

# NETCHER

## NETwork and digital platform for Cultural Heritage Enhancing and Rebuilding

Type of action:  
Coordination and support action

Work programme topic addressed:  
SU-TRANSFORMATIONS-09-2018  
“Social platform on endangered cultural heritage and  
on illicit trafficking of cultural goods”

### Deliverable 2.3 Seminar 1 Report



[www.netcher.eu](http://www.netcher.eu)  
[info@netcher.eu](mailto:info@netcher.eu)

EC Grant Agreement number:	H2020-822585	Lead beneficiary of this deliverable:	IA
Start date of project:	1 January 2019	Due date of deliverable:	2019/10/31
Duration:	24 months	Actual submission date:	2020/02/20
Version #:			R0.1

Project funded by the European Commission within the Horizon 2020 Program (2014-2020)		
Type		
R	Document, report excluding the periodic and final reports	X
DEM	Demonstrator, pilot, prototype, plan designs	
DEC	Websites, patents filing, press & media actions, videos, etc.	
OTHER	Software, technical diagram, etc.	
Dissemination level		
PU	PUBLIC, fully open, e.g. web	X
CO	CONFIDENTIAL, restricted under conditions set out in Model Grant Agreement	
CI	CLASSIFIED Information as referred to in Commission Decision 2001/844/EC	

#### Revision History

R#	Date	Description/Reason for change	Author
R0.1	2019/11/05	Editing	Interarts (IA)

#### Authors and Contributions

Partner	Name
CNRS	Veronique Chankowski
CNRS	Marine Lechenault
MCA	Corinne Szteinszneider
MCA	Pier Giacomo Sola
Interarts (IA)	Mercedes Giovinazzo
Interarts (IA)	Antonio Gucciardo

Interarts (IA)	Viviana Pabón
Deutsches Archäologisches Institut (DAI)	David Wigg-Wolf
Deutsches Archäologisches Institut (DAI)	Michaela Reinfeld
Università Ca' Foscari (UniVe)	Riccardo Giovanelli
Capital High Tech (CHT)	Maxime Guibert
Ecole nationale supérieure de la Police (ENSP)	Natacha Gesbert

## Table of Contents

1.	Executive Summary.....	5
2.	Introduction .....	6
3.	NETCHER Workshops (28-29 May 2019, Frankfurt am Main, Germany) .....	9
3.1	Methodology.....	9
3.2	Operational and legal interventions.....	10
3.3	Provenance and Traceability .....	11
3.4	Preservation and Reconstruction .....	14
3.5	Return and Restitution .....	17
3.6	Awareness-raising and education .....	19
3.7	Traffic Channels and Actors.....	21
4.	First NETCHER Seminar (3-4 October 2019, Barcelona, Spain) .....	24
4.1	State-of-play validation .....	24
4.2	Existing tools and platforms, technological issues, databases on illicit trafficking, platforms & networks on illicit trafficking.....	25
4.3	Trans-domain working: challenges, needs, existing solutions and improvements for the Social Platform for Cultural Heritage.....	31
5.	Conclusion.....	36
6.	Annexes.....	38
	Annex 1: Workshops in Frankfurt am Main (Germany) - agenda and participants .....	38
	Annex 2: Seminar 1 in Barcelona (Spain) - agenda and participants .....	41
	Annex 3: Written contributions.....	43
	Annex 4: Bibliographies.....	43

## 1. Executive Summary

The NETCHER – Social Platform for Cultural Heritage focuses on the issue of protecting endangered world cultural heritage: archaeological sites and museums are mostly concerned, but the conclusions would not be very different for any other cultural good<sup>1</sup>. It aims at identifying the relevant initiatives and actors in the field, creating conditions for discussions between the relevant communities and delivering recommendations for policymaking. It also looks to foster cooperation between all relevant initiatives and actors concerned with illicit trafficking of cultural goods, with the aim of creating synergies. It stems from the 2018 European Year of Cultural Heritage for strategic approaches to cultural heritage protection.

During its first year, the NETCHER project has carried out a series of activities that have allowed the involvement of a wide community of stakeholders to assess the current situation as regards illicit trafficking of cultural goods and identifying potential paths for improvement. Indeed, the first year of the NETCHER project has allowed collating and organizing a substantial amount of high-quality information as regards the issue of illegal trafficking of cultural goods, in cooperation with relevant professional communities, such as law enforcement agencies, cultural heritage specialists from academia and museum organisations,<sup>2</sup> as well as cultural organisations at large, institutional representatives, technology providers, etc.

This report (D2.3) presents the structure and outputs of the first NETCHER seminar that took place in Barcelona on 3 and 4 October 2019. The general objective of the seminar was to analyse the results of the first phase of the project, including the state-of-play within the different thematic areas addressed by the project, as well as the development of the online platform for exchange and debate.

In order to give a full overview of the work carried out during the first year of the NETCHER project, the present report also includes a summary of the first NETCHER workshops that took place in Frankfurt am Main (Germany) on 28 and 29 May 2019.

The main conclusion from this first year of the NETCHER project is that the NETCHER Platform is a **“toolkit for toolkits” and a resource centre**. Indeed, it is both an open and public website that includes a restricted area for specialised professionals, but also a resource and data centre for where to find key information and links towards relevant organisations, tools, platforms and resources both by the general public and specialised professionals.

As regards future development of a structured cooperation mechanism to support the protection of endangered cultural heritage, this first year of NETCHER points, on the one hand, to the need for a **European agency and resource centre** to serve the community of professionals involved in the fight against illicit trafficking of cultural goods and, on the other to the need to support **digitisation strategies** of cultural goods and monuments as well as interconnection of existing databases following the FAIR data principles.

1 For the purpose of ease, throughout this document the term “cultural good/cultural goods” is used to refer to “items of which countries consider that they have great artistic, historical or archaeological value and which belong to the country’s cultural heritage. Because of their value, it is very important to protect cultural goods from illegal trafficking,” in European Commission, Regulation of the European Parliament and of the Council on the import of cultural goods, COM (2017) 375 final. See: [https://ec.europa.eu/taxation\\_customs/sites/taxation/files/cultural\\_goods\\_proposal\\_en.pdf](https://ec.europa.eu/taxation_customs/sites/taxation/files/cultural_goods_proposal_en.pdf).

2 The term “museum organisations” refers to all those organisations “representing the museum community” as suggested by NE-MO – Network of European Museum Organisations. See <https://www.ne-mo.org/about-us/who-we-are.html>.

## 2. Introduction



NETCHER - NETwork and Social platform for Cultural Heritage Enhancing and Rebuilding

The NETCHER – Social Platform for Cultural Heritage focuses on the issue of protecting endangered world cultural heritage: archaeological sites and museums are mostly concerned, but the conclusions would not be very different for any other cultural good.

The project intends to gather several professional categories who do not usually work together:

- Archaeologists and other cultural heritage professionals in need of concrete help because they have witnessed the looting and destruction of cultural heritage for years.
- Police officers who wish for increased and more efficient cooperation in order to enhance European coordination.
- Representatives of international organizations with a specific remit on the issue.
- Representatives of the European Commission requiring increased efficiency.

Of course, NETCHER does not intend to duplicate the work done, for instance by UNESCO with the 1970 Convention on the prevention of the illicit trafficking of cultural property. Many institutions and organizations, such as UNESCO, ICOM and ICOMOS, INTERPOL, the World Customs Organization, UNIDROIT, and others, have contributed to developing guidelines in the complex world of legal provisions; they have also produced tools and toolkits to help those who want to get involved in heritage protection, at any level of society. Also, scholars and academics address the phenomenon of looting in cultural heritage, either from the legal or from the social and archaeological point of view. Overall, the situation is being documented with evermore precision.

The result has been the setting up of a strong framework of reference. Nevertheless, despite all efforts in recent years, the destruction, plundering and looting of cultural heritage and goods continues to be a problem internationally, because the issue is in constant evolution. Digital usage, but also conflicts and terrorism, contribute to very rapid developments. In recent years, the European Union has called for enhanced coordination in efforts, and for more efficiency in the results.

The NETCHER project addresses these challenges. One of these is the need to promote and facilitate cooperation between socio-professional communities. The NETCHER consortium represents this effort because it involves research and academic institutions (CNRS, DAI, University of Venice), police forces (ENSP), networks of European private and public organizations in heritage (Michael Culture Association), civil society organizations specialized in cultural cooperation (Interarts) and private sector representatives specialized in innovation management (Capital HighTech).

With regards to the European Commission, by the end of 2020 the NETCHER project will provide a set of recommendations in the form of a charter of good practices and will have set up a social platform of experts and professionals in the field of heritage protection and promotion.

During its first year, the NETCHER project has carried out a series of activities that have mobilised a wide community of stakeholders to assess the current situation as regards illicit trafficking of cultural goods and identify potential paths for improvement.

The first NETCHER Workshops took place on 28 and 29 May 2019 in Frankfurt am Main (Germany) and were organised by the Deutsches Archäologisches Institut – DAI, partner of the NETCHER consortium. It tackled the six main topics addressed by the project:

- Legal and operational interventions
- Preservation and reconstruction
- Provenance and traceability
- Return and restitution
- Education and awareness

The different working sessions provided for:

- a description of the state-of-play;
- the analysis of the stakeholders' needs, also as regards decision-making processes;
- the identification of the technical and legal tools needed for efficient operations;
- the transposition of the needs and requirements into "online functionalities".

The Workshops thus enabled the identification of the existing gaps and trends as regards each of the six issues tackled, and a significant amount of data was collected.



Seminar I: State-of-play validation and collaborative platform modelling  
Barcelona (Spain), October 2019

The first NETCHER Seminar took place on 3 and 4 October 2019 in Barcelona, and was organized by Interarts, partner of the NETCHER consortium. The Seminar offered the possibility continuing the analysis of the state-of-the-art as regards illicit trafficking of cultural goods and connecting to ongoing projects that address heritage protection and conservation. The NETCHER Platform was also presented and its functionalities analysed.

These two events have involved a variety of stakeholders and experts on cultural heritage protection, such as law enforcement agencies, archaeologists, engineers, researchers, academics, museum curators and institutional representatives. It has thus set the basis for the development of a community of interest as regards the issue of illicit trafficking of cultural goods and heritage protection.

This report illustrates the details of these two events and highlights the major conclusions. These will serve to develop the next set of NETCHER activities.



