **Economic instability:** The economic costs of cultural heritage trafficking extend beyond art markets and tourism, seeping into the broader spectrum of economic activity. The proliferation of illicit trade networks is often entangled with other forms of organised crime, which diverts profits from cultural heritage trafficking into other illicit pursuits, such as drug trafficking, human smuggling, and arms dealing. These ill-gotten gains infiltrate and contaminate sectors of society, undermining social and economic stability. Consequently, the economic costs extend to the destabilisation of societies, intensifying insecurity, and compromising the rule of law.

### **Social costs**

As previously mentioned, the social costs of cultural heritage crime reverberate through societies and communities globally, entailing a host of interlinked consequences, including its associations with organised crime networks, its role in financing terrorism, its impacts on local communities, and its contribution to the erosion of societal cohesion.



- **Reduced access to heritage:** Cultural heritage is intricately interwoven with the identity and livelihoods of local communities. When cultural artefacts are looted, it disrupts the cultural heritage ecosystem within these communities. Local residents may lose access to historical sites and artefacts that hold personal, cultural, and spiritual significance. Furthermore, illegal excavation can inflict irreparable damage on archaeological sites, compromising their scientific and cultural value. Local communities reliant on cultural tourism may experience reduced economic opportunities as visitor numbers dwindle due to concerns about authenticity and preservation. In conflict zones, residents may be coerced into participating in looting activities, exposing them to physical danger and moral dilemmas. The social fabric of these communities may fray as they grapple with the consequences of cultural property crime, from economic hardship to the loss of cultural heritage.
- **Social disconnection:** The cumulative social costs of cultural heritage trafficking extend to the broader erosion of social fabric. Trafficking and looting cultural heritage have the potential to attack ethnic and religious identity (Altaweel & Shana'ah, 2023). The importance of cultural heritage for social cohesion has been recently recognized by heritage-based programs to develop more cohesive and plural communities through involvement in cultural processes of increasingly large segments of population (Carrà, 2016). Moreover, heritage tourism holds significance not only in terms of its economic impact but also in its pivotal role in facilitating reconciliation, promoting inclusiveness, commemorating history, and shaping a national identity (Viljoen & Henama, 2017). Communities, nations, and regions are interconnected through their shared heritage. However, when cultural heritage is stolen or lost, it creates a sense of disconnection and alienation among people. Moreover, the illegal trade of cultural artefacts fosters a culture of exploitation and disregard for cultural heritage. It erodes the trust and mutual respect that underpin relationships between nations and communities. This erosion of social cohesion impedes efforts to address other pressing societal issues, further exacerbating social divisions.

As other social costs, we must also take into account here that the illicit trafficking of cultural goods has far-reaching implications for national and international security.

- **Organised crime:** One of the most alarming social costs associated with cultural heritage trafficking lies in its collusion with organised crime networks (Blake, 2020: 167-168; Eber et al., 2022). Criminal organisations have discerned the financial allure of looting and trafficking cultural artefacts. They exploit the vulnerabilities of this trade, infiltrating supply chains and controlling routes through which stolen and looted heritage is disseminated. The nexus between cultural property crime and organised crime transcends financial gain. It extends to other illicit activities, including drug trafficking, human smuggling, wildlife and arms dealing. Cultural heritage trafficking furnishes a lucrative source of revenue that buttresses the expansion and consolidation of these criminal networks, destabilising societies and





undermining the rule of law. Moreover, there is ample evidence that looted and stolen antiquities are being laundered, as are the criminal proceeds of their sales (Brodie & Yates, 2022).

- **Financing of terrorism:** Equally concerning is the role of cultural heritage trafficking in financing terrorism, adding another layer of social costs (FATF, 2015, 2016, 2023). Terrorist organisations have identified the potential for financial gain within the illicit art and antiquities market. They exploit this opportunity to fund their operations through the looting and sale of cultural artefacts. The funds derived from cultural property crime are channelled into the acquisition of weapons, recruitment endeavours, and the sustenance of terrorist activities. By partaking in the illegal trade of cultural heritage, these groups not only undermine cultural preservation but also pose a direct threat to global security (Vlasic & Turku, 2016; Losson, 2016). Addressing this social cost requires vigilance in monitoring financial flows and artefact movements to prevent them from falling into the hands of terrorist organisations.
- **Destabilising source countries:** Many cultural artefacts are looted from source countries that are already grappling with political instability or conflicts. The plundering of their cultural heritage not only robs these nations of their identity but also exacerbates existing security challenges. The loss of cultural treasures can further fuel social unrest and resentment, potentially leading to more violence and instability.

<p><b>Cultural Costs</b></p> <ul style="list-style-type: none"> <li>● Loss of Identity and Heritage</li> <li>● Destruction of Cultural Landscapes</li> <li>● Erosion of cultural diversity</li> </ul>	<p><b>Economic Costs</b></p> <ul style="list-style-type: none"> <li>● Illicit trade and underground economy</li> <li>● Impact in tourism</li> <li>● Economic instability</li> </ul>
<p><b>Social Costs (security)</b></p> <ul style="list-style-type: none"> <li>● Organised crime</li> <li>● Financing of terrorism</li> <li>● Destabilising source countries</li> </ul>	<p><b>Other Social Costs</b></p> <ul style="list-style-type: none"> <li>● Reduced access to heritage</li> <li>● Social disconnection</li> </ul>

**Table 1:** Overview of costs of CH crime

In summary, the illegal trafficking of cultural heritage engenders a triad of cultural, economic, and social costs that are intricately interwoven. These consequences, ranging from the loss of cultural identity and the destruction of cultural landscapes to the financial destabilisation and societal fragmentation, emphasise the multifaceted nature of the challenge. Addressing these complex costs requires a comprehensive approach that prioritises the preservation of cultural heritage, financial integrity, and societal well-being, while fostering international cooperation and safeguarding our shared human heritage for present and future generations. The main expectation of the RITHMS project and the technologies developed within the project is to improve the capabilities to fight against





trafficking in cultural heritage, which would directly minimise the risks mentioned in this section associated with this illegal market.

## 2.2 Social impact of Artificial Intelligence for policing

Security within society is not uniformly distributed, varying based on factors like race, economic status, family structures, cultural norms, and political systems (Le Garrec, 2005; Cooper, 2008; Tefre, 2010; De Koning 2017; Herbert et al., 2018). Similarly, the benefits derived from security research are unevenly distributed, with certain segments benefiting more than others (Burgess, 2012). Security research can yield a range of diverse benefits, but not all are applicable to every societal group. The overall impact of security research outcomes is complex and may not necessarily translate into improved security for society as a whole; some benefits to specific segments can even have detrimental effects on others. Additionally, these developments can influence values beyond security, with both positive and negative consequences for society. This underscores the multifaceted and nuanced nature of security research's societal impact.

The historical integration of digital technologies and Artificial Intelligence (AI) into policing has witnessed significant developments. It commenced in the 1950s-1970s with the early adoption of computer systems for data management, transitioning from manual record-keeping. In the 1980s-1990s, expert systems emerged, offering AI-driven decision support, especially in areas like forensics and profiling (Cortada, 2007; Wilson, 2019). The 2000s-2010s saw predictive policing, leveraging the use of big data and machine learning to forecast crime patterns but sparking concerns about algorithmic bias (Perry, 2013, Ferguson, 2016; 2019). The 2010s to the present brought advanced surveillance technologies like facial recognition systems and drones, which enhanced monitoring capabilities but raised privacy and civil liberties concerns (Bier & Feeney, 2018; Bacalu, 2021; Almeida et al., 2022; Shanthi & Sivalakshmi, 2023). Simultaneously, body-worn cameras with AI features and audio analysis tools became standard, affecting transparency and accountability in police interactions. Additionally, AI's increasing use in sentencing recommendations and risk assessment, while promising, has generated concerns about bias and fairness. This historical context provides a foundation for understanding the current AI risks for policing.

In the dynamic landscape of combating illicit trade in cultural goods, the emergence of AI as a key ally marks a pivotal juncture in the collective endeavour to safeguard our shared heritage. AI's unparalleled capabilities to process, analyse, and derive insights from vast datasets offer a transformative potential that extends across the spectrum of detection, reaction, and prevention efforts (Dakalbab, 2022). This section provides an in-depth exploration of how AI acts as a catalyst, amplifying the efficacy of strategies designed to counter the complex challenges posed by the illicit trade in cultural artefacts.

- **Detection: Amplifying precision through AI.** The application of AI in detection strategies heralds a new era of precision and efficiency (McDaniel & Pease, 2021). With its advanced image recognition algorithms, AI can rapidly sift through an extensive collection of images to





identify stolen artefacts, including those that have been counterfeited or altered (Abate et al., 2022; Abate et al., 2023; Patias & Georgiadis, 2023). This capability significantly enhances the ability of law enforcement agencies and cultural institutions to identify and recover looted items. AI's tireless and consistent analysis ensures that even the subtlest visual cues are captured, making it a powerful tool to differentiate genuine artefacts from counterfeit replicas, often used to camouflage illicit trade.

- **Reaction: Real-time insights and timely interventions.** The dynamic nature of illicit trade requires equally agile responses. AI's capacity for real-time analysis enables law enforcement agencies to receive instantaneous alerts and insights regarding potential trafficking activities (Wen et al., 2012; Castro & New, 2016; Abate et al., 2022). When paired with data from various sources such as auction houses, online marketplaces, and cultural institutions, AI can swiftly flag suspicious transactions or emerging trends indicative of illicit trade. This real-time information equips authorities with the ability to intervene promptly, intercepting stolen artefacts before they disappear into the labyrinthine networks of traffickers.
- **Prevention: Harnessing predictive analytics for anticipation.** AI's predictive prowess empowers stakeholders with the ability to anticipate and proactively prevent illicit trade. By analysing historical data and identifying patterns, new technologies can predict potential trafficking routes, trends, and targets (Soldi et al., 2021; Ferber et al., 2023). This predictive capability is a transformative asset in crafting prevention strategies, enabling LEAs to allocate resources strategically and reinforce security measures at vulnerable sites. Moreover, AI aids in the optimisation of customs inspections, facilitating the identification of cultural artefacts amidst legitimate shipments and minimising the risk of undetected trafficking.

The integration of AI in detection, reaction, and prevention strategies not only amplifies their efficacy but also introduces an element of adaptability that is crucial in an ever-evolving landscape. However, the intersection of AI with efforts to combat cultural goods trafficking raises significant rights and civil liberties concerns that intersect with fundamental rights and freedoms. While AI technologies offer promising tools to detect and prevent the illegal trade in cultural artefacts, they also introduce potential threats to individual civil liberties.

Some of the primary rights and civil liberties concerns in this context, most of them already identified in the Ethics Protocol, include:

- **Surveillance and privacy concerns:** AI-powered surveillance technologies, including Big Data analysis tools, can be used to monitor public spaces and online marketplaces for cultural goods. While such surveillance can aid in identifying stolen and looted artefacts, it also risks infringing upon the right to privacy (Ferguson, 2017; Fan, 2018; Rademacher, 2020), a core element of European human rights law. Striking a balance between effective enforcement and privacy protection is crucial.