NETCHER Workshop  
(28-29 May 2019, Frankfurt am Main, Germany)



State-of-play Workshops, Frankfurt am Main (Germany), May 2019

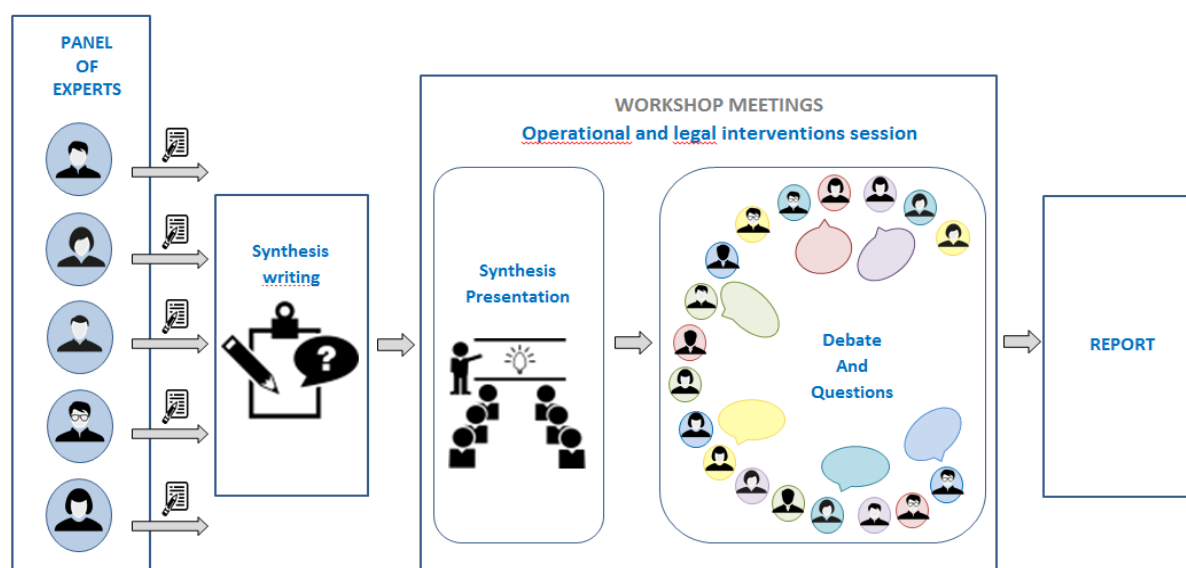
### 3.1 Methodology

The first NETCHER Workshops took place on 28 and 29 May, in Frankfurt am Main (Germany); they were organized by the Römisch-Germanische Kommission of the DAI, with a strong contribution from the French Police College (ENSP) in the matter of methodology.

The objectives of the Workshops were:

- to gather a strong **methodological background** and deliver the most accurate and updated picture about the **concepts** for each thematic group;
- to collect **bibliographical** data and references;
- to gather contributions from **cultural heritage specialists** according to each chronological and cultural areas.

Six working groups addressed the NETCHER thematic issues (Operational and legal measures, Origin and traceability, Preservation and reconstruction, Return and restitution, Awareness-raising and education, Trafficking channels and actors). The experts were asked to provide contributions, which were then synthesised by the partner leading each working group. The syntheses were presented at the Workshops, leading on to a general discussion. Afterwards, detailed reports were prepared for each group and served as the basis for the present document. The figure below illustrates the methodology used for all the 6 working groups.



The following pages will provide position papers and guidelines for each of the six areas (example: the Operational and Legal interventions session)

The results of each of the 6 thematic issues/working groups are presented here below.

### 3.2 Operational and legal interventions



To the question “Do we identify a legal gap?”, it can be answered that there is no need of a new international legislation but, rather, **to focus on the following concepts: Implementation, Coordination, Harmonization and Inclusion.**

#### ■ Implementation

##### *Lack of implementation*

Proposals:

- Implement embargoes and moratoria;
- leverage UNESCO reputation to reinforce internationalization;
- involve the UN Security Council.

##### *Due diligence and protection of good faith*

Proposals:

- Standardization and normalization;
- Better implementation of UNIDROIT convention;
- With respect to due diligence from a property law perspective, going beyond the actual punishment of losing property (beyond the sole confiscation and adopting legal prosecutions);
- Raise due diligence level/criteria?

#### *Insufficient prosecution*

- Ensure that criminal offences foreseen by conventions are criminally punishable.

#### ■ *Coordination*

*Many tools and databases exist but are too disconnected*

Proposals:

- A user-friendly platform with access to case laws, or summaries and the laws of all countries, in English;
- The use of new technologies and new innovative tools.

#### *Lack of coordination and collaboration*

Proposals:

- Soft-law instruments and exchanges of best practices;
- More public-private partnerships;
- Creation of an interagency body with legal authority.

#### ■ *Harmonization/Unification*

*Difference between legal systems used by traffickers*

Proposal:

- Re-write EU regulation ensuring that most countries accept it.

#### *Cope with stolen objects many years ago that now re-appear*

Proposal:

- Try to demonstrate the link between cultural heritage and terrorism and apply the Palermo Convention.

#### ■ *Inclusion*

##### *Art market inclusion*

Proposal:

- Raise awareness of the risks faced by the art industry and share practical guides to address such risks? There was disagreement between the experts.

##### *Lack of inclusion of some communities*

Proposals:

- Raise awareness of judges and magistrates, and more generally of all actors;
- Adopt a global and integrated approach.

### 3.3 Provenance and Traceability



“Provenance” and “traceability” should be understood as two non-synonymous words.

- **Provenance** addresses the question of the origin of the artefact (place of discovery and/or manufacture, place of conservation).
  - All professions involved do not share a univocal definition of what is included in the word “provenance”;
  - Archaeological provenance is of utmost importance for archaeologists;
  - The archaeological provenance (context) may be different from the original place of manufacture of the object.
- **Traceability** adopts a prospective point of view. It monitors the possible tracking of the object in the future. To be traceable, an object and its provenance must be identified (archaeological excavation and/or collecting history).
- As regards the **collecting history**, many artefacts on the art market have no archaeological provenance but possess a collecting history (sometimes forged to launder an illegal provenance).

Moreover, it must be noted that:

- The **accuracy of provenance information** varies considerably;
- Provenance information (archaeological provenance and collecting history) can be **concealed** or **falsified**;
- Proven authenticity gives **added value**;
- The **high variability in the quality (accuracy and veracity)** of the provenance information makes it difficult to reach firm conclusions (in a scientific as well as in a judiciary framework).

The issues identified, discussion and potential solutions can be summarised as follows:

- *How to establish a provenance?*
  - Information can be found **in the object itself** (materials, techniques, typological and stylistic series).
  - **External indications** are to be found in the bibliography and the archival documentation.
  - In the case of possibly looted cultural objects, **establishing whether the alleged provenance is doubtful** should be decisive and not the firm establishment of the provenance.
- *How to make archaeological artefacts traceable?*
  - Artefacts must be **documented**: they must possess a discovery and/or a collecting history.
  - Monitor **circulating artefacts in the art market**.
  - A **certification protocol** with basic requirements (and the necessity to produce all relevant evidence sustaining the provenance attribution).
  - Archaeologists must **alert** customs and police authorities in case of theft and **give access to excavation databases**.

- **Embedding** the provenance information **in the artefact itself**;
  - **Marking artefacts** by using **nanotechnologies**.
- *An illegally acquired object can acquire a legal provenance.*
    - An archaeological provenance that is stated as “**said to be from**” tends to become progressively “**from**” when the object is reproduced several times in various publications.
  - *The vast majority of antiquities that appear on the market lack a detailed provenance.*
    - It cannot be proven that they have been looted and thus be claimed for restitution.
    - These objects can be acquired by private collectors and, consequently, be lost to the public.
  - *What evidence should be recognised as **sufficient** to establish the provenance of an archaeological artefact (and thus disclaim an alleged falsified provenance)?*
    - Why is scientific back-up research not enough to serve as proof of provenance, and why is a complete inventory file required? In most cases, such a requirement cannot be fulfilled as most archaeological material lacks a proper description.
    - In the case of suspicious looting, is it relevant to ask for a **proof of provenance** rather than ask for proof that the alleged provenance (place of provenance and/or collection history) is **doubtful**?
    - Conversely, the Object ID standard should be disseminated outside the museum community, and especially amongst archaeologists.
    - Some **case studies** could be picked up in order to test the possible recording of excavation collections (more specifically in endangered source countries).
  - *Is it desirable that an **illegally** acquired archaeological object acquires a **legal provenance**?*
    - Cultural heritage professionals have always been split between those who believe that by working with antiquities collectors they can **rescue information** that would otherwise be lost, and those who believe that by working with antiquities’ collectors they **encourage the antiquities’ trade** and lose even more information.
    - **Demand exceeds offer where antiquities are concerned**: no new antiquities are likely to appear on the market since no source country authorizes the export of its cultural heritage (which is inalienable and, as such, invaluable...).

The only “**legal antiquities**” are those that **reappear on the market from old collections**. One can thus safely conclude that most antiquities on the market are non-legal antiquities. These antiquities can then obtain a legal status when they are donated to or acquired by museums. The process is debatable: it can serve to **launder** wrongly acquired objects. One may perhaps think of an **evolution of museums’ policies**: no further acquisitions, but long-term loans, virtual presentations and restitutions, etc.
  - *Is the **open access dissemination** of scientific cultural heritage research **a tool** or **a threat** for cultural heritage management?*
    - The basic role of researchers is to publish the results of their research. In the current context of open science, researchers are also encouraged to disseminate their “raw” data (databases,



primary documentation, data papers...). It is now becoming an obligation. Besides technical and methodological constraints in making data FAIR, this trend raises ethical issues. For example, the generalized use of GIS enables an accurate mapping of archaeological sites with accurate coordinates. It is thus a valuable tool for scientific research, also to establish the provenance of a looted object. But it can similarly be used as a tool for illegal excavations.