- **Data protection and GDPR compliance:** The use of AI for monitoring cultural goods transactions must adhere to the GDPR within the EU. Collecting and processing personal data, even in the context of cultural goods trafficking investigations, must comply with GDPR principles, ensuring the rights of individuals to data protection and lawful processing.
- **Freedom of expression and access to information:** Efforts to combat cultural goods trafficking through AI may inadvertently infringe upon the freedom of expression and access to information. Overly broad surveillance and data analysis measures may restrict individuals' ability to engage in legitimate cultural exchange and research, undermining their right to share and access information.
- **Algorithmic biases and discrimination:** Big data and AI are revolutionising how we can classify individuals and guide decision making. AI algorithms used by LEAs in their investigations should be rigorously tested to prevent biases that may result in discriminatory outcomes. For example, if AI systems disproportionately target specific cultural or ethnic groups, it could lead to unjust accusations and violations of non-discrimination principles enshrined in European human rights law.
- **Protection from unwarranted searches and seizures:** The use of AI in monitoring cultural goods transactions should not lead to unwarranted searches and seizures. Safeguards should be in place to ensure that individuals' rights to protection from arbitrary interference and unwarranted searches are upheld.

Addressing concerns regarding civil liberties in the context of AI-assisted efforts to combat the trafficking of cultural goods within Europe requires a delicate balance between preserving cultural heritage and safeguarding individual civil liberties. Policymakers, LEAs, and AI developers must collaborate to establish guidelines that respect privacy, data protection, and freedom of expression while effectively combating the illicit trafficking of cultural goods within the framework of European human rights standards and national legal frameworks.

### 2.3 Social impact of AI tools for the fight against the trafficking of cultural goods: a systematic review

Although within the RITHMS project, the implementation of AI technology will be limited to specific features of the SNA-based platform, the need to evaluate the impact of AI-based tools for law enforcement purposes is a topic on the rise and must be addressed, also with respect to RITHMS Platform potential future development beyond the project's end.

Currently, both public and academic debate are flourishing, taking into account opportunities and risks to enable initiatives that foster innovation but also minimise or eliminate potential risks (see, among many others, Joh, 2016; Ferguson, 2017; Eubanks, 2018; Algorithm Watch & Bertelsmann Stiftung, 2019; Lynskey, 2019; Marquenie, 2019; Ugwudike, 2020, 2021; Marquenie & Quezada-Tavárez, 2022). AI-based



tools such as facial recognition systems, intelligent video surveillance, aural surveillance, scraping of social media posts, police and commercial databases, financial transactions and tax files, as well as metadata from hotline calls requesting help or reporting child abuse have merited much attention, with careful evaluations of the benefits and risks of their implementation. However, from our viewpoint, the evolution of this discussion shows two relevant shortcomings: on the one hand, the debate is pretty much centred on the ethical implications of using AI, with far less attention paid to the societal aspects; and, on the other hand, it has not reached the same speed with regard to the use of these AI-based tools specifically to fight cultural property crimes. This relatively low level of attention may be due to the fact that a considerable number of academic works explore AI-based tools and technologies that do not deal with personal data and, therefore, do not pose - at least, apparently - as compelling concerns regarding their impact on individuals and society as the ones that do. For instance, optical and radar satellite technologies for monitoring archaeological sites at risk or finding looted sites; tagging systems using blockchain technology that connect cultural objects to their cloud-based 'biographies', inventorial information, and 'digital-twin' (i.e. their representation in a 3D environment); or convolutional neural networks for the identification of looted or stolen items sold online.

Considering this, the primary purpose of this systematic review is twofold: 1) to evaluate the impact and effectiveness of AI applications in detecting, preventing, and mitigating the phenomenon of illicit trafficking in cultural goods; 2) to identify the challenges, limitations, and social considerations associated with the use of AI in this domain in specialised literature; and 3) in the last step, to identify the main recommendations for eliminating or mitigating the negative social impacts of AI-based tools in the fight against cultural heritage crime. This includes potential biases in AI algorithms, data privacy concerns, and algorithmic limitations. We will also explore the societal and cultural implications of employing AI in the fight against cultural goods trafficking. This includes considering the impact on cultural heritage preservation, ethical aspects, and unintended consequences.<sup>2</sup>

### **Search strategy**

- Databases: The following databases will be systematically searched: Web of Science and Scopus.
- Inclusion Period: Studies published between 2013 and 2023 will be considered.
- Exclusion Criteria: Studies not related to cultural heritage crime, not in English, or outside the specified date range will be excluded.
- Search Terms: The search will employ a combination of relevant keywords and Boolean operators to identify eligible studies. The search strategy will include:
  - ("Artificial Intelligence" OR "AI" OR "Machine Learning" OR "Deep Learning" OR "Natural Language Processing" OR "NLP" OR "Computer Vision" OR "Image

---

<sup>2</sup> We use here the concept 'unintended consequences' in the Mertonian sense, as outcomes of a purposeful action that are not intended or foreseen, and can be beneficial and detrimental (Merton, 1936)



Recognition" OR "algorithm" OR "big data") AND ("Trafficking" OR "Illegal Trade" OR "Smuggling" OR "Illicit Trade" OR "looting") AND ("Cultural Goods" OR "Cultural Heritage" OR "Artefacts")

### **Study selection process**

- Initial Screening: Titles and abstracts of retrieved articles will be screened independently by two reviewers to identify potentially relevant studies.
- Full-Text Review: Selected articles from the initial screening will undergo full-text review to determine eligibility based on inclusion and exclusion criteria.

The results of the search process can be seen in **Table 2**.

### **Methodology for analysis and classification**

Each of the studies has been summarised (see **Table 3**) and analysed individually taking into consideration the societal impact checklist of Burgess (2012), which consists of 10 items organised in 3 categories:

#### *Ensuring security research aligns with societal needs and values*

1. The proposed research aims to address documented societal security needs, including those related to life, liberty, health, employment, property, environment, and cultural values.
2. The research output will meet these needs through rigorous analysis, innovative technologies, and evidence-based strategies. This will be demonstrated through comprehensive data collection, impact assessments, and stakeholder engagement to ensure relevance and effectiveness.
3. The research addresses threats to society such as crime, terrorism, pandemics, and natural and man-made disasters, safeguarding the well-being of individuals and communities.
4. The proposed research is suitable for addressing these threats due to its multidisciplinary approach, integration of cutting-edge technologies, and collaboration with relevant authorities and organisations.

#### *Promoting broad societal benefits*

5. The research will benefit various segments of society, including individuals, communities, businesses, and governments, by enhancing security, reducing vulnerabilities, and improving overall quality of life.
6. Society, as a whole, will benefit from increased security through reduced risks, improved public safety, and the preservation of societal values and norms.
7. The proposed research may enhance other societal values in Europe, such as cultural heritage preservation, social cohesion, and economic stability, by promoting security and stability.



Ensuring the research does not imply a negative impact on society

8. If implemented without proper safeguards, the research could potentially impact the rights and values enshrined in the Treaties, including freedom of association, freedom of expression, protection of personal dignity, privacy, and data protection. Ensuring these values are respected remains a paramount concern.
9. The research should avoid disproportionate impacts on specific groups or any form of discrimination. Equity and fairness in implementation must be upheld to prevent adverse consequences.
10. To mitigate negative impacts and uphold the European Charter of Fundamental Rights, specific measures will be implemented. These measures include robust ethical guidelines, continuous monitoring, stakeholder feedback mechanisms, and transparent reporting. Regular evaluations will ensure compliance with fundamental rights and equitable distribution of benefits, while also addressing potential negative consequences.

**Results and Discussion**

The literature analysing AI, deep learning, machine learning, or SNA tools is still very limited. Searches in Scopus and Web of Science in June 2023 yielded a total of 40 results. Of the 40 articles found, the list was reduced to 22 after eliminating duplicates present at the same time in both databases. The reading of titles, abstracts and full texts excluded 13 of these articles because they did not refer to looting or trafficking of cultural heritage, reducing the list to 9 studies.

Source	Search date	n° results
Web of Science	20/06/2023	22
Scopus	20/06/2023	18
Total found		40
Total after excluding duplicate studies		25
Total after excluding non-relevant studies for the topic		9

**Table 2:** Results obtained by source

A summary of the study’s purpose and main results is presented below.

Reference	Resume
Laucirella et al., 2017	This study introduces a semi-automated detection process that offers a fast and accurate approach to monitoring looting activities over time, demonstrated at the Ai Khanoum site in Afghanistan by using High-resolution satellite imagery data, principal component analysis (PCA) and empirically established geometric properties to identify and



measure individual pits.

- Tapete & Cigna, 2018
- The study assesses Sentinel-2's capability for monitoring cultural heritage sites by detecting changes, including collapses and looting in Syria, utilising 10-metre spatial resolution and multispectral data. It proves the accuracy of tracking changes over time and space and its usefulness in analysing urban sprawl across cultural landscapes.
- Greenland et al., 2019
- Archaeological looting causes problems like the destruction of stratigraphic data and artefact damage or loss. It also generates revenue, but studying its economic impact is challenging due to its hidden nature. To address this, the study employs machine learning to estimate market values. Using data from 41,587 sales across 33 firms, the algorithm predicts distribution channels, lot packaging, and estimated sale prices based on object characteristics.
- Hajj, 2021
- The Near East's archaeological heritage faces threats like looting, militarisation, and urban expansion. Physical monitoring is challenging due to dangerous conditions and vast areas. This study uses open-source data from ESA's Copernicus Constellation (Sentinel-1 and Sentinel-2) and Machine Learning to detect looting and destruction areas, offering a cost-effective, sustainable solution for large-scale, long-term monitoring.
- Winterbottom & Moubayed, 2022
- In this study, machine learning is applied to identify known artefacts in new images, specifically focusing on instance classification within large archaeological datasets. The research, based on a dataset of 24,502 images representing 4,332 unique object instances from the Durham Oriental Museum, achieves an initial accuracy of approximately 72%. With increased images per object instance and the use of ensemble classifiers, accuracy improves to around 83% and up to 84%.
- Abate et al., 2022
- The SIGNIFICANCE project will utilise Artificial Intelligence (AI) and Deep Learning algorithms to identify illicitly sold items on both the internet and dark web. It aims to develop a platform that enables LEAs and relevant authorities to effectively identify, track, and prevent illegal online auctions while exposing criminal networks. The platform will monitor forums and communication networks, flagging suspicious activities for prompt action by authorities.



Altaweel & Shana’ahc, 2023	This study utilises deep learning to detect looting at heritage sites using unmanned aerial vehicles (UAV) optical imagery, showcasing its precision and recall. The research emphasises the value of deep learning in automating heritage site protection and discusses potential improvements with new data, providing access to code and data for wider use.
Abate et al., 2023	This study demonstrates the potential of deep learning algorithms, particularly Convolutional Neural Networks (CNNs), in recognizing and identifying cultural heritage goods from images.
Patias & Georgiadis, 2023	The EU-funded ENIGMA project aims to enhance cultural heritage protection by improving identification, traceability, provenance research, and monitoring of endangered sites. This collaborative effort tries to address multifaceted challenges through database integration and evidence-based preventative measures.

**Table 3:** Selected studies

We then proceeded to analyse the societal impact of each of these studies according to the checklist mentioned above. It should be noted that the items were determined taking into consideration the content of the articles and not the potential impact of the studies, but rather the impact that the authors expressly identified.

First, we analyse how each of these studies ensures that the research is aligned with the needs and values of society.

Reference	1. Need	2. How to meet needs	3. Threat	4. How to address threats
Laucirella et al., 2017	Values (cultural heritage)	Satellite image and Semi-automated analysis	Looting	Identification (looting hotspots)
Tapete & Cigna, 2018.	Values (cultural heritage)	Satellite image	Looting, destruction	Identification (looting hotspots)
Greenland et al., 2019	Values (cultural heritage)	Market analysis, machine learning	Looting, Illegal trade	Identification (marketplaces); measuring markets and prices





Hajj, 2021	Values (cultural heritage)	Very High Resolution (VHR) imaging satellites	Looting, destruction	Identification (hotspots)
Winterbottom & Moubayed, 2022	Values (cultural heritage)	Machine learning	Illegal trade	Monitoring (Response): Identify illicitly sold items on both the internet and dark web
Abate et al., 2022	Values (cultural heritage)	AI, deep learning, crawlers	Illegal trade	Monitoring (Response): Identify illicitly sold items on both the internet and dark web
Altaweel & Shana'ahc, 2023	Values (cultural heritage)	UAV and deep learning	Looting	Fast response with real time data (prevention)
Abate et al., 2023	Values (cultural heritage)	Artificial Intelligence	Illegal trade	Monitoring (Response): Identify illicitly sold items on both the internet and dark web
Patias & Georgiadis, 2023	Values (cultural heritage)	Artificial intelligence; satellite image; other	Looting, illegal trade	Prevention, monitoring, social engagement and LEAs capacity building. provision of reliable and timely information; Authenticity and Traceability; remote sensing and monitoring; Enabling Database and Inventory Sharing and Interlinking; Augmented Reality; Public engagement

**Table 4:** Analysis of needs and values of society.

In relation to the need, all the selected studies deal with looting and or trafficking of cultural heritage, so the need to which they all respond is to a value, in this case, cultural heritage. To address this need, different technologies have been used, which can be reduced to: 1) satellite imagery; 2) unmanned vehicle imagery, algorithms, AI tools, including deep learning and machine learning and crawlers to download content from the internet.

The threats these studies are trying to respond to have been categorised into Illegal trade, referring to any form of illegal trade, looting, and destruction. It is noticeable that neither there are studies focused on developing technologies aimed at addressing other threats, such as artefacts counterfeiting or smuggling, nor to identify potential looters. All the studies focus on either the physical location or the online characteristics of the artefact.

We have identified a correspondence between studies that utilise satellite imagery and the threat of looting and destruction. These studies typically respond to the threat through delayed monitoring,





which does not allow for swift prevention or response, although, in some cases, they are combined with AI tools that enable the prediction of hotspots, which can assist in prevention by allocating available resources to the right places. However, we have found a study that, instead of using satellites as a data source, utilises images from unmanned aerial vehicles (UAVs). This enables an immediate response and facilitates the prevention of such crimes. On the other hand, we have studies that focus on illegal trade, specifically online commerce, developing tools to monitor markets, identify artefacts, users, and transactions.

Secondly, we analysed the presence of the items for social benefits impact:

Reference	5. Segments benefit	6. Social benefits	7. Other European values
Laucirella et al., 2017	LEAs. Local communities on cultural tourism	x	x
Tapete & Cigna, 2018.	x	x	x
Greenland et al., 2019	x	x	x
Hajj, 2021	x	x	x
Winterbottom & Moubayed, 2022	LEAs	x	x
Abate et al., 2022	LEAs	x	x
Altaweel & Shana'ahc, 2023	LEAs and other guards	x	x
Abate et al., 2023	LEAs	x	x
Patias & Georgiadis, 2023	LEAs	x	x

**Table 5:** Analysis of social benefits

Most studies identify LEAs as a beneficiary segment, owing to a reduction in workload and an improvement in response to this type of crime. Only one study mentions the local communities that rely on cultural tourism.

None of the studies describe specific impacts on the citizens, beyond indicating in the theoretical framework that this type of crime has a negative social and economic impact and they also do not identify other European values beyond security and cultural protection.

Finally, we analysed the potential negative impact described by the selected studies.



Reference	8. Negative impact	9. Impact on groups	10. Mitigation measures
Laucirella et al., 2017	x	x	x
Tapete & Cigna, 2018	x	x	x
Greenland et al., 2019	x	x	x
Hajj, 2021	x	x	x
Winterbottom & Moubayed, 2022	x	x	x
Abate et al., 2022	x	x	x
Altaweel & Shana'ahc, 2023	x	x	x
Abate et al., 2023	x	x	x
Patias & Georgiadis, 2023	x	x	x

**Table 6:** *Analysis of risks*

It is alarming that none of the studies have identified a negative impact or at least potential risks associated with the use of these tools, neither for society as a whole nor for specific groups. Consequently, no measures to mitigate a potential negative impact are identified either.

The lack of identification of risks and benefits of AI, SNA, and other disruptive technologies in the fight against the trafficking of cultural heritage is overwhelming. Therefore, it becomes necessary to seek alternative approaches to identify potential benefits and risks of RITHMS' technological outputs.



## 3 Expected impacts of RITHMS

### 3.1 The Nominal Group Technique: Methodological considerations

According to the task description, we would collect data on LEAs within the Consortium partners, which would provide their knowledge. To explore LEAs' views in relation to the expected impact of RITHMS we used the Nominal Group Technique (NGT). The in-person session took place during the meeting in Venice, 14-15 September 2023. NGT is a structured and participatory method that facilitates effective decision-making and idea generation within a group of experts or stakeholders. In the context of this research, NGT serves as an invaluable tool for systematically collecting insights, opinions, and perspectives from diverse stakeholders who have a vested interest in the societal impact, risks, and benefits of an SNA-based, AI-equipped tool designed to combat trafficking, smuggling, and looting of cultural goods. The choice of NGT for this research methodology is deliberate and well-suited to achieve several critical objectives:

- **Ensuring participation and equal voice:** NGT is designed to promote equal participation among stakeholders, ensuring that every voice is heard. This is crucial when dealing with a range of stakeholders, including citizens, law enforcement personnel, and suspects. It fosters a democratic and inclusive approach to gathering input.
- **Structured and systematic approach:** NGT provides a clear and structured process for generating, sharing, and prioritising ideas. It guides participants through distinct rounds of idea generation, discussion, and ranking, ensuring a methodical and organised approach to data collection.
- **Anonymity and independence:** NGT allows participants to express their opinions anonymously in the initial idea generation phase. This anonymity encourages open and honest contributions, particularly from stakeholders who may have concerns or reservations about the AI tool.
- **Balancing quantitative and qualitative Data:** NGT combines both quantitative and qualitative elements. Participants not only rank ideas but also engage in discussions to provide context and elaborate on their perspectives. This mixed-methods approach enriches the data collected.
- **Transparency and consensus building:** Through NGT, participants engage in collaborative discussions that enable them to better understand each other's viewpoints. This fosters transparency and often leads to consensus or a shared understanding of key issues.
- **Incorporating diverse perspectives:** Cultural goods trafficking and the use of AI tools to combat it involve multifaceted ethical, legal, and societal dimensions. NGT enables the incorporation of these diverse perspectives into the research process, allowing for a more comprehensive assessment.



By introducing NGT as the chosen methodology, this research acknowledges the complexity of the issue at hand and the importance of engaging stakeholders with varying interests and viewpoints. It underscores the commitment to a rigorous, inclusive, and systematic approach to understanding the societal impact, risks, and benefits of an SNA-based, AI-equipped tool in addressing cultural goods trafficking, benefiting from the collective wisdom and insights of all involved stakeholders.

Thus, regarding the structured framework of the NGT session, it comprised several key phases to facilitate the meaningful and comprehensive collection of input from stakeholders. The session was systematically organised as follows:

**Introduction (Facilitator):** The facilitator warmly welcomed participants and set a positive, inclusive tone.

The NGT process was explained, emphasising the session's objectives and the importance of each participant's contributions. Anonymity and confidentiality were assured to promote candid and honest sharing of perspectives.

- **Round 1 (Silent Generation of Ideas):** Participants individually brainstormed ideas related to the societal impact, risks, and benefits of the foreseen RITHMS Platform. Silent brainstorming allows for unbiased and independent idea generation. To facilitate the group dynamics, the questions were sent to the LEAs in advance.
- **Round 2 (Sharing Ideas):** Participants took turns sharing one of their generated ideas without repetition or judgement. Ideas were recorded on a shared screen without immediate evaluation.
- **Round 3 (Clarification and Discussion):** Participants engaged in a discussion to clarify and elaborate on the shared ideas. The facilitator moderated the discussion to ensure inclusivity and focus.
- **Round 4 (Voting and Prioritization):** Participants individually voted on ideas, indicating their importance or relevance. Ideas were prioritised based on the participants' perspectives.
- **Round 5 (Ranking and Summary):** The facilitator compiled and analysed the votes to identify the top-ranked ideas. The usual procedure is to vote for the 5 most relevant ideas, assigning 5 points to the most relevant of those selected, 4 points to the second most relevant, and so on until 1 point is assigned to the fifth most relevant idea on the list. In the nominal group that we have carried out we have found some questions in which there were only 3 ideas, in this case we have chosen to assign 2 points to the most relevant idea and 1 point to the second most relevant, in order to identify ideas that appeared in the discussion but were not relevant.

The aim was to engage participants in an in-depth discussion focused on the most significant ideas, fostering consensus and a thorough examination of their implications.



This structured NGT approach ensures that diverse stakeholder input is systematically collected and evaluated, contributing to a comprehensive understanding of the societal impact, risks, and benefits of the RITHMS tool in combating cultural goods trafficking.

Regarding the session's content, we took into account that the looting, smuggling, and trafficking of cultural goods are critical issues that have far-reaching implications for society, heritage preservation, and law enforcement. To address these challenges effectively, innovative solutions are required like the ones proposed by RITHMS. However, the adoption of SNA and AI in law enforcement practices introduces a complex interplay of societal impacts, risks, and benefits that warrant careful consideration. Therefore, the session focused on understanding the multifaceted implications of RITHMS with a particular emphasis on the perspectives of law enforcement officers. In this context, two key research questions have been formulated to guide our exploration of the societal dynamics surrounding SNA and AI technologies in law enforcement:

- **What are the perceived societal impacts of implementing the RITHMS Platform in combating cultural goods trafficking for citizens, police, and suspects?** This question aims to elicit police officers' opinions on how the deployment of the RITHMS platform affects various segments of society. Participants can provide insights into how citizens, including cultural heritage enthusiasts, may experience positive or negative societal impacts. Additionally, it explores the impact on the police force itself and the potential consequences for suspects involved in cultural goods trafficking.
- **What are the identified risks and benefits of using the RITHMS Platform in law enforcement practices related to the fight against cultural goods trafficking?** This question delves into the specific risks and benefits perceived by police officers in utilising the SNA-based, AI-equipped tool developed by RITHMS in their daily operations. Participants could share insights on potential operational risks, such as false positives or biases, as well as the advantages, such as enhanced detection capabilities and streamlined investigations, considering the implications for citizens and suspects.

### 3.2. Benefits of RITHMS for citizens

After generating, sharing, discussing and ranking ideas regarding the expectations of the benefits and positive impact that RITHMS and the tools developed within the project could have for citizens, the final list generated by the participants included nine ideas.