- The non-dissemination of scientific research is not the solution. Archaeologists and other cultural heritage professionals must appear to the wider public as the right persons in charge of cultural heritage. The dissemination in open access of scientific information is also a way of empowering locals to respect their own cultural heritage and participate of its management.
- *Is the implementation of a **stricter legal framework** concerning provenance certificates a viable response to illegal trafficking?*

“She doesn’t trust the dealer. She has been sent paperwork certifying that the items were legally exported from India, but these documents can be illicitly obtained. In the old days before the Indian Antiquities and Art Treasures Act, she says, it was harder to smuggle stuff out, because people were not sure whom to bribe. But since 1976 the exporters know which inspectors to deal with, so it’s more straightforward. Acquisitions are complicated by such questions of provenance. (...) This is almost certainly an unauthorized export, she says to the dealer, handing back the bowl. The documentation is unconvincing. We can’t acquire.” (Rushdie 2017)

This provocative and fictional statement made by a character in Rushdie’s latest novel addresses a crucial question: the implementation of the law by services that are generally understaffed and suffer from a lack of coordination with other services.

The Provenance and Traceability workshop came to the following recommendations:

- Considering trafficking as a **global social phenomenon** is essential.
- A **sociological study of the actors** in the field of trafficking of cultural goods is highly required.
- **Social networks research tools** could be used for modelling the various social actors in the field of trafficking.
- A long-term study of **the trafficking routes** based on the monitoring of circulating artefacts is needed.
- A **historical study of techniques of conservation** is needed.
- A **history of national and international policies and of their impact** on cultural heritage looting and trafficking is needed.
- The **development of technical tools**, an investment that exceeds the possibilities of individual countries and institutional national actors. This technological development applies to:
  - o the identification of the individual artefact (marking and describing the object);
  - o the monitoring of circulating cultural goods (automatic crosschecking of both art market and cultural heritage databases, building up and regular updating of interoperable databases).

### 3.4 Preservation and Reconstruction



## Preservation and Reconstruction

NETcher

### ■ *The role of data*

Without identifying objects and recording damage and theft, no action can be taken against or to prevent looting and trafficking. Access to reliable documentation and data is important for any later reconstruction measures. But often, cultural heritage professionals are the only ones to make a record, which then often disappears as the medium on which the record is made degrades (paper) or becomes obsolete (outdated IT hardware and software, formats), or else is stored in archives that may become inaccessible.

Therefore, there is a vital requirement for **sustainable depositories** in which data can be stored. Cultural heritage professionals producing relevant data must also be encouraged, if not obligated, to make use of such archival facilities. Data must be archived in a way that ensures sustainable access and re-use, for example by using the FAIR principles: Findable, Accessible, Interoperable, Re-usable.

Identifying looting and stolen objects requires collecting data on them... but collecting and publishing data can have important implications for the persons involved and can lead to their being exposed to danger. Those researching illicit trafficking can become “embarrassing witnesses”. This leads to the notion of **anonymity**: indeed, preservation can also mean preservation of heritage professionals.

Release of data can also lead to the identification by looters of sites where clandestine excavations may be profitable. Expressions of scientific interest objects or groups of objects can valorise these sites. In certain sensitive cases, accessibility to data needs to be restricted in order to ensure the safety of both cultural heritage and cultural heritage professionals.

Eventually, together with the importance of documenting cultural heritage, there is a need to reinforce physical means and implement simple common-sense measures to ensure the security of cultural heritage.

### ■ *Capacity Building and Awareness Raising*

Activities to prevent damage and theft, and activities to deal with them can go hand in hand. Reconstructing damaged cultural heritage can play a positive role in raising awareness as to the value of local heritage, both symbolic and monetary, and can therefore help to protect it. Young people are the target audience of the UNESCO *#Unite4Heritage* campaign that uses social media to empower young people to reject the propaganda of violent extremism and mobilise them for the defence of their shared heritage.

However, there is little awareness as regards less obvious and slow destruction, for example from climate change, agriculture or natural erosion, which takes place beyond public perception, posing its own specific problems and challenges.

A survey of the situation in Jordan by the EAMENA project demonstrated that most damage was in fact caused by agriculture and construction.

For the Central Asian Archaeological Landscapes (CAAL - University College London): “A vast range of heritage is rapidly disappearing through recent urban expansion, changing agricultural practices, rural depopulation, and the effects of climate change”.

#### ■ *Damage, Loss and Reconstruction*

A wide range of threats to cultural heritage exists, including different scenarios of destruction. Cooperation between institutions is strongly needed: no single institution can handle the entire range of challenges, and exchange of data is essential not only for successful outcomes and the pooling of resources and skills but also for the integration of workflows.

##### *New technologies*

Technical advances and new technologies play an important part in preservation and reconstruction.

Should we use data to reconstruct?

Damage is part of the biography of the object, and a reconstruction is never the original. This leads to the debate on what to reconstruct, to what extent the sad biographies of monuments should be visible, and to what extent the requirements of tourism and a simple desire to see monuments restored to their former glory can be accommodated.

##### *New technologies – identifying agents*

Computer-based technologies, in particular 3D-models, can help understand patterns of damage, and thus the organisation and activities of looters. This can be crucial in determining criminal activities and identifying the perpetrators.

By capturing data and producing virtual reconstructions of sites at various moments in time, the morphology of destruction can be recreated, potentially allowing the identification of those involved, as well as primary and secondary goals.

This in turn can inform the strategies of subsequent protection, preservation and reconstruction.

#### ■ *Issues, challenges, needs in the matter of Preservation and Reconstruction*

- The media are an important factor for raising awareness. However, they focus all too often on the spectacular.
- Awareness raising of the cultural and economic value of cultural heritage in countries where it is most under threat can significantly contribute to its protection.
- Measures for Preservation and Reconstruction present a wide range of challenges that can only be addressed successfully by cooperative action.



- Data collection is fundamental to all aspects. Interoperability between datasets and central sustainable archives are vital.
- Different institutions and individuals have different capabilities and resources that can only be fully effective in combination with each other.

### 3.5 Return and Restitution



**Return** and **Restitution** are terms that are applied to the restoration of cultural property to its rightful ownership if it has been stolen (Restitution) or illegally exported (Return). The mechanisms which may be involved can be complex, including proof of provenance, technological solutions to identification and restoration, and legal hurdles.

Any process of Return or Restitution involves the identification of objects “to be returned/restituted” and, often, addresses conflicting legal aspects. A further focus is on potential effects of Return/Restitution, in particular the dynamics of interplay between Return/Restitution and the protection of cultural heritage.

#### ■ Identification as “to be returned/restituted”

If the ability to identify objects as being looted, stolen, or otherwise illegally obtained is an absolute prerequisite for return or restitution, then the objects need to have been recorded in the first place.

*Operational Guidelines for the Implementation of the Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (UNESCO, Paris, 1970)* “33. A key step in the protection of States Parties’ cultural property against illicit import, export and transfer of ownership is establishing and keeping up to date, on the basis of a national inventory of protected cultural property, a list of important public and private cultural property whose export would constitute an impoverishment of the national cultural heritage.”

#### ■ Operational Guidelines

- “4 (c) (i) ensuring updated inventories with photographs of cultural objects, or at least their description, for example through the **Object ID**”<sup>3</sup>.
- *Object ID* international standard for describing art, antiques, and antiquities.
- Launched in 1997, conceived by the Getty Information Institute and developed with the collaboration of the world museum community, police and customs’ agencies, the art and antiques trade, appraisers and the insurance industry.
- Endorsed by ICOM and UNESCO.

#### ■ New technologies

<sup>3</sup> Citation from the document mentioned in the paragraph above. See:

[http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CLT/pdf/OPERATIONAL\\_GUIDELINES\\_EN\\_FINAL\\_FINAL.pdf](http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CLT/pdf/OPERATIONAL_GUIDELINES_EN_FINAL_FINAL.pdf).

The research project "*Improving Knowledge on Illicit Trade in Cultural Goods in the EU*" (re. European Commission EAC/06/2017) aimed at investigating what new technologies can be used to identify illicitly-traded objects, and to improve information-sharing and other forms of inter-agency cooperation and collaboration. It concluded that the actual utility of many technology-based solutions being offered was often questionable, and it was felt that in most cases a few digital photographs taken with a phone camera will allow a known cultural object to be identified following theft as accurately as more complicated solutions, and at a fraction of the cost.

- *Improving access to data*

The EU-funded Horizon 2020 project *ARIADNEplus* provides a framework and portal for the integration of archaeological data infrastructures across Europe. It can provide a paradigm for increasing the range of resources that can be consulted in order to identify an object as stolen. The IIIF - *International Image Interoperability Framework* also has potential to record data on objects together with images.

- *Automated processes*

Automatic recognition of images of artefact, e.g. European FP6 COINS project "Combat on-line illegal numismatic sales."

- *Legal Framework*

- *1970 UNESCO Convention*: requires that objects for which a claim for return or restitution is made must be already recorded in an inventory.
- *1995 UNIDROIT Convention*: covers all stolen cultural objects, not just the ones that have inventoried and declared; it also stipulates that all cultural property must be returned.
- *The Territoriality Principle* has long been a central principle of legislation.
- The new European Regulation on the *Introduction and the Import of Cultural Goods* breaks with the principle of territoriality: "(8) The legality of export of cultural goods should be primarily examined based on the laws and regulations of the country where those cultural goods were created or discovered."

- *Return/Restitution and preserving cultural heritage*

- Dynamics of interplay between Return/Restitution and the protection of cultural heritage can be leveraged to protect the latter.
- Can restitution be an important part of a successful strategy to counter illicit trade by stimulating the internal market and raising awareness for the symbolic and economic value of a state's cultural heritage?
- However, there is a tendency to resist Return on the grounds that objects are being returned to an environment that is felt to be unsafe.
- *Saar/Savoy (2018)*: "However, the history of restitutions has shown that once works are returned, the Nation-States are quick to welcome them and prepare the adequate political infrastructures necessary."

- *Issues, challenges, needs in the matter of Return and Restitution*

- Objects must be recorded in both image and text, data and metadata (e.g. Object ID) for the purpose of identification.

- Increased financial and material resources for the creation of such inventories, with a focus on feasible and practical solutions. Complex technical solutions are only indicated when they are proven to lead to the freeing up of resources for other tasks.
- Political will to implement the required measures must be increased.
- Departing from the Territoriality Principle; cases “to be examined based on the laws and regulations of the country where those cultural goods were created or discovered.” But this cannot replace strict export controls by the country of origin.
- Research is needed to ascertain how effective legal measures and conventions are.

### 3.6 Awareness-raising and education



The “Education & Awareness” workshop focussed on **current training programmes**.