1. Safer online trading and other private transactions for buyers
2. Increased perception of security
3. Increased social awareness of protecting cultural heritage
4. Providing new conceptual advances in the use of AI-based evidence to combat illicit trade in cultural goods
5. Cutting off financial flows to terrorist and criminal organisations
6. Increased prosecution of heritage crimes
7. Citizens will be able to share information with LEAs more easily<sup>3</sup>
8. Protection of national heritage to give the opportunity to the citizens to know their background, their past
9. Improving cultural tourism and attraction to exhibitions and museums

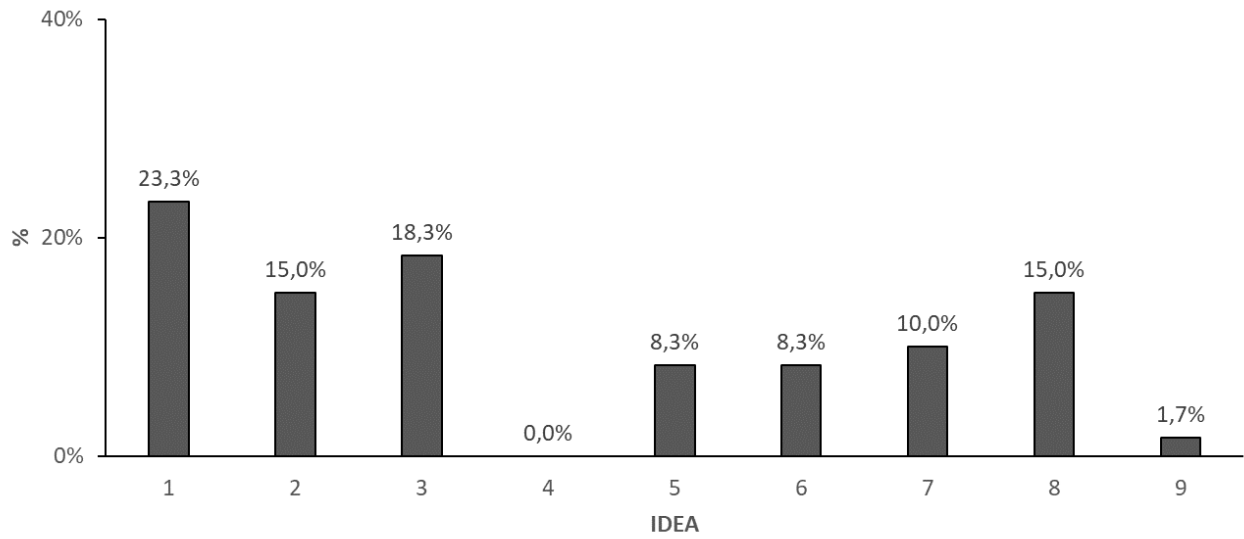
**Table 7:** *Expected benefits of RITHMS for citizens*

When analysing the proportion of the total number of assignable points we found that 8 of the 9 ideas were scored.

The idea with the highest score was “Idea 1: Safer online trading and other private transactions for buyers”, followed by “Idea 3: Increased social awareness of protecting cultural heritage”, “Idea 8: Protection of national heritage to give the opportunity to the citizens to know their background, their past” and “Idea 2: Increased perception of security”. “Idea 4: Providing new conceptual advances in the use of AI-based evidence to combat illicit trade in cultural goods” was the non-scored idea. This is quite surprising, since RITHMS, as a research & innovation action, includes a specific research Task (2.5) that aims at providing exactly that.

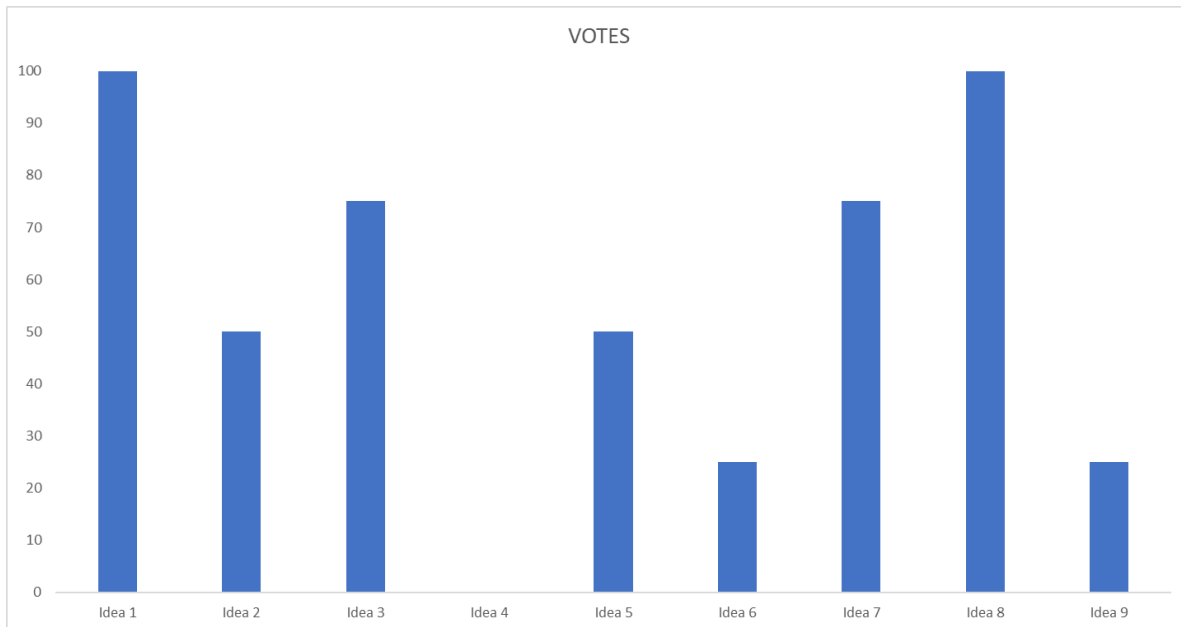
---

<sup>3</sup> It should be underlined that citizens will not have direct access to the RITHMS platform, and this will not imply any automatic system of information sharing between citizens and LEAs. RITHMS project, overall, will raise awareness and encourage citizens to collaborate with LEAs, also boosting the improvement of EU policy for open-data exploitation.



**Figure 1:** Distribution of scores for expected benefits of RITHMS for citizens

“Idea 1” received the highest number of votes and was ranked by all participants “Idea 8”, although it has fewer votes than “idea 1” and “idea 3”, was also ranked by all participants, so these two ideas are the ones on which there is the greatest consensus.



**Figure 2:** Distribution of votes for expected benefits of RITHMS for citizens



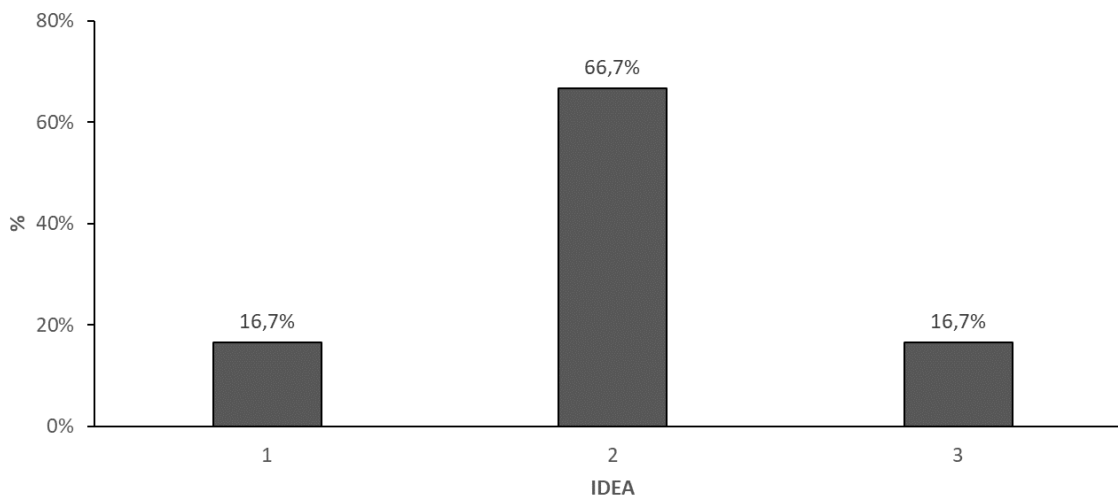
### 3.3. Risks of RITHMS for citizens

After generating, sharing, discussing, and ranking ideas regarding the expectations of the risks and potential negative impact that RITHMS and the tools developed within the project could have for citizens, the final list generated by the participants included only 3 ideas:

1. Increasing outcomes in government domain: people will pay more for security
2. Criminals will become more flexible and find new ways of selling the illicit goods
3. Lack of information about the objects and illicit access to the system

**Table 8:** *Expected risks of RITHMS for citizens*

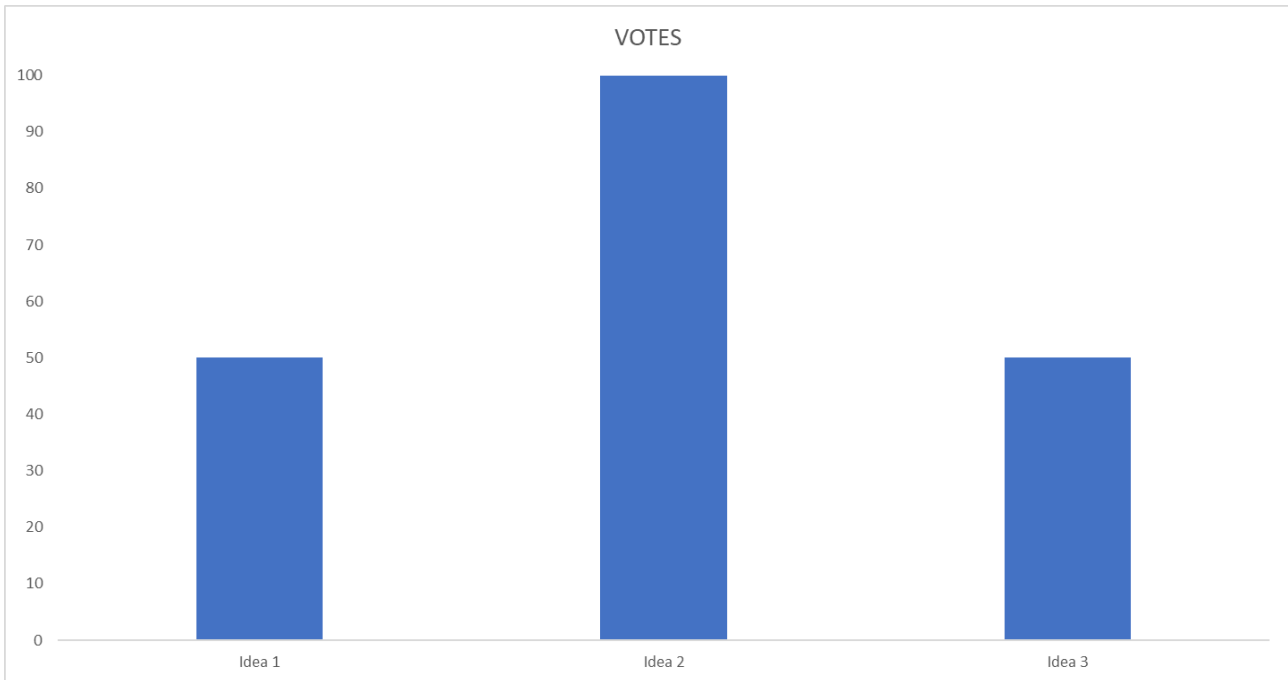
As the list of ideas was short, we just ranked the 2 first ideas rather than 5, in order to identify the most and least relevant idea. As can be seen in the figure 3, "idea 2: Criminals will become more flexible and find new ways of selling the illicit goods" received the highest proportion of points, while "idea 1: Increasing outcomes in government domain: people will pay more for security" and "idea 3: Lack of information about the objects and illicit access to the system" received equal scores, far below "idea 2".



**Figure 3:** *Distribution of scores for expected risks of RITHMS for citizens*

When analysing the number of participants who voted for each idea, we found similar results, since "idea 2" was voted for by all participants, and is, therefore, the one on which there is the greatest consensus.





**Figure 4:** Distribution of votes for expected risks of RITHMS for citizens

These scarce results are consistent with the ones obtained through the Ethics Questionnaire sent in December 2022 and the Ethics Workshop that took place in Munich, 31 January 2023. Law enforcement officers find it extremely difficult to acknowledge the existence of the ethical and societal negative implications of their work for citizens and society in general, even when directly asked about them after being presented with a list of risks and a short definition.

### 3.4 Benefits of RITHMS for LEAs

Participants were much more explicit with regard to the benefits of using the RITHMS Platform for LEAs. In this case, after generating, sharing, discussing, and ranking ideas regarding the expectations of the benefits and positive impact that RITHMS and the tools developed within the project could have for them, the final list generated by the participants included a total of 15 ideas:

1. Having an easy and stable system that can reduce daily time work
2. Data collection from open sources
3. Exchange of information between LEAs<sup>4</sup>
4. Be able to analyse larger volume of information
5. Public awareness and civil society involvement in the protection of cultural heritage

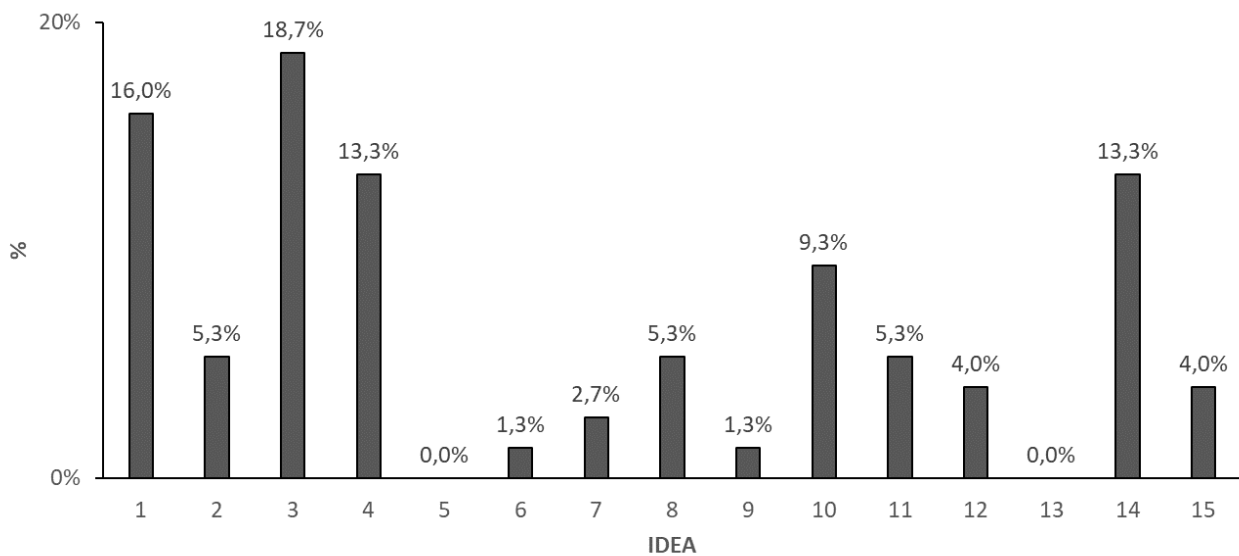
<sup>4</sup> It should be underlined that the RITHMS platform will not imply any automatic system of information sharing among LEAs: data retrieved from the platform can be eventually shared by the LEAs through their usual channels, without prejudice to compliance with the current legal framework.



6. Get reliable intelligence results to ensure criminal proceedings
7. Creating a database with all types of cultural heritage
8. Get a broader view of the criminal situation, actors and connections
9. Good enforcement of legal norms and control by the State in order to protect cultural heritage
10. Fast identification of stolen objects online
11. Easier to identify illegal marketplaces
12. Prevention of criminal influence on historical heritage domain
13. Implementation of intelligence and innovation technologies in combatting and protecting cultural heritage
14. Be able to identify networks of organised crime easy and fast
15. Import and collect information in the system

**Table 9:** Expected benefits of RITHMS for LEAs

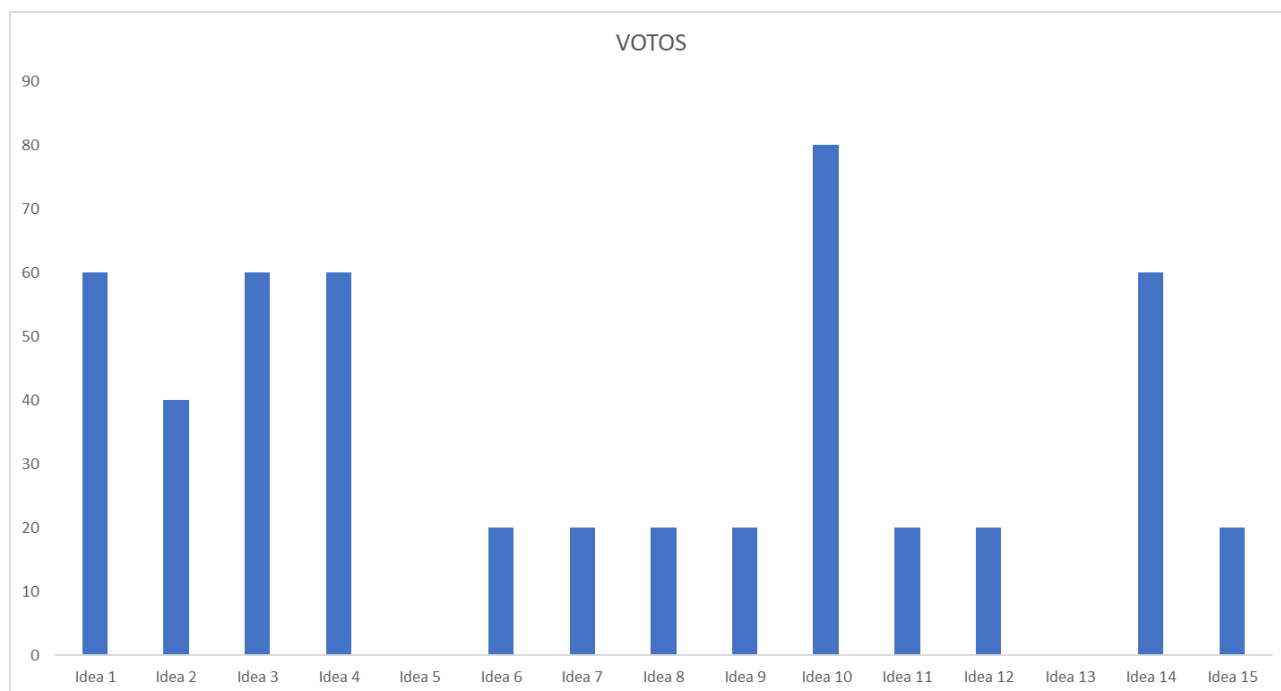
When analysing the proportion of the total number of assignable points we found that 13 of the 15 ideas were scored. The idea with the highest score was “Idea 3: Exchange of information between LEAs”, followed by “Idea 1: Having an easy and stable system that can reduce daily time work; “Idea 4: Be able to analyse larger volume of information” and, with the same score “Idea 14: Be able to identify networks of organised crime easy and fast”. “Idea 5: Public awareness and civil society involvement in the protection of cultural heritage” and “idea 13: Implementation of intelligence and innovation technologies in combatting and protecting cultural heritage” did not receive any points and as can be seen in Figure 5, the rest of the ideas are relatively far from the top ideas mentioned above.



**Figure 5:** Distribution of scores for expected benefits of RITHMS for LEAs



When analysing the number of votes received, regardless of the score given, we found interesting results. Each of the ideas in the top 4 of the aforementioned ideas was voted with some points by 60% of the participants, but “idea 10: Fast identification of stolen objects online”, which received a lower total score than the ideas in the top 4, was voted by 80% of the participants, which indicates that although other ideas are more prioritised, this idea is important for most of the participants, and the one on which there is the greatest consensus.



**Figure 6:** Distribution of votes for expected benefits of RITHMS for LEAs

### 3.5 Risks of RITHMS for LEAs

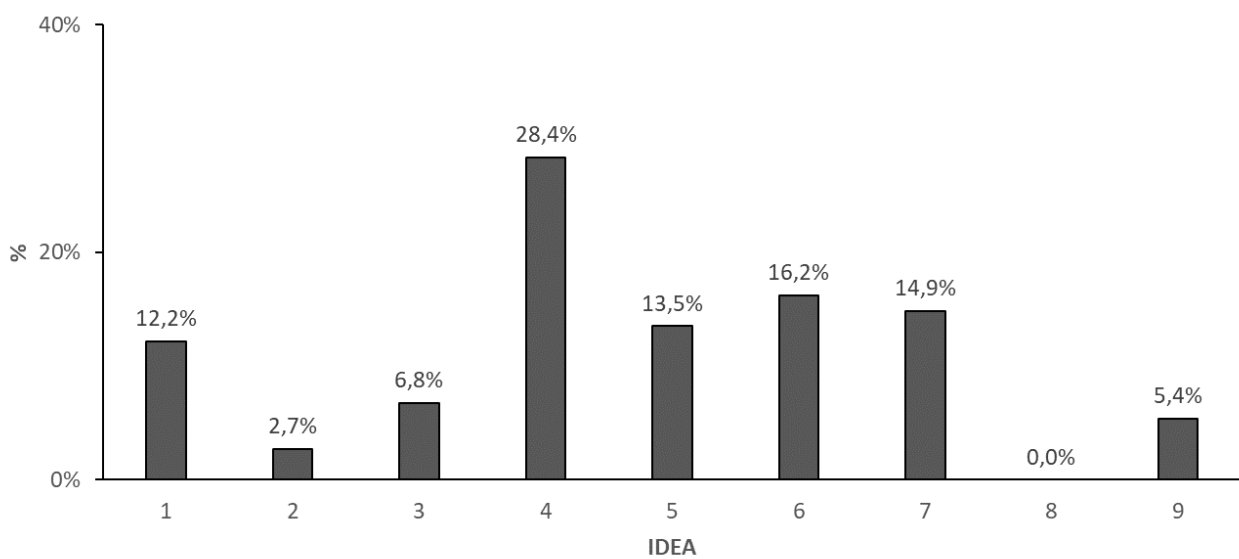
The discussion about risks of using the RITHMS Platform for LEAs was also fruitful, as a total of 10 ideas were identified:

1. Problem of certification of software
2. Need of IT support for another big scale IT system
3. Cognitive bias
4. Problem of data preparation: much effort before feeding the system
5. Need of additional training for officers
6. System can be more complex and time consuming
7. Financial resources for implementation and exploitation
8. Costs for copyright and licensing
9. Additional work for officers
10. Production of a lot of information, but not useful.