Participants were professionals involved in the process of protecting endangered cultural heritage. For them, the aim should be to collect data that can deliver a clear view of the current state of affairs in education and training, and highlight areas that require more articulated programmes and interventions. This implies identifying:

- **Gaps** in educational backgrounds;
  - **Skills** needed;
  - **Awareness-raising strategies** on the damage caused by pillaging and illicit trading, and the loss of cultural identity entailed by the destruction or loss of cultural heritage.
- The issue of education and awareness is **rarely addressed** in detail in relevant reports about the fight against illicit trafficking of antiquities and looting.
  - However, it is often mentioned **as part of the solutions** to be implemented.
  - The notions of education and awareness belong to the domain of **prevention**, and concern several targets and several social and socio-professional backgrounds:
    - the general public and schools;
    - all trades in interaction with cultural heritage and cultural heritage professionals;
    - art market, press, embassies, etc.
    -

Education and awareness are concerned with **training**, but more generally with the **organization of the available information and tools** in order to protect cultural heritage from looting. Training of cultural heritage keepers such as owners, institutions and associations whose physical involvement on the field is essential, with the purpose of preventing robberies, would also be deeply needed.

The main issues identified in the matter of education and awareness are as follows:

- *Facts need to be demonstrated and documented in order to serve as an educational basis and as awareness material.*
  - There is a **lack of demonstration** of the roots and effects of the phenomenon.
  - We need studies about the **phenomena of money laundering** through trafficking in cultural goods, about the connections with terrorist financing that extend from the excavated countries to the market countries, about the free port systems, about the modulations and reactions of the art market, etc.
  - The NETCHER project could be an opportunity to address the problem of trafficking in archaeological artefacts from the perspective of the **human and social sciences**.
  
- *Press communities tend to **reinforce the public stereotypes about antiquities**.*
  - The police, justice and customs communities **are not always well informed** about the implications of trafficking in antiquities;
  - So-called “**minor**” damage to cultural heritage is not taken seriously.
  
- *There are many educational paths and they must be coordinated*
  - To avoid maintaining deep national divergences, we must ensure that the information provided by education does not deepen national differences, but serves to raise awareness among future generations with a minimum of harmonization on content.
  - To show and demonstrate to the public strong coordination between the professional communities involved in the fight against illicit trafficking.
  - School education programmes can be supported by “social archaeology” defined as a new profile of archaeologists and cultural heritage professionals who, in addition to traditional skills, are able to present cultural heritage to different publics, finding new approaches and using cultural mediation.
  - Such awareness-raising programmes need also to be based on the knowledge of existing legal frameworks.
  - Training modules between professional communities.
  - NETCHER will produce a mapping and survey of existing programs.
  - Emergence of new professional profiles.
  
- *The efficiency of education and awareness processes relies on the capacity to create reliable, comprehensive and accessible information.*
  - It seems useful to give greater importance to the notion of “**best practices**”. This involves setting standards consisting in benchmarks and levels of requirement that institutions and civil society agree to apply.
  - **Open source** tools to be defined.
  - Several professional communities are calling for **an operational and simple circuit to report looting on sites and stolen objects when they appear on the market**.

- Depending on the specific situation of each country, archaeologists and cultural heritage professionals may be unable to follow the process in case of claim or complaint concerning looting.
- The following potential perspectives have been identified:
  - EU programmes need to involve **cooperation with South Mediterranean countries**, in order to support best practices in the communities of Antiquities Services;
  - Participative projects could also be encouraged as a way of **integrating civil society and the general population in a virtuous approach to cultural heritage**.
  - In MENA countries, it may be interesting **to bring into play the actors of the export business** that are interested in developing more ethical and sustainable networks locally.
  - To ensure **broader approaches and communication strategies** on the problem of trafficking of cultural property to gain some support from embassies.
  - To better inform professional communities as to the potential of **quality-information sharing**.
  - **Tools** have to be provided in order to facilitate **interprofessional cooperation**, in accordance with the professional ethics of each of these communities.
  - The question of the fight against looting needs to be **connected to other domains**: digital humanities; sustainable development; cooperation for development assistance.

### 3.7 Traffic Channels and Actors



Six major questions have been identified in this topic:

- Supply and demand
- Freeports
- The use of metal detectors
- Online traffic
- Lack of resources
- Global cooperation

Findings came from each of those points, as well as improvement perspectives.

- *Supply and demand*  
*Source and transit countries change over time*  
As a perspective, focus is needed on destination countries:

- Increased control of buyers.
- Information campaigns to discredit possession of illegal goods.
- Raising public awareness.

### *Traceability as a key notion*

Improving goods' identification is highly required, notably by:

- Cataloguing 'orphan objects';
- Increased collaboration between researchers and archaeologists.

### ■ *The question of freeports*

#### *Lack of traceability and opacity of the instrument*

As an improvement measure, resorting to social scientists can lead to an understanding of how freeports function.

### ■ *Use of metal detectors*

Significant damage to cultural heritage results from the use of metal detectors. Raising awareness is the main perspective identified, together with:

- Many efforts currently being undertaken;
- Involvement of the judiciary in educational programmes;
- UNESCO working groups.

### ■ *Online trafficking*

#### *Impossible to monitor, always changing*

- Would reinforcing controls help in dismantling it, or would networks go deeper into the dark web?

### *Sales of fakes or sales of originals as copies*

### ■ *Lack of resources*

#### *Lack of information exchanged*

Fostering **collaboration** at both national and international level is needed.

#### *Lack of material and people*

It appears that good results are obtained in **countries with strong dedicated units**.

### ■ *Lack of global cooperation*

Global political support is required in order to:

- connect national and international databases and **encourage interoperability**.
- Learn from other traffic/experiences and **share good practices**.

The workshops led to the following general conclusions:

### ■ *Mapping the dissemination of traffic in European countries*

- need for in-depth studies;

- lack in demonstrating the roots and effects of the phenomenon;
  - Geographical Information Systems?
- 
- *Organizing the fight with operational tools*
    - Increased cooperation between professional communities;
    - Sustainability and interoperability between databases;
    - Operational and simple circuit to report looting;
    - Developing digital tools allowing for more efficient data research on the web;
    - Creation of an ID for each object, or at least at the scale of a site;
    - Lack of people dedicated to fight against trafficking of cultural heritage.
- 
- *Raising awareness among professional communities and in European societies*
    - Training modules;
    - Communication and warning to the general public.



### 3. First NETCHER Seminar (3-4 October 2019, Barcelona, Spain)



Seminar I: State-of-play validation and collaborative platform modelling: Consortium  
Barcelona (Spain), October 2019

The first NETCHER “State-of-play validation and collaborative platform modelling” Seminar took place on 3 and 4 October 2019 in Barcelona, Spain. It was hosted and organized by Interarts, partner of the NETCHER consortium. The Seminar was attended by 45 participants from 14 different countries, representing a diverse community of stakeholders.

- *The Seminar had the following objectives:*
  - Validate the state-of-play as regards illicit trafficking of cultural goods
  - Present the model for the NETCHER Platform
  - Analyse transversal issues
  
- *To respond to this objective, the Seminar was structured around three main working sessions:*
  - Session 1. State-of-play validation.
  - Session 2. Existing tools and platforms, technological issues, databases on illicit trafficking, platforms & networks on illicit trafficking.
  - Session 3. Trans-domain work: challenges, needs, existing solutions and improvements for the Social Platform for Endangered Cultural Heritage.

The detailed program of the first NETCHER seminar is available in Annex 2.

#### 4.1 State-of-play validation





Seminar I: State-of-play validation and collaborative platform modelling: Workshops  
Barcelona (Spain), October 2019

During **session 1** the NETCHER consortium members presented the conclusions of the issues analysed during the first NETCHER Workshop in Frankfurt am Main in May 2019, including the challenges and requirements identified as well as the first recommendations for the NETCHER Social Platform (see section 4.2 below).

This first session enabled all participating stakeholders and experts to be on the same page and engage in fruitful debate and exchanges.

#### 4.2 Existing tools and platforms, technological issues, databases on illicit trafficking, platforms & networks on illicit trafficking

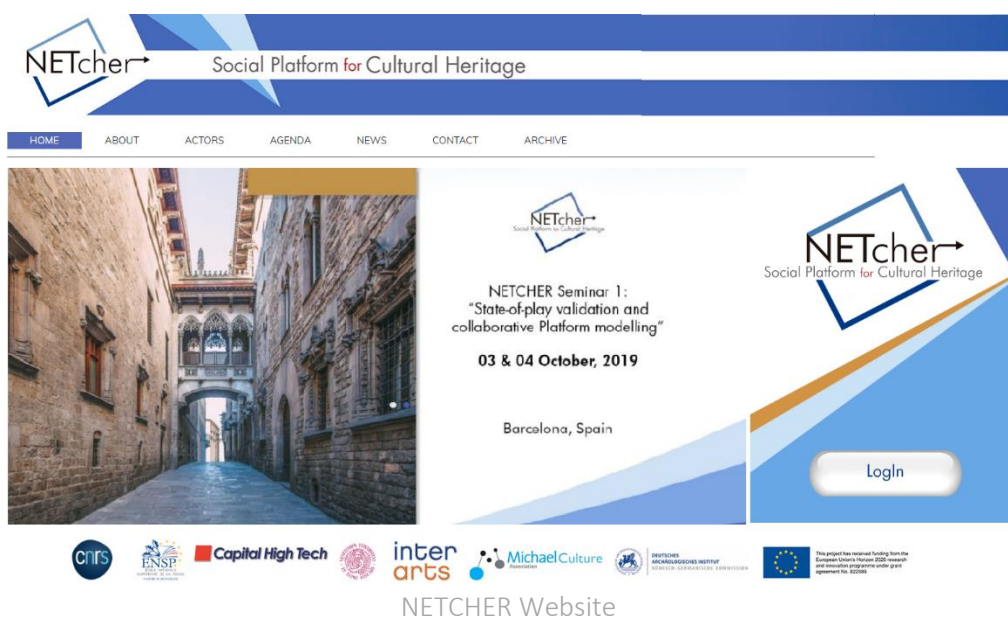


NETCHER online platform

**Session 2** confirmed the NETCHER Platform requirements (toolkit, potential mutualisation, information management, access modalities, data storage reliability and transparency issues), assessed its potential for sustainability, and identified the first elements of a technology roadmap for potential improvements.

The **NETCHER Platform** aims to support the Consortium in setting-up a network of stakeholders, both researchers and practitioners active in the field; to stimulate a structured interaction and participation among the stakeholders involved; to provide sustainable and useful tools to increase knowledge for the formulation and implementation of relevant policies and practices; and to promote the project and its outputs at European and international level towards the general public, target communities and policy makers. The Platform proposes a participative research model and addresses the complex

challenge of setting-up a structured network between a broad range of diverse players such as international and umbrella organizations, national authorities and public policy makers, researchers, NGOs, as well as public and private organizations.