**Table 10:** Expected risks of RITHMS for LEAs

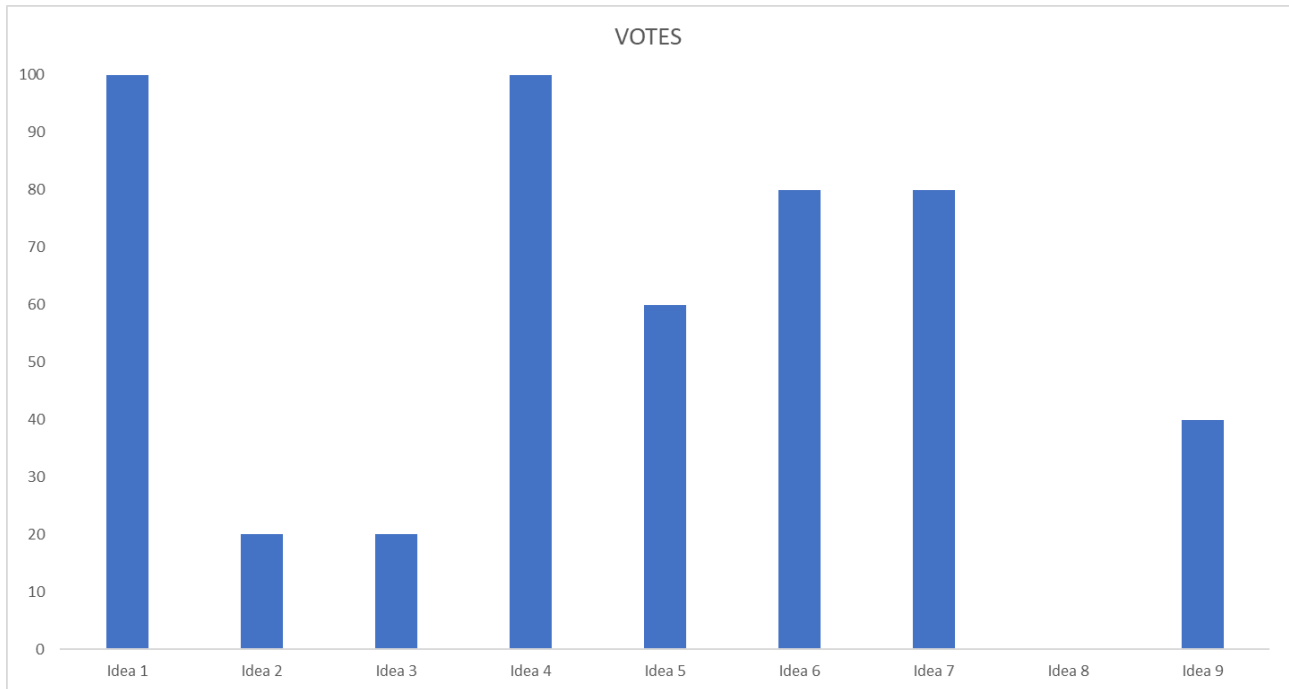


When analysing the proportion of the total number of assignable points that had to be distributed among all the ideas, we found that 9 of the 10 ideas listed were scored. The idea with by far the highest score was “idea 4: Problem of data preparation: much effort before feeding the system” followed by “idea 6: System can be more complex and time consuming”; “idea 7: Financial resources for implementation and exploitation”; “idea 5: Need of additional training for officers” and “idea 1: Problem of certification of software” These results may indicate a low level of acceptance of technological developments by police officers, but may also reflect a saturation point or past experiences gone bad.



**Figure 7:** Distribution of scores for expected risks of RITHMS for LEAs

As would be expected, the idea with the highest score (idea 4) is also the idea selected with the highest number of points by the largest number of participants. In this case by 100 percent of the participants. However, idea 1, despite being the fifth in the ranking of points, was also selected by 100 percent of the participants. It does not seem too serious a problem for them, but it is a problem for everyone. So, we can identify these ideas as those on which the participants have a greater consensus but idea 4 is also the most serious risk they identified.



**Figure 8:** Distribution of votes for expected risks of RITHMS for LEAs

### 3.6 Benefits of RITHMS for suspects

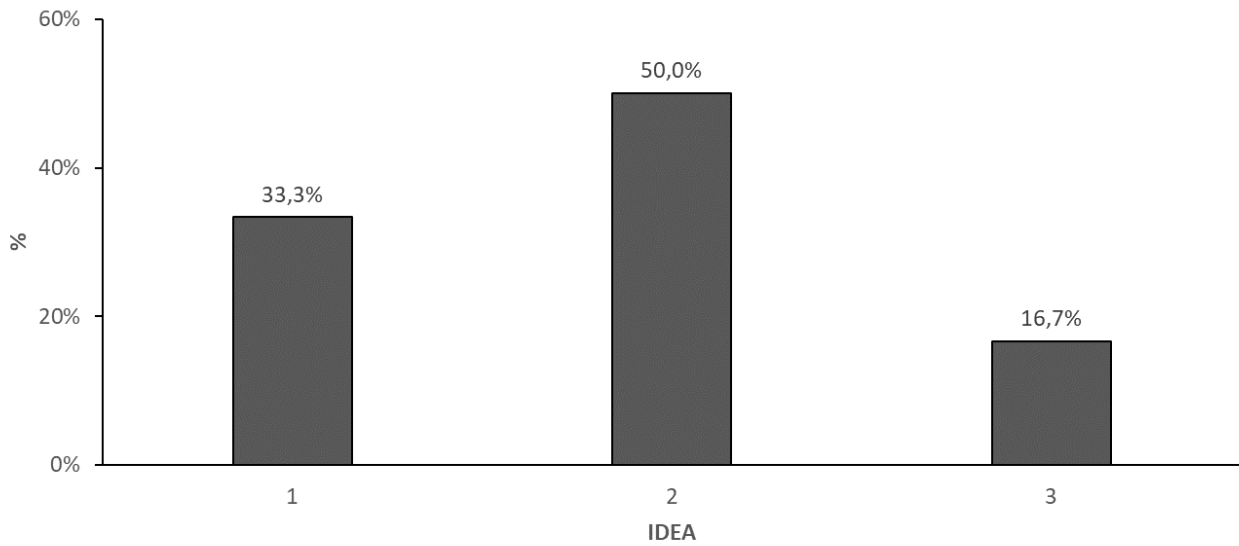
In contrast, discussion of the impact of RITHMS on suspects was not relevant. Participants only identified 3 potential benefits for suspects, which also in some cases did not answer the question posed. The ideas identified are as follows:

<ol style="list-style-type: none"> <li>1 Additional opportunity to defend in court</li> <li>2 Criminals can find a way to avoid the system</li> <li>3 Exchange of information becomes easier between different countries<sup>5</sup></li> </ol>
---

**Table 11:** Expected benefits of RITHMS for suspects

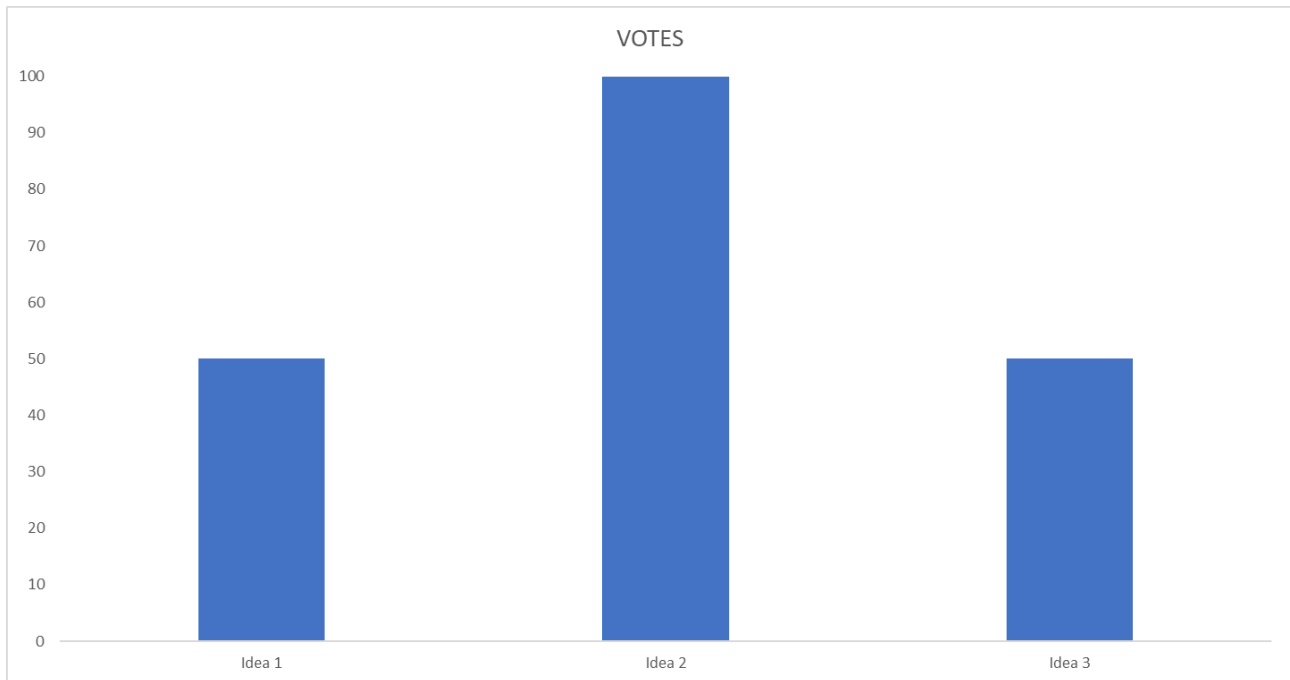
All three ideas were scored, being “idea 2: Criminals can find a way to avoid the system” the one with the higher score, followed by “idea 1: Additional opportunity to defend in court” and finally “idea 3: Exchange of information becomes easier between different countries”.

<sup>5</sup> It should be underlined that the RITHMS platform will not imply any automatic system of information sharing between countries: data retrieved from the platform can be eventually shared by the LEAs through their usual channels, without prejudice to compliance with the current legal framework.



**Figure 9:** Distribution of scores for expected benefits of RITHMS for LEAs

The patterns of votes received for each idea are congruent with the scores, and no results of interest can be identified.



**Figure 10:** Distribution of votes for expected benefits of RITHMS for suspects

Of interest, however, is the use of the term "criminal" in "idea 2", the most voted, which suggests that the participants may have some bias that leads them to assimilate criminals with suspects. It seems that the question also elicited from them the benefits that criminals could have in abusing the system, which could actually be considered a risk to LEAs or the criminal justice system.



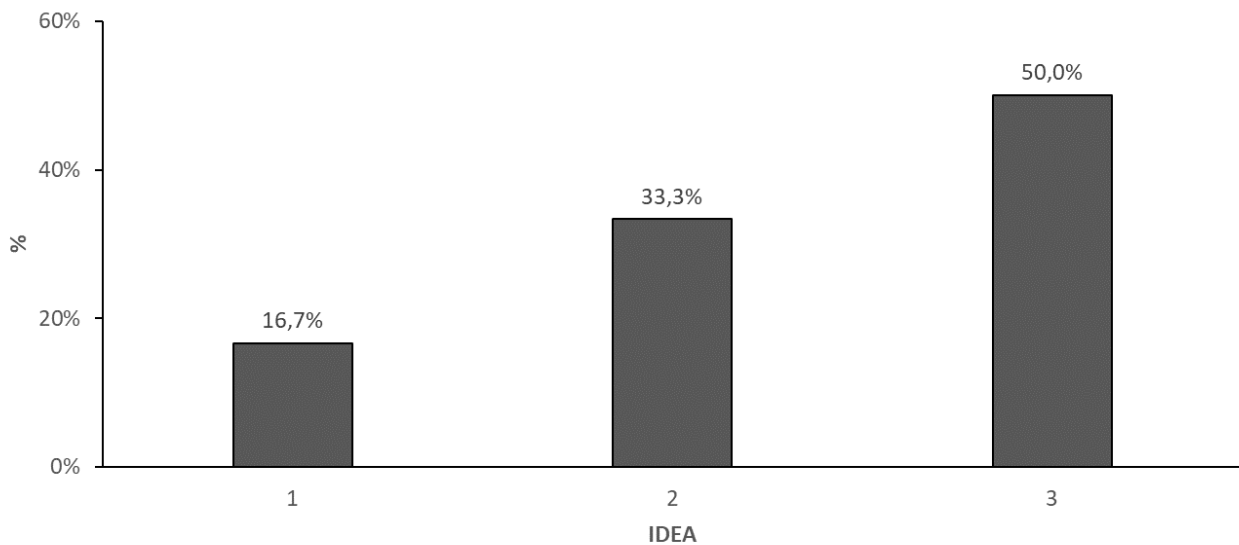
### 3.7 Risks of RITHMS for suspects

The discussion on the risks that RITHMS might pose to suspects also did not generate much debate and again only 3 ideas were generated:

- 1 Cognitive bias: false positives
- 2 More opportunities for the prosecutor in court by using the system
- 3 Finding more easily objects and suspects

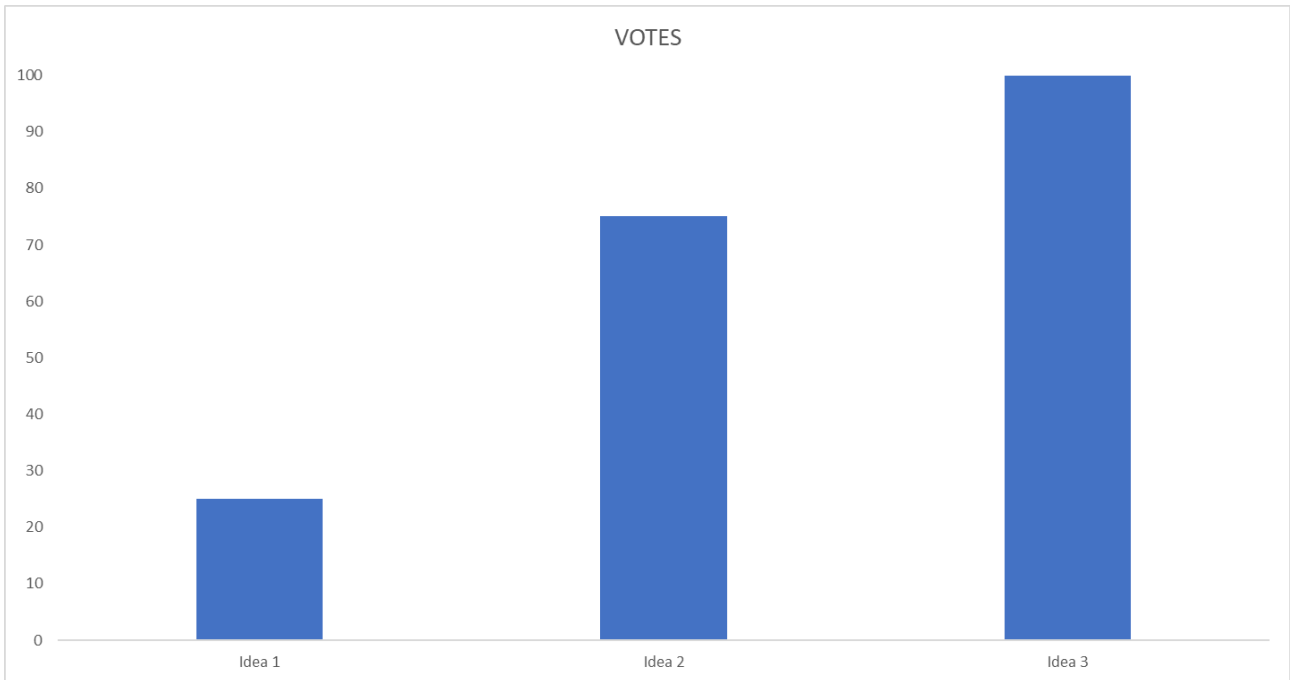
**Table 12:** *Expected risks of RITHMS for suspects*

All three ideas were scored, being “idea 3: Finding more easily objects and suspects” the one with the higher score, followed by “idea 2: More opportunities for the prosecutor in court by using the system” and, finally “idea 1: Cognitive bias: false positives”. It is paradoxical considering that it is the idea that is least related to the question posed.



**Figure 11:** *Distribution of scores for expected risks of RITHMS for suspects*

Again, the number of people who voted for the idea and the number of votes obtained are parallel, so the idea with the highest score is also the one on which there is more consensus.



**Figure 12:** *Distribution of votes for expected risks of RITHMS for suspects*





## 4 Conclusions

The initial review of the literature on the impact of crimes against cultural heritage has allowed us to identify four types of impact: cultural, economic, social, and security costs. It is expected that the development of tools for the effective fight against these forms of crime will make it possible to reduce some of these costs to a certain extent.

In a second step, the review of the literature on the use of AI for policing has allowed us to identify, on the one hand, benefits for LEAs, which, however, would indirectly generate benefits to society by allowing a fight against CH crimes, while at the same time generating risks against the rights of citizens and against specific communities or, at least, generating social concerns. However, when analysing the existing literature in relation to the technologies used for the fight against CH crimes, we find that the studies hardly identify social benefits, beyond reducing work time and allowing the analysis of larger amounts of data. More worrying is the lack of analysis of the risks that the tools used can produce on citizens, end users and suspects. This lack of literature on expected benefits and risks has been mitigated by the direct collection of information from LEAs; however, while they are able to identify expected benefits and risks for themselves, they find it difficult to elicit risks to citizens or suspects.

In addition to the social benefit of protecting the assets themselves to be accessible to citizens, which is commonly cited in the literature, the nominal group technique has allowed us to identify other expected positive impacts, such as safer online trading and other private transactions for buyers. It has also allowed us to identify social risks, such as criminals becoming more flexible, adapting to the use of these tools, and looking for ways to evade them to continue their activity. The adaptation of criminals to blocking opportunities is a well-known phenomenon in criminology. As for the benefits for LEAs, the literature identifies mainly one benefit, the reduction of working time. Our work has also identified other potential benefits, such as the development of a stable system or the ease of information retrieving and the subsequent eventual sharing – without prejudice to compliance with the current legal framework, while at the same time identifying potential risks, such as the problem of system preparation or problems related to software certification. Like the literature reviewed, LEAs do not identify significant risks to citizens or suspects. Perhaps future research should select other types of participants such as legal experts and representatives of civil society, or even convicted persons, although access to this sample would be much more complicated.

It should be eventually highlighted that the RITHMS project will limit the use of actual AI technology to specific tasks (i.e., mostly the predictive feature of the RITHMS SNA-based Platform), meanwhile ensuring the mitigation of all the risks/concerns generally related to AI implementation.



## References

- Abate, D., Paolanti, M., Pierdicca, R., Lampropoulos, A., Toumbas, K., Agapiou, A., ... & Zingaretti, P. (2022). Significance. Stop Illicit Heritage Trafficking with Artificial Intelligence. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, 43, 729-736.
- Abate, D., Agapiou, A., Toumbas, K., Lampropoulos, A., Petrides, K., Pierdicca, R., ... & Zingaretti, P. (2023). Artificial Intelligence to Fight Illicit Trafficking of Cultural Property. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, 48, 3-10.
- Algorithm Watch & Bertelsmann Stiftung (2019). *Automating Society. Taking stock of automated decision-making in the EU*. Available at: [www.bertelsmann-stiftung.de/de/publikationen/publikation/did/automating-society](http://www.bertelsmann-stiftung.de/de/publikationen/publikation/did/automating-society).
- Almeida, D., Shmarko, K., & Lomas, E. (2022). The ethics of facial recognition technologies, surveillance, and accountability in an age of artificial intelligence: a comparative analysis of US, EU, and UK regulatory frameworks. *AI and Ethics*, 2(3), 377-387
- Altaweel, M., Khelifi, A., & Shana'ah, M. M. (2023). Monitoring Looting at Cultural Heritage Sites: Applying Deep Learning on Optical Unmanned Aerial Vehicles Data as a Solution. *Social Science Computer Review*, 08944393231188471.
- Arizpe, L., & Arizpe, L. (2015). Cultural diversity as a source of creativity for globalization. *Culture, diversity and heritage: Major studies*, 83-90
- Bacalu, F. (2021). Digital policing tools as social control technologies: data-driven predictive algorithms, automated facial recognition surveillance, and law enforcement biometrics. *Analysis and Metaphysics*, (20), 74-88.
- Blake, J. (2020). Trafficking in Cultural Property. Where Cultural Heritage Law and the International Fight Against Transnational Organized Crime Coincide. In: Carstens, A. M. & Verner, E. (eds.). *Intersections in International Cultural Heritage Law*. Oxford University Press, 157-180.
- Brodie, N., Doodle, J. & Watson, P. (2000). *Stealing History: the Illicit Trade in Cultural Material*. Cambridge: McDonald Institute.
- Brodie, N., Yates, D., Slot, B., Batura, O., & van Wanrooij, N. (2019). Illicit trade in cultural goods in Europe. Characteristics, criminal justice responses and an analysis of the applicability of technologies in the combat against the trade. Final report. European Commission, Publications Office.
- Brodie, N. and Yates, D. (2022). Money Laundering and Antiquities. *transfer*, 1.
- Burgess, J. P. (2012) The Societal Impact of Security Research. *PRIO Policy Brief 9/2012*.
- Bier, D. J., & Feeney, M. (2018). Drones on the border: Efficacy and privacy implications. Cato Institute.
- Campbell, P. B. (2013). The illicit antiquities trade as a transnational criminal network: Characterizing and anticipating trafficking of cultural heritage. *International Journal of cultural property*, 20(2), 113-153.