NETCHER Website

In August 2019 the **NETCHER Platform** was set-up. It is accessible at the '**NETCHER - Network and digital platform for Cultural Heritage Enhancing and Rebuilding**' website ([www.netcher.eu](http://www.netcher.eu)), through a dedicated link. In the last months, 100+ users (30+ consortium members and 70+ stakeholders/experts) have been registered on the Platform and granted specific levels of access to one or more of the 6 thematic working groups.

The **NETCHER Platform** can only be accessed by authorized users: members of the consortium and stakeholders/experts that have been invited and provided with the corresponding access information to login and actively participate in the Platform.



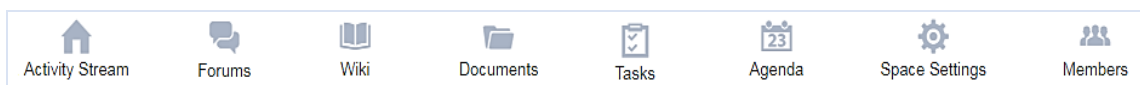
The **NETCHER Platform** provides different **core features, spaces and applications** that enable users to interact and work together within a secured environment, but also give them the possibility to organise themselves depending on their interests and levels of access.



NETCHER online platform: Consortium Space

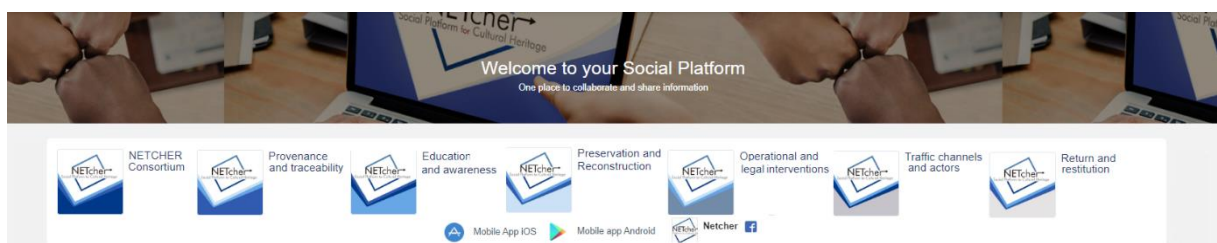
■ **Core features:**

- **Home page:** gives an overview of all the available Spaces and of the functional specificities of the Platform via a 'User Manual' (PDF document) and a 'Tips and tricks to use the platform' video.
- **Members' profile settings:** allows users to enter their own personal information (e.g. job title, email, Skype username and city/country).
- **Notification system and Unified research tools:** allows members to meet and interact through tags, keywords, messages, and invitations to connect.
- **Mobile application:** downloadable via *AppStore* (iOS) or *PlayStore* (Android).



■ **Spaces:**

These are those **groups of members** that share an objective or interest. Within each Space several applications help members organize and share information in different formats, wikis (articles), forums (live debates), folders (with co-editable documents), and organize activities (schedules, skills or experiences).



NETCHER online platform: Thematic Spaces

At present, the NETCHER Platform is divided into **seven Spaces**:

1. **NETCHER Consortium Space** for the project consortium team;
2. **Six Thematic Spaces**, one for each of the main NETCHER topics:
  - Provenance and traceability;
  - Education and awareness;
  - Preservation and reconstruction;

- Return and restitution;
- Traffic channels and actors; and
- Operational and legal intervention.

The number of members registered in each Space is detailed in the table below. In addition to the experts/ stakeholders invited to participate in the six Thematic Spaces, 29 members of the Consortium have full access to the Platform for the overall technical or content management.

	Experts/Stakeholders	Consortium members
<i>NETCHER Consortium</i>	0	29
1. <i>Provenance and traceability</i>	31	14
2. <i>Education and awareness</i>	26	14
3. <i>Preservation and reconstruction</i>	21	14
4. <i>Return and restitution</i>	24	14
5. <i>Traffic channels and actors</i>	25	14
6. <i>Operational and legal intervention</i>	21	14

#### ■ Applications

The NETCHER Platform offers the following Applications:

- **Activity Stream:** is the “news feed” section of the Platform through which users share information, drag and drop documents and interact with each other by posting a “Like”, a “@Tag” or a “Comment”.
- **Forums:** users (as participants or moderators) share and discuss interests or topics, in order to exchange ideas or animate debates with other members.
- **Wikis:** users create notes and articles to communicate important and/or standard information, such as rules, guidelines, roadmaps, procedures, meetings, news and best practices.
- **Documents:** users can upload, save, download and edit documents in various office formats.
- **Tasks:** through a calendar, members can effectively organize an activity, following-up on the corresponding actions of the process.
- **Agenda:** provides users with an annual, monthly or weekly overview of the upcoming tasks and events.
- **Chat:** enables users to send instant messages either to an individual member, to all members of a group, or to a specific set of members.
- **Web conferencing:** enables users to make one-to-one video calls or group calls, with more than two users, through the Skype icon integrated in the Platform.

Session 2 also allowed for the presentation, by the respective coordinators, of a series of **EU-funded H2020 projects in the field of cultural heritage**. The aim was to share the **lessons learned**. The projects presented were the following:



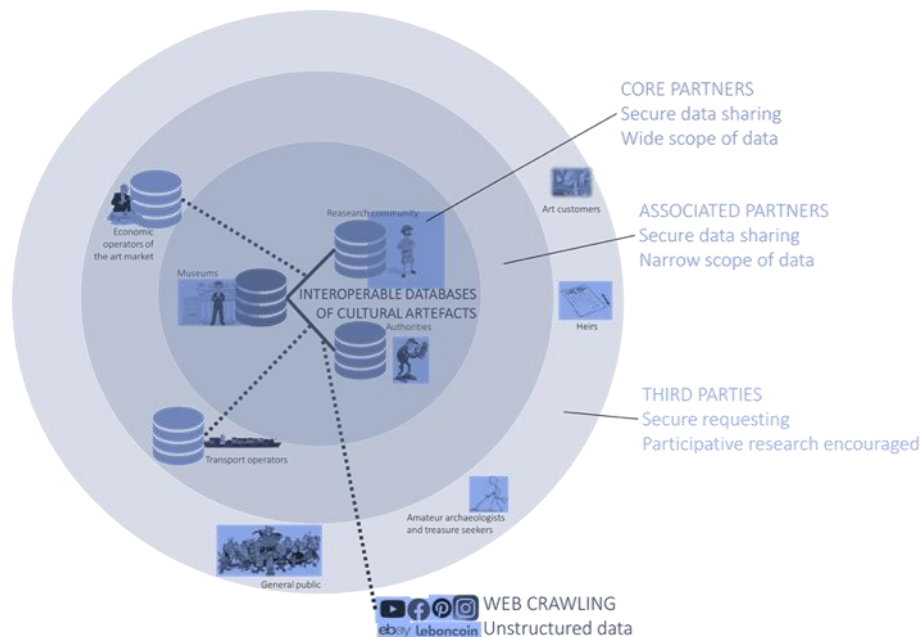
<p>CulturalBase Prof. Arturo Rodriguez Morató <a href="https://culturalbase.eu/">https://culturalbase.eu/</a></p>	 <p><b>Cultural Base</b> Social Platform on Cultural Heritage and European Identities</p>
<p>Ariadne Plus Sorin Hermon <a href="https://ariadne-infrastructure.eu/">https://ariadne-infrastructure.eu/</a></p>	
<p>MAGNETO H2020 Evgenia Adamopoulou <a href="http://www.magneto-h2020.eu/">http://www.magneto-h2020.eu/</a></p>	
<b>Databases &amp; platforms on Illicit Traffic</b>	
<p>UNESCO digital tools Asja Prohic-Doric <a href="https://fr.unesco.org/about-us/unesco-house">https://fr.unesco.org/about-us/unesco-house</a></p>	  <p>United Nations Educational, Scientific and Cultural Organization</p> <p>Convention for the fight against the illicit trafficking of cultural property</p>
<p>ICOM toolkit Sophie Delepierre <a href="https://www.obs-traffic.museum/">https://www.obs-traffic.museum/</a></p>	
<p>French Ministry of Culture Database Judith Kagan <a href="https://www.culture.gouv.fr/">https://www.culture.gouv.fr/</a></p>	 <p>Liberté • Égalité • Fraternité RÉPUBLIQUE FRANÇAISE</p> <p>Ministère <b>Culture</b></p>
<p>ARCH project Frédérique Duyrat, Andrew Meadows <a href="https://www.greekcoinage.org/arch-project.html">https://www.greekcoinage.org/arch-project.html</a></p>	<p><b>ARCH</b></p> <p>Ancient <u>coinage</u> as <u>Related Cultural Heritage</u></p>
<p>E-RIHS European Research Infrastructure for Heritage Science IPANEMA Loïc Bertrand <a href="http://www.e-rihs.eu/">http://www.e-rihs.eu/</a></p>	 <p><b>E-RIHS</b> EUROPEAN RESEARCH INFRASTRUCTURE FOR HERITAGE SCIENCE</p>
<p>PREVISION H2020 Konstantinos Demestichas</p>	
<p>Catalogue of Endangered Latvian Archaeological Artefacts and other Latvian solutions for protection of cultural objects Andris Kairiss Electronic service "Creation of description of cultural objects" <a href="https://www.ic.iem.gov.lv/ko/index.php">https://www.ic.iem.gov.lv/ko/index.php</a></p>	

Electronic service "Detection of the status of cultural object"  
[https://www.ic.iem.gov.lv/ko\\_status/index.php](https://www.ic.iem.gov.lv/ko_status/index.php)

Finally, **Session 2** analysed the possible technological solutions necessary to help end-users to effectively address the trafficking of cultural goods. The results will be reported in the NETCHER Technology Roadmap, to be delivered at the end of NETCHER project.

In order to achieve this, the NETCHER project will work, both through its upcoming activities and the NETCHER Platform, with experts/stakeholders in order to identify new approaches for possible technological solutions likely to help in the fight against illegal trafficking of cultural goods and assess the potential, originality and feasibility of these new approaches. Creative methods will be used to support this innovation aspect of the NETCHER project.