- Campfens, E. (2020). Whose cultural objects? Introducing heritage title for cross-border cultural property claims. *Netherlands International Law Review*, 67(2), 257-295.
- Carrà, N. (2016). Heritage/Culture and social cohesion in the project of Metropolitan City. *Procedia-Social and Behavioral Sciences*, 223, 583-589.
- Castro, D., & New, J. (2016). The promise of artificial intelligence. *Center for Data Innovation*, 115(10), 32-35.
- Chainoglou, K. (2019). Tourism and Trafficking of Cultural Goods: An Overview of Regulatory Initiatives. *Yellow Tourism: Crime and Corruption in the Holiday Sector*, 135-146.
- Cooper, M. (2008). The inequality of security: Winners and losers in the risk society. *Human relations*, 61(9), 1229-1258.
- Cortada, J. W. (2007). *The digital hand, vol 3: How computers changed the work of American public sector industries*. Oxford University Press.
- Dakalbab, F., Talib, M. A., Waraga, O. A., Nassif, A. B., Abbas, S., & Nasir, Q. (2022). Artificial intelligence & crime prediction: A systematic literature review. *Social Sciences & Humanities Open*, 6(1), 100342
- De Koning, A. (2017). 'Handled with care': Diffuse policing and the production of inequality in Amsterdam. *Ethnography*, 18(4), 535-555.
- Eber, A., Leggett, T. & Yee, S. (2022). *False trades: uncovering the scale and scope of trafficking in cultural property. Knowledge gaps and future directions for research*. UNODC. Available at: [https://www.unodc.org/documents/data-and-analysis/briefs/Trafficking\\_in\\_cultural\\_properties\\_brief.pdf](https://www.unodc.org/documents/data-and-analysis/briefs/Trafficking_in_cultural_properties_brief.pdf).
- El Hajj, H. (2021). Interferometric SAR and machine learning: using open source data to detect archaeological looting and destruction. *Journal of Computer Applications in Archaeology*, 4(1).
- Eubanks, V. (2018). *Automating Inequality: How High-Tech Tools Profile, Police, and Punish the Poor*. New York: St. Martin's Press.
- Fan, M. D. (2018). Body cameras, big data, and police accountability. *Law & social inquiry*, 43(4), 1236-1256.
- FATF (2023). *Money Laundering and Terrorist Financing in the Art and Antiquities Market*. Paris: FATF. Available at: <https://www.fatf-gafi.org/content/dam/fatf-gafi/reports/Money-Laundering-Terrorist-Financing-Art-Antiquities-Market.pdf.coredownload.pdf>.
- FATF (2016). *Consolidated FATF Strategy on Combating Terrorist Financing*. 19 February 2016. available at: <https://www.fatf-gafi.org/content/dam/fatf-gafi/reports/FATF-Terrorist-Financing-Strategy.pdf>.
- FATF (2015). *Financing of the Terrorist Organisation Islamic State in Iraq and the Levant (ISIL)*. Paris: FATF. Available at: <https://www.fatf-gafi.org/media/fatf/documents/reports/Financing-of-the-terrorist-organisation-ISIL.pdf>.
- Ferber, A., Griffin, E., Dilkina, B., Keskin, B., & Gore, M. (2023). Predicting Wildlife Trafficking Routes with Differentiable Shortest Paths. In *International Conference on Integration of Constraint Programming, Artificial Intelligence, and Operations Research* (pp. 460-476). Cham: Springer Nature Switzerland.





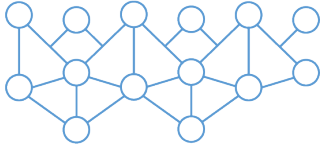
- Ferguson, A. G. (2016). Policing predictive policing. *Wash. UL Rev.*, 94, 1109.
- Ferguson, A. G. (2017). *The rise of big data policing*. New York University Press.
- Ferguson, A. G. (2019). Predictive policing theory. Chapter, 24, 2020-10.
- Greenland, F., Marrone, J. V., Topçuoğlu, O., & Vorderstrasse, T. (2019). A site-level market model of the antiquities trade. *International Journal of Cultural Property*, 26(1), 21-47.
- Hardy, S. A. (2016). 'Black archaeology in Eastern Europe: Metal detecting, illicit trafficking of cultural objects, and legal nihilism in Belarus, Poland, Russia, and Ukraine. *Public Archaeology*, 15(4), 214-237.
- Harvey, N., & Holmes, C. A. (2012). Nominal group technique: an effective method for obtaining group consensus. *International journal of nursing practice*, 18(2), 188-194.
- Herbert, S., Beckett, K., & Stuart, F. (2018). Policing social marginality: Contrasting approaches. *Law & Social Inquiry*, 43(4), 1491-1513.
- Joh, E. (2016). The new surveillance discretion: automated suspicion, big data, and policing. *Harvard Law Policy Review*, 10, 15-42.
- Kar, D., & Spanjers, J. (2017). Transnational crime and the developing world. *Global Financial Integrity*, 53-59.
- Kueper, J. K., Terry, A., Bahniwal, R., Meredith, L., Beleno, R., Brown, J. B., ... & Lizotte, D. J. (2022). Connecting artificial intelligence and primary care challenges: findings from a multi stakeholder collaborative consultation. *BMJ Health & Care Informatics*, 29(1).
- Lauricella, A., Cannon, J., Branting, S., & Hammer, E. (2017). Semi-automated detection of looting in Afghanistan using multispectral imagery and principal component analysis. *Antiquity*, 91(359), 1344-1355.
- Le Garrec, G. (2005). Social security, inequality and growth. OFCE (Observatoire Français des Conjonctures Economiques), Document de Travail.
- Losson, P. (2016). Does the International Trafficking of Cultural Heritage Really Fuel Military Conflicts? *Studies in Conflict & Terrorism*, 40(6), 484-495.
- Lynskey, O. (2019). Criminal justice profiling and EU data protection law: precarious protection from predictive policing. *International Journal of Law in Context*, 15(2), 162-176, 2019, doi: Available at: <https://www.cambridge.org/core/article/criminal-justice-profiling-and-eu-data-protection-law-precarious-protection-from-predictive-policing/10FD4B64364191B619FBCB864CD40A7F>.
- Marquenie, T. (2019). The impact of predictive policing and law enforcement AI on human rights: The right to fair trial under pressure. In KU Leuven Centre for IT & IP Law, *Rethinking IT and IP Law – Celebrating 30 years of CiTiP*. Intersentia, 109-116.
- Marquenie, T. & Quezada-Tavárez, K. (2022). Data Protection Impact Assessments in Law Enforcement: Identifying and Mitigating Risks in Algorithmic Policing. In Markarian, G. et al. (eds.). *Security Technologies and Social Implications*. Wiley Publishing, 32-60.
- McDaniel, J., & Pease, K. (Eds.). (2021). *Predictive policing and artificial intelligence*. Routledge.
- Merton, R. K. (1976). *The sociology of science*. Chicago: University of Chicago Press.



- Naudé, A., & Bornman, J. (2021). Using nominal group technique to identify key ethical concerns regarding hearing aids with machine learning. *Perspectives of the ASHA Special Interest Groups*, 6(6), 1800-1808.
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *International journal of surgery*, 88, 105906.
- Pasikowska-Schnass, M. (2018). Cultural heritage in EU policies.
- Passas, N. & Proulx, B. B. (2011). Overview of Crimes and Antiquities. In Manacorda, S. & Chappell, D. (eds.). *Crime in the Art and Antiquities World. Illegal Trafficking in Cultural Property*. New York: Springer, 51-67.
- Patias, P., & Georgiadis, C. (2023). Fighting Illicit Trafficking of Cultural Goods—The ENIGMA Project. *Remote Sensing*, 15(10), 2579.
- Perry, W. L. (2013). Predictive policing: The role of crime forecasting in law enforcement operations. Rand Corporation.
- Raub, M. (2018). Bots, bias and big data: artificial intelligence, algorithmic bias and disparate impact liability in hiring practices. *Ark. L. Rev.*, 71, 529.
- Rademacher, T. (2020). Artificial intelligence and law enforcement. *Regulating artificial intelligence*, 225-254
- Shanthi, K. G., & Sivalakshmi, P. (2023). Smart drone with real time face recognition. *Materials Today: Proceedings*, 80, 3212-3215.
- Soldi, G., Gaglione, D., Forti, N., Millefiori, L. M., Braca, P., Carniel, S., ... & Farina, A. (2021). Space-based global maritime surveillance. Part II: Artificial intelligence and data fusion techniques. *IEEE Aerospace and Electronic Systems Magazine*, 36(9), 30-42.
- Suárez-Mansilla, M. (2018). Blood antiquities: a net acting in Spain helped to finance DAESH through illicit trafficking of cultural goods. *ArtWorldLaw Bulletin. Chronicles of Themis & Athenea*, 4.
- Tapete, D., & Cigna, F. (2018). Appraisal of opportunities and perspectives for the systematic condition assessment of heritage sites with copernicus Sentinel-2 high-resolution multispectral imagery. *Remote Sensing*, 10(4), 561.
- Tefre, Ø. S. (2010). Persistent inequalities in providing security for people in South Africa—A comparative study of the capacity of three communities in Hout Bay to influence policing (Master's thesis, The University of Bergen).
- Ugwudike, P. (2020). Digital prediction technologies in the justice system: The implications of a 'race-neutral' agenda. *Theoretical Criminology*.
- Ugwudike, P. (2021). Data-Driven Technologies in Justice Systems: Intersections of power, data configurations, and knowledge production. In Lavorgna, A. & Holt, T. J. (eds.). *Researching cybercrimes. Methodologies, ethics, and critical approaches*. Cham: Springer, 81-102.
- Vlasic, M. V. & Turku, H. (2016). Blood Antiquities. *Journal of International Criminal Justice*, 14(5), 1175-1197.



- Viljoen, J., & Henama, U. S. (2017). Growing heritage tourism and social cohesion in South Africa. *African Journal of Hospitality, Tourism and Leisure*, 6(4), 1-15.
- Wen, C. H., Hsu, P. Y., Wang, C. Y., & Wu, T. L. (2012). Identifying smuggling vessels with artificial neural network and logistics regression in criminal intelligence using vessels smuggling case data. In *Intelligent Information and Database Systems: 4th Asian Conference, ACIIDS 2012, Kaohsiung, Taiwan, March 19-21, 2012, Proceedings, Part II 4* (pp. 539-548). Springer Berlin Heidelberg.
- Warnke, U. (2019). 'Blood Antiquities': The Problem of Illicit Trafficking for Tourism. *Yellow Tourism: Crime and Corruption in the Holiday Sector*, 119-133.
- Wilson, D. (2019). Predictive policing management: A brief history of patrol automation. *New formations*, 98(98), 139-155.
- Winterbottom, T., Leone, A., & Al Moubayed, N. (2022). A deep learning approach to fight illicit trafficking of antiquities using artefact instance classification. *Scientific Reports*, 12(1), 13468.
- Yates, D. & Brodie, N. (2023). The illicit trade in antiquities is not the world's third-largest illicit trade: a critical evaluation of a factoid. *Antiquity*, 1-13.
- Zagato, L. (2021). The EU Contribution against the Illicit Trafficking of Cultural Goods.



Title

Report on RITHMS social benefits and risks

Deliverable Number

D7.3

Version

1.0



# RITHMS

Research, Intelligence and Technology for  
Heritage and Market Security

Project Coordinator

Arianna Traviglia

arianna.traviglia@iit.it

Scientific Project Manager

Michela De Bernardin

michela.debernardin@iit.it

Ethics Manager

Patricia Faraldo Cabana

patricia.faraldo@udc.es



Funded by  
the European Union

RITHMS – GA 101073932 [HORIZON-CL3-2021-FCT-01-08]

Page 47 of 47