The figures below illustrate two concepts on which the work leading to the NETCHER Technology Roadmap will be based:



Feedback on the picture: “museums”; “authorities”; “(...) cultural goods”; “web crawling”, etc.



#### 4.3 Trans-domain working: challenges, needs, existing solutions and improvements for the Social Platform for Cultural Heritage

**Session 3** provided participants with the possibility to exchange and debate on four of the main topics of the NETCHER project. Accordingly, working groups were organised, and discussions were moderated by a member of the NETCHER consortium. Each group was asked to address the following questions:

- Q1.** Which tools are accessible and can be shared between professional communities? Which ones need to be developed? How can they be harmonized?
- Q2.** How to enhance the set of data and archive collection that already exist in academic institutions and programs, with the aim of combating illicit trafficking of cultural goods?
- Q3.** How to ensure that open access to the NETCHER Platform does not facilitate the work of looters and fraudulent art dealers?
- Q4.** How to structure cooperative actions to foster interdisciplinary research on the phenomenon of cultural heritage looting?
- Q5.** How to design effective communication strategies?

The main conclusions are highlighted below.

- **Q1.** *Which tools are accessible and can be shared between professional communities? Which ones need to be developed? How can they be harmonized?*

##### *T2. Provenance and Traceability*

- The diversity of existing databases implies that issues of access, open data accessibility and incomplete data, etc. must be addressed.
- New databases are not really needed. Rather interoperability must be ensured.

- Using the “Red list” and applying data mining techniques from image and/or metadata could be a good starting point. Nevertheless, establishing whether the “Red list” is sufficiently comprehensive is necessary.
- To increase information accessibility, classifiers and training models could be important instruments.

#### *T3. Return and Restitution*

- Existing tools will often be closed, whereas data should be as open as possible.
- Tools are necessary for legal frameworks and the identification of the identity/origin/nature of objects.
- There is a need to move beyond object identification by linking data through specific standards.
- The International Image Interoperability Framework (IIIF) is surely a major part of the solution, and its effective implementation should be assessed.

#### *T4. Education and Awareness*

- Awareness-raising should be practical and concrete, addressing first local communities. Evidence shows that collaboration, and through it more effective protection of cultural heritage, is enhanced through engagement by the local population and targeted communication strategies.
- A repository of good practices might be an important tool. It should include specific details on projects, their funding and the communities they target, as well as specificities of archaeological sites/problems addressed, in order to enable comparison and replication of good practices.
- A first simple repository (up- and downloadable) could initially suffice. It could be upgraded in time to include a search function by keywords (place, funding, communities addressed, project typology).
- Targeting diverse audiences, such as children, could also contribute to raising awareness.

#### *T5. Preservation and Reconstruction*

- A **central database, or inter-operability tool**, linked to already existent resources is needed.
- **Navigation systems and contents should be created according to user profiles**: archaeologist, LEA, curators, general public, etc.
- **International standards** are necessary for photography /recording, DNA, sediments analysis.
- A European program for massive digitalisation/modern documentation might be highly useful for prevention, identification, investigation/recognition (immediate and long term) and restitution/recovery.
- Prevention is strongly connected to digitisation. It requires social tools, legislation and assessments of risks. Identification may be facilitated through tools, application, recognition tools (images), quick research databases (consultation of data), mobile tools.
- Restitution, understood as the possibility of recovering an object, requires legislation and documentation.

- **Q2. How to enhance the set of data and archive collection that already exist in academic institutions and programs, with the aim of combating illicit trafficking of cultural goods?**

#### *T2. Provenance and Traceability*



- Interoperability is often difficult to attain, also from a practical point of view. Therefore, priorities should be established.
- Gathering collections from source countries is often complex, also politically.
- Possible solutions should tackle the generation of new databases, by connecting analytical data and working on automatic alerts from image recognition.
- Case studies also provide a good basis.
- Integrating existing vocabularies.

#### *T3. Return and Restitution*

- International standards are necessary, with standards-based resources linked to international frameworks.
- Reference datasets provide identification resources, e.g. by image recognition. Data must be structured according to international standards and translated into standardised data.
- Digitization is not comprehensive and requires further funding, e.g. for skilled human resources.
- Easy access to international instruments and norms is necessary.

#### *T4. Education and Awareness*

- Access to data/information is necessary.
- A list of references would be a first step. The collection of data may later be used to develop further academic strategies.

- **Q3.** *How to ensure that open access to the NETCHER Platform does not facilitate the work of looters and fraudulent art dealers?*

#### *T2. Provenance and Traceability*

- Access should be regulated, since a public database can be part of the looting process.
- Dissemination is a key.
- Local situations can be extremely challenging (extreme poverty, social difficulties etc.).
- Regulation of open data-sharing and publication, e.g. standard practices for GIS data, management of personal data, data on private properties and location data are necessary.

#### *T3. Return and Restitution*

- As regards data, the FAIR approach should be used: Findable – voluntary; Accessible – voluntary; Interoperable – compulsory; Reusable – compulsory.
- This improves access to information if an object is stolen.
- For the purpose of avoiding looting, a suitable compromise would be keeping find spot location data at a safe degree of vagueness.
- Can experts agree on a standard or hierarchy of location for this?

#### *T4. Education and Awareness*

- Publishing archaeological information can ensure control and attention.
- Publications and conferences raise awareness of and enhance engagement by local communities.

#### *T5. Preservation and Reconstruction*

- Defining levels of access to data may be useful.
- Web scanning and statistics are useful tools.

■ **Q4. How to structure cooperative actions to foster interdisciplinary research on the phenomena of cultural heritage looting?**

*T2. Provenance and Traceability*

- Networking ensures cooperation within a larger community of stakeholders.
- Pilot projects provide the ground for lessons learned.
- Interdisciplinarity provides for identification of common vocabularies, standard setting (e.g. typologies), etc.
- Behavioural conduct of looters is well documented. Further behavioural research should be carried out as regards the professional community.
- Training on existing legal frameworks is necessary.

*T3. Return and Restitution*

- Evidence-based policing research, based on specific questions, is necessary.
- The obstacles are legal and political.
- Interdisciplinary research should be facilitated.

*T4. Education and Awareness*

- “Participatory research” can lead to increased involvement by the general public/communities.
- Higher education in this specific field should be provided, possibly through a dedicated degree.
- Young people should be made aware as to their power to change things.

■ **Q5. How to design effective communication strategies?**

*T3. Return and Restitution*

- Sharing stories, both successful and unsuccessful, is necessary: to this end the NETCHER Platform is an effective instrument.
- Social media are crucial to disseminating information.
- Dealing with a “suspicious case” requires identifying the details of the case as well as the appropriate legal framework (as presented in the UNESCO site, for instance) to address it effectively. This information should be provided through a dedicated digital platform for cultural heritage.

*T4. Education and Awareness*

- Heritage sites often signal, through disclaimers, that removing/destroying items is illegal. To this end, the EU should enforce advertising campaigns (such as for wildlife in airports, on TV such as the Antiquities Coalition campaign or the ones developed by the Health Ministries of the concerned countries, etc.).
- The community of purchasers should also be sensitized as to these issues.
- A dedicated repository of public campaigns could be useful.

- Due diligence requirements and ICOM Code of Ethics should be enforced upon museums that buy cultural goods.

#### *T5. Preservation and Reconstruction*

- Set up a “Reward programme” for contributors with economic/scientific benefits, according to contributors’ interest (archaeologists, LEAs, curators etc.).
- An interdisciplinary EU agency for heritage conservation and the fight against illicit trafficking fully connected to international organisations and involving experts (lawyers, magistrates, scientists, archaeologists, arts specialists, police representatives, etc.) would ensure coordination among the various existing European projects and improve the sharing of practices and human resources.

Further to the specific contributions on issues T2 to T5, the general contributions to the debate by the working groups on T1 and T6 are detailed here.

#### *T1. Traffic channels and actors*

- The NETCHER Platform could, in the long term, be the tool for the collation of all information available on the Internet (Twitter, websites, online tools), in particular when mapped. This would save time and energy, and increase efficiency.
- A specific focus should be on languages and national frameworks. News from specific areas can be collected only if the local language used is known.
- Quality photos ensure that objects/artefacts are easily identified.
- Purchasers and the private sector should be more involved as they are key actors.

#### *T6. Legal and operational interventions*

- EU instruments (e.g. resolutions) can help in the protection of cultural heritage and the fight against illicit trafficking.
- A multilingual search engine is also necessary.
- Collaborative studies with the participation of different specialists (e.g. criminologists, economists, archaeologists, sociologists, etc.) are also necessary to assess the economic and social impact of looting and trafficking of cultural goods.
- The NETCHER Platform will also allow the sharing of information about training, events, etc.

#### 4. Conclusion



The first year of the NETCHER project has facilitated collating and organizing a substantial amount of high-quality information as regards the issue of illegal trafficking of cultural good, in cooperation with relevant professional communities, such as law enforcement agencies, cultural heritage specialists from the academia and museum and cultural organisations, institutional representatives, technology providers, etc.

#### The NETCHER Social Platform: a “toolkit for toolkits” and resource centre

A tool is defined by its users. The first NETCHER Seminar has allowed us to validate, based on the practitioners’ requirements, the major features that the NETCHER Platform should encompass. The NETCHER Platform is indeed an open and public website that also includes a restricted area for specialized professionals. It is a resource and data centre, a place to find key information and links to relevant organisations, tools, platforms and resources both for the general public and specialised professionals. The NETCHER Website will also include a Geographical Information System (GIS) to provide users with information specific to countries and resources.

The main conclusions of this first year of the NETCHER project are twofold:

1. There is a shared claim for the setting-up of a **European agency and resource centre** to serve the community of professionals involved in the fight against illicit trafficking of cultural goods.
2. There is a need to support **digitisation programmes and strategies** of heritage, based on the FAIR approach.

For its second year the NETCHER project foresees the following activities:

- The first **NETCHER Forum** will take place on February 25, 2020 in Lyon (France). Participation is open to the professional community involved in cultural heritage protection. Registration details are available on the NETCHER website.
- **Training module n°1** “Provenance and Traceability” will take place in Lyon, 18-21 February 2020. **Training modules n°2** “Preservation and Reconstruction” and **n°3** “Remote sensing and Earth observation”, will be organized in Venice, June 2020.
- The second **NETCHER Seminar**, with specialized training modules, will take place in June 2020 in Venice (Italy). It will address increased European integration as regards data sharing and alert protocols, define the NETCHER research roadmap and policy recommendations, and launch the NETCHER label.
- An awareness raising event will be organized in September 2020 in Brussels (Belgium).
- The second Forum will take place in December 2020 in Venice (Italy).
- Online events such as webinars and MOOCs will be launched throughout the year 2020.

Save the dates!

## 5. Annexes

### Annex 1: First NETCHER Workshop



#### Illicit trafficking in Cultural Heritage :

#### NETCHER state of play

- 28 & 29 May 2019, Frankfurt am Main, Germany

Römisch-Germanische Kommission

Palmengartenstrasse 10-12, in Frankfurt am Main

- 28 May

8h30 to 9h00	Registration
9h00 to 9h30	<p>Welcoming by the representatives of DAI</p> <p>Presentation of the Netcher project by Véronique Chankowski</p> <ul style="list-style-type: none"> <li>• Aims and goals of the workshops</li> <li>• Topic issues and restitution at stake</li> </ul>
9h30 to 11h00	<p><a href="#">Provenance and traceability</a>, Mrs Sabine Fourrier, CNRS</p> <p>Vincent MICHEL, Professor, Poitiers University</p> <p>Xavier DELESTRE, Head of the regional department of archaeology, DRAC PACA</p> <p>Jérôme PLAIN, Professor, Troyes University</p> <p>Evangéline MARKOU, Researcher, National Hellenic Research Foundation</p> <p>Sylvain DHENNIN, Researcher, CNRS</p>

#### 11h00 to 11h30 Coffee break

11h30 to 13h00	<p><a href="#">Education and awareness</a>, Mrs Véronique CHANKOWSKI, CNRS</p> <p>Anna KEDZIOREK, Policy Officer, European Commission</p>
----------------	---

Sophie DELEPIERRE, Head of Heritage Protection and Capacity Building  
Departement, ICOM

Valérie GILLET, Lecturer, EFEO

Lidia VIGNOLA, Director, Archeomafie

Tsao CEVOLI, Director, Centro per gli Studi Criminologici

Arianna TRAVIGLIA, Coordinator of the IIT Centre for Cultural Heritage Technology

Riccardo GIOVANELLI, Archaeologist

Yann BRUN, Safety advisor, French Ministry of Culture

*13h00 to 14H30 Lunch buffet*

14h30 to 16h00

[Preservation and reconstruction](#), Mr David WIGG-WOLF, DAI

Sebastian DOBBERSTEIN, ArcHerNet coordinator, DAI

Marinos IOANNIDES, Chair of the Digital Heritage Research Lab, Cyprus University of Technology

Bastien VAROUTSIKOS, Head of development, ICONEM

Alexandre RABOT, Archaeologist Engineer, Lyon 2 University

Robert Bewley, Project Director of EAMENA project, Oxford University

*16h00 to 16h30 Coffee break*

16h30 to 18h00

[Return and restitution](#), Mr David WIGG-WOLF, DAI

Judith KAGAN, Curator, French Ministry of Culture

Sorin HERMON, associate professor, The Cyprus

Institute

Felicity BODENSTEIN, Head of development,  
Technische Universität Berlin

Mara WANTUCH-THOLE, German lawyer

Edouard PLANCHE, UNESCO

St John SIMPSON, senior curator responsible for  
the pre-Islamic collections from Iran and Arabia,  
British Museum

*20h Gala Dinner*

---

- 29 May

9h to 10h30      [Traffic channels and actors](#), Eric GIL, ENSP

*10h30 to 11h Coffee break*

11h to 12h30      [Operational and legal interventions](#), Eric GIL, ENSP

*12h30 to 14h Lunch Buffet*

14h to 15h      [General conclusion](#)

---



## Annex 2: First NETCHER Seminar

### NETCHER H2020 Seminar 1: “State-of-play validation and collaborative platform modelling” 03-04 October 2019, Barcelona (Spain)

#### Objectives

- State of play validation
- Collaborative platform modelling
- Trans-domain working; setting-up next months’ work

#### Agenda Day 1

Time (from-to)		Topic	Speaker(s)
9.00	9.30	Welcome coffee, registration, NDA and ToRs signature	
9.30	10.00	Introduction, NETCHER presentation, aims and goals of the Seminar	Véronique Chankowski (CNRS) Marine Lechenault (CNRS) Mercedes Giovinazzo (Interarts)
10.00	12.30	<b>Session 1. State of play validation</b>	
10.00	11.00	10 minutes summary/workshop	Each Workshop leader (CNRS, DAI, ENSP)
		Traffic Channels and Actors	Corinne Chartrelle (ENSP)
		Preservation & Reconstruction	David Wigg-Wolf, Michaela Reinfeld (DAI)
		Provenance & Traceability	Marine Lechenault (CNRS)
		Return & Restitution	David Wigg-Wolf, Michaela Reinfeld (DAI)
		Education & Awareness	Marine Lechenault (CNRS)
		Operational and Legal Interventions	Corinne Chartrelle (ENSP)
11.00	11.30	Coffee break	
11.30	11.45	Gaps and Trends status and consolidation plan	Véronique Chankowski
11.45	12.30	Discussion	All
12.30	14.00	Lunch	
14.00	17.30	<b>Session 2. Existing tools and Platforms, Technological issues Databases on Illicit traffic Platforms &amp; networks on illicit traffic</b>	<b>Moderation:</b> David Wigg-Wolf (DAI)

14.00	14.45	Presentation of NETCHER Platform: functionalities, groups, activity	Antonio Gucciardo Oualid Chaker Shazia Ben Jaâfar Samuel Renault
15.00	16.30	Guests' showcases (10 minutes/guest)	
		<i>Social platforms: how to manage a social platform/lessons learnt from previous initiatives?</i>	
		Cultural Base	Prof. Arturo Rodriguez Morató
		Ariadne-Plus	Sorin Hermon
		MAGNETO H2020	Evgenia Adamopoulou
		<i>Databases &amp; platforms on Illicit Traffic</i>	
		UNESCO digital tools	Asja Prohic-Doric
		ICOM toolkit	Sophie Delepierre
		ARCH project	Frédérique Duyrat, Andrew Meadows
		E-RIHS: European Research Infrastructure for Heritage Science - IPANEMA	Loïc Bertrand
		PREVISION H2020	Konstantinos Demestichas
		Catalogue of Endangered Latvian Archaeological Artefacts and other Latvian solutions for protection of cultural objects	Andris Kairiss
16.30	16.45	Coffee break	
16.45	17.00	Technological solutions for NETCHER Community	Maxime Guibert (CHT)
17.00	17.30	#hacking cultural heritage trafficking. Building out solutions for end-users needs	Maxime Guibert, All
17.30	18.00	Conclusion of Day 1, practical information	Véronique Chankowski and Marine Lechenault (CNRS)
18.00		<i>End of Day 1</i>	

### Agenda Day 2

Time (from-to)		Topic	Speaker(s)
9.00	9.30	Welcome coffee, registration	
10.00	13.00	<b>Session 3. Trans-domain working: challenges, needs, existing solutions and improvements for the Social Platform for Cultural Heritage</b>	

9.30	10.00	Day 1 wrap-up session, day 2 agenda	Véronique Chankowski (CNRS) Marine Lechenault (CNRS)
10.00	11.00	Thematic workshops according to Day 1 axes, with mixed audience: Profiles and focus on Challenges, Needs, Available solutions and Solutions to be built Supporting tool for the session: NETCHER Platform	Interarts, 1 EXO representative, 1 moderator, 1 reporter
11.00	11.30	Coffee break	
11.30	12.00	Wrap-up session per workshop	Workshops' Moderators and Reporters
12.00	12.30	Discussion	All
12.30	13.00	Conclusion of the Seminar, next steps	Véronique Chankowski (CNRS) Marine Lechenault (CNRS)
13.00	End of the Seminar - Departure		

### Annex 3: Written contributions

Corinne CHARTRELLE

Laure CHEVALIER

Barbora GABRYS

Monika HAGEDORN-SAUPE

Samuel HARDY

Judith KAGAN

Lenka STARKOVA

Donna YATES

### Annex 4: Bibliography

Al-Azm, A, Paul, K A and Graham, S 2019 *Facebook's Black Market in Antiquities; trafficking, terrorism, and war crimes*. ATHAR Project.

American Association for the Advancement of Science—AAAS. Ancient History, Modern Destruction: Assessing the Status of Syria's Tentative World Heritage Sites Using High-Resolution Satellite Imagery; *American Association for the Advancement of Science Scientific Responsibility, Human Rights and Law Program: Washington, DC, USA, 2014*.

Anonym 2016 *Cultural heritage in a changing world*. New York, NY: Springer Berlin Heidelberg.

- Anonym n.d. *Photogrammetry is the New Archaeological Photography: 3D Modeling at Abydos*. Abydos Archaeology. Available at <https://abydos.org/blog/2019/3/13/photogrammetry-is-the-new-archaeological-photography-3d-modeling-at-abydos> [Last accessed 19 December 2019].
- Audebert, N, Saux, B. L., and Lefevre, S, Beyond rgb: Very high resolution urban remote sensing with multimodal deep networks, *ISPRS Journal of Photogrammetry and Remote Sensing*, **2017**.
- Baca, M 2016 *Introduction to Metadata*. 20 July 2016. Available at <http://www.getty.edu/publications/intrometadata> [Last accessed 19 December 2019].
- Brodie, N 2011 The Market in Iraqi Antiquities 1980–2009 and Academic Involvement in the Marketing Process. In: Manacorda, S. and Chappell, D. (eds.) *Crime in the Art and Antiquities World*. New York, NY: Springer New York. pp. 117–133. DOI: [https://doi.org/10.1007/978-1-4419-7946-9\\_7](https://doi.org/10.1007/978-1-4419-7946-9_7).
- Brodie, N 2014a Provenance and Price: Autoregulation of the Antiquities Market?, *European Journal on Criminal Policy and Research*, 20(4): 427–444. DOI: <https://doi.org/10.1007/s10610-014-9235-9>.
- Brodie, N 2014b The Internet Market in Pre-Columbian Antiquities. In: Kila, J. and Balcells, M. (eds.) *Cultural Property Crime*. BRILL. p. DOI: [https://doi.org/10.1163/9789004280540\\_014](https://doi.org/10.1163/9789004280540_014).
- Brodie, N 2017 The role of conservators in facilitating the theft and trafficking of cultural objects: the case of a seized Libyan statue, *Libyan Studies*, 48: 117–123. DOI: <https://doi.org/10.1017/lis.2017.1>.
- Brodie, N n.d. Virtually gone! The Internet market in antiquities. In: *Proceedings of the 6th International Conference of Experts on the Return of Cultural Property*. p. p.190–204.
- Brughmans, T, Collar, A and Coward, F S eds. 2016 *The connected past: challenges to network studies in archaeology and history*. First edition. Oxford: Oxford University Press.
- Carlotto M. J., Detection and analysis of change in remotely sensed imagery with application to wide area surveillance, *IEEE Trans. Image Process.* **6**(1), 189–202, doi:10.1109/83.552106
- Chodoronek, M n.d. *The Use and Application of Photogrammetry for the In-field Documentation of Archaeological Features: Three Case Studies from the Great Plains and Southeastern Alaska* 99.
- Collier, D 1973 Field Museum Policy Concerning Acquisition of Antiquities, *Current Anthropology*, 14(4): 514–514. DOI: <https://doi.org/10.1086/201372>.
- Davis, T and Mackenzie, S 2015 Chapter 15 : Crime and Conflict: Temple Looting in Cambodia. In: *Cultural Property Crime An Overview and Analysis of Contemporary Perspectives and Trends*. Brill. p. p.292–306.
- Duval, E, Hodgins, W, Sutton, S and Weibel, S L 2002 Metadata Principles and Practicalities, *D-Lib Magazine*, 8(4): . DOI: <https://doi.org/10.1045/april2002-weibel>.
- Gaimster, D 2004 Measures against the illicit trade in cultural objects: the emerging strategy in Britain, *Antiquity*, 78(301): 699–707. DOI: <https://doi.org/10.1017/S0003598X0011333X>.

- Geary RC, The Contiguity Ratio and Statistical Mapping. *The Incorporated Statistician* 5(3):115– 145. 1954. <https://doi.org/10.2307/2986645> JSTOR2986645
- Giovanelli, R 2018 Provenance non verificabili nel mercato di antichità romane: case study sui 300 oggetti di più alto valore in vendita in eBay US, *Archeomafie*, X: 115–135.
- Gupta, S n.d. *Illegal trading of cultural property by Isis - the need for deep web monitoring with peacekeeping operations*.
- Hardy, S A 2015 Is looting-to-order ‘just a myth’? Open-source analysis of theft-to-order of cultural property, Chamberlain, J.M. (ed.) *Cogent Social Sciences*, 1(1): . DOI: <https://doi.org/10.1080/23311886.2015.1087110>.
- 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. DOI: <https://doi.org/10.1080/14655187.2017.1410050>.
- He, H, Chen, M, Chen, T, Li, D. Matching of remote Sensing Images with Complex Background Variations via Siamese Convolutional Neural Network. *Remote Sens.* **2018**, 10, 355.
- Huffer, D and Graham, S 2018 Fleshing Out the Bones: Studying the Human Remains Trade with Tensorflow and Inception, *Journal of Computer Applications in Archaeology*, 1(1): 55–63. DOI: <https://doi.org/10.5334/jcaa.8>.
- Isakhan, B 2015 Creating the Iraq cultural property destruction database: calculating a heritage destruction index, *International Journal of Heritage Studies*, 21(1): 1–21. DOI: <https://doi.org/10.1080/13527258.2013.868818>.
- Karrels, N 2014 Renewing Nazi-era provenance research efforts: case studies and recommendations, *Museum Management and Curatorship*, 29(4): 297–310. DOI: <https://doi.org/10.1080/09647775.2014.934050>.
- Koutsomitropoulos, D A, Alexopoulos, A D, Solomou, G D and Papatheodorou, T S 2010 The Use of Metadata for Educational Resources in Digital Repositories: Practices and Perspectives, *D-Lib Magazine*, 16(1/2): . DOI: <https://doi.org/10.1045/january2010-koutsomitropoulos>.
- Lefèvre, S.; Tuia, D.; Wegner, J.D.; Produit, T.; Nassaar, A.S. Toward seamless multiview scene analysis from satellite to street level. *Proc. IEEE 2017*, 105, 1884–1899.
- Lloyd, J 2016 Contextualizing 3D Cultural Heritage. In: Ioannides, M., Fink, E., Moropoulou, A., Hagedorn-Saupe, M., Fresa, A., Liestøl, G., Rajcic, V., and Grussenmeyer, P. (eds.) *Digital Heritage. Progress in Cultural Heritage: Documentation, Preservation, and Protection*. Lecture Notes in Computer Science. 2016 Cham: Springer International Publishing. pp. 859–868. DOI: [https://doi.org/10.1007/978-3-319-48496-9\\_69](https://doi.org/10.1007/978-3-319-48496-9_69).
- Lundén, S 2012 Perspectives on looting, the illicit antiquities trade, art and heritage, *Art Antiquity and Law*, XVII(2): 109–134.

- Mackenzie, S 2015 *Do we need a Kimberley Process for the Illicit Antiquities Trade? Some lessons to learn from a comparative review of transnational criminal markets and their regulation*. p.p.151-162.
- Mackenzie, S and Davis, T 2014 Temple Looting in Cambodia: Anatomy of a Statue Trafficking Network, *British Journal of Criminology*, 54(5): 722–740. DOI: <https://doi.org/10.1093/bjc/azu038>.
- Mackenzie, S, Brodie N, Yates, D, and Tsirogiannis, C 2019 *Trafficking Culture: New Directions in Researching the Global Market in Illicit Antiquities*. London: Routledge.
- Manolakis D and Shaw G, Detection algorithms for hyperspectral imaging applications, *IEEE Signal Process. Mag.* 19(1), 29-43, **2002**, doi:10.1109/79.974724. Tapete, D.; Cigna, F. Detection of Archaeological Looting from Space: Methods, Achievements and Challenges. *Remote Sens.* **2019**, 11, 2389.
- Maranda, L and Brulon, B 2017 The Predatory Museum, *ICOFOM Study Series [Online]*, 45: 13-20.
- Mou, L.; Bruzzone, L.; Zhu, X.X. Learning spectral-spatial-temporal features via a recurrent convolutional neural network for change detection in multispectral imagery. *IEEE Trans. Geosci. Remote Sens.* **2019**, 57, 924–935.
- Mou, L.; Schmitt, M.; Wang, Y.; Zhu, X.X. A CNN for the identification of corresponding patches in SAR and optical imagery of urban scenes. In *Proceedings of the Urban Remote Sensing Event (JURSE)*, Dubai, UAE, 6–8 March **2017**; pp. 1–4.
- O’Keefe, P J 2014 UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects (1995). In: Smith, C. (ed.) *Encyclopedia of Global Archaeology*. New York, NY: Springer New York. pp. 7450–7455. DOI: [https://doi.org/10.1007/978-1-4419-0465-2\\_1268](https://doi.org/10.1007/978-1-4419-0465-2_1268).
- Patel, M, White, M, Mourkoussis, N, Walczak, K, Wojciechowski, R and Chmielewski, J 2005 Metadata requirements for digital museum environments, *International Journal on Digital Libraries*, 5(3): 179–192. DOI: <https://doi.org/10.1007/s00799-004-0104-x>.
- Petkova, G 2004 How to get a 2,000% profit from selling an object, *International Journal of Heritage Studies*, 10(4): 361–367. DOI: <https://doi.org/10.1080/1352725042000257384>.
- Prott, L 2009 The UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects – Ten Years On, *Uniform Law Review*, 14(1–2): 215–237. DOI: <https://doi.org/10.1093/ulr/14.1-2.215>.
- Reed, V 2013 Due Diligence, Provenance Research, and the Acquisition Process at the Museum of Fine Arts, Boston, *DePaul Journal of Art, Technology & Intellectual Property Law*, 23(2): 363.
- Siebke, I, Campana, L, Ramstein, M, Furtwängler, A, Hafner, A and Lösch, S 2018 The application of different 3D-scan-systems and photogrammetry at an excavation — A Neolithic dolmen from Switzerland, *Digital Applications in Archaeology and Cultural Heritage*, 10: e00078. DOI: <https://doi.org/10.1016/j.daach.2018.e00078>.



- Singh, A. Digital change detection techniques using remotely-sensed data. *Int. J. Remote Sens.* **1989**, 10, 989–1003.
- Statham, N 2019 Scientific rigour of online platforms for 3D visualization of heritage, *Virtual Archaeology Review*, 10(20): 1. DOI: <https://doi.org/10.4995/var.2019.9715>.
- Tapete, D.; Cigna, F.; Donoghue, D.N.M. Looting marks” in space-borne SAR imagery: Measuring rates of archaeological looting in Apamea (Syria) with TerraSAR-X Staring Spotlight. *Remote Sens. Environ.* **2016**, 178, 42–58
- Tremain, C G 2017 Fifty Years of Collecting: The Sale of Ancient Maya Antiquities at Sotheby’s, *International Journal of Cultural Property*, 24(2): 187–219. DOI: <https://doi.org/10.1017/S0940739117000054>.
- Tsirogiannis, C 2015 ”Due Diligence” Christie’s antiquities auction, London, October 2015’, *Journal of Art Crime*, Fall: 27–37.
- Ulph, J 2011 The impact of the criminal law and money laundering measures upon the illicit trade in art and antiquities, *Art Antiquity and Law*, XVI(1): 39–52.
- Vassallo, V, Kyriacou, N, Hermon, S and Eiades, I 2013 Tracing provenance of lost and found Cypriot Byzantine icons. In: Addison, A.C., De Luca, L., Guidi, G., and Pescarin, S. (eds.) *Digital Heritage International Congress (DigitalHeritage)*, 28 Oct – 1 Nov 2013 Marseille, France. pp. 667–670.
- Wachowiak, M J and Karas, B V 2009 3d Scanning and Replication for Museum and Cultural Heritage Applications, *Journal of the American Institute for Conservation*, 48(2): 141–158. DOI: <https://doi.org/10.1179/019713609804516992>.
- Yates, D 2015 Value and doubt: the persuasive power of ‘authenticity’ in the antiquities market, *PARSE: Platform for Artistic Research Sweden*, 2: 71–84.
- Zhan, Y.; Fu, K.; Yan, M.; Sun, X.; Wang, H.; Qiu, X. Change detection based on deep Siamese Convolutional Network for optical aerial images. *IEEE Geosci. Remote Sens. Lett.* **2017**, 14, 1845–1849.