Institute for Spatial Information
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COLOR & SPACE IN
CULTURAL HERITAGE

DIGITISATION OF CULTURAL HERITAGE AT THE NATIONAL MUSEUM OF ROMANIAN HISTORY

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Guides to good practice in documentation of cultural heritage assets

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EUROPEAN COOPERATION

Collectively assembling the pieces of a jigsaw puzzles

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Muzeul Național de Istorie a României

IFIN-HH

The Norwegian Colour and Visual Computing Laboratory

National Museum of Romanian History

Historic building, beginning of 20th century.

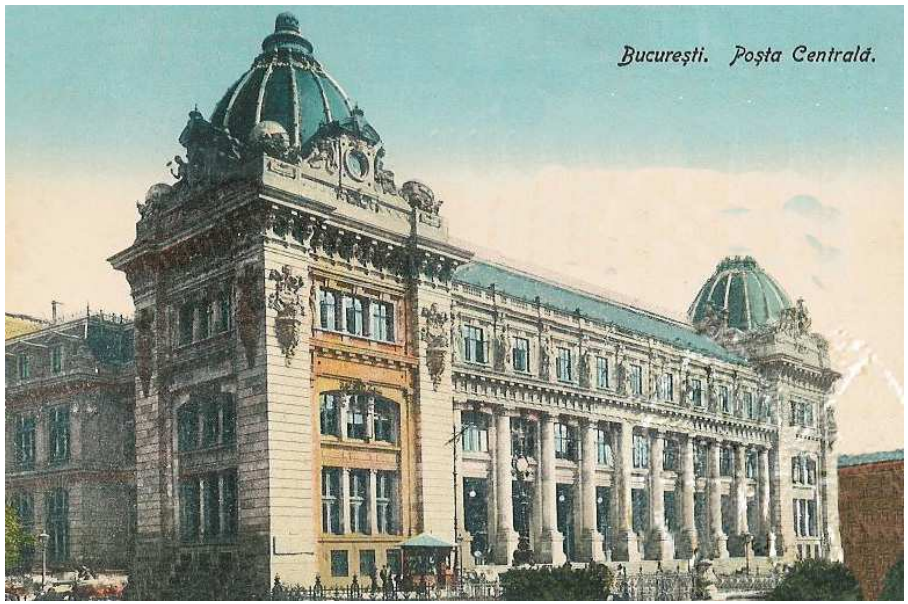
Eclectic neoclassic architecture.

First, the Palace of the Post Office

In 1960s, became the museum of history.

Survived a big earthquake in 1977.

Varied collection: ceramic, numismatic, gold thesaurus, icons



Museum is undergoing works of renovation – the objects are being moved.

The objects selected for the proposed case study are not available for public visit.

Case Study Proposal

- Explore novel cultural heritage reconstruction techniques in addition to those used by the National Museum of Romanian History and contribute to the museum's virtual collection.

- Realize spatial documentation with various techniques and create 3D models for **ceramic vases** with significant origin and artistic manufacturing from MNIR's collection.

- Realize spectral documentation of a collection of representative **icons** and **manuscripts**.

- Widely disseminate the alternative methods of cultural heritage items throughout Romania and increase awareness among the multidisciplinary network of students and professors of art and conservation, museum curators, archaeologists.

Guidelines to understand the end-user needs

- Ask, ask, ask!
- Translate answers and “what-ifs” into actions that need to be taken.
- If needs are specific, it is easy to extract goals and objectives.
- If needs are not specific, try to reach the core problem/desire by more questioning and also by assumptions.
- Finally, even though it is important to offer an individual treatment to each particular need, try to find at least one **underlying common** need for all groups of end-users involved from a CH perspective, so that the final results are wrapped-up in a **common language.**

Guidelines to understand the end-user needs

Scenarios:

The museum curator: *"I want to present in a nutshell the collection held by the museum and its importance. The **representation** should be **holistic** as possible."; "The museum is undergoing works of renovation, so it is difficult to exhibit the objects. We are afraid that the visitors might **lose interest** during the renovation period."*

The conservation scientist: *"We already did some analysis on these objects, but we are curious to see how this new technique works. Maybe it can tell us **something new**."*

Needs identified:

1. **Improve documentation → 3D and multispectral documentation**
2. **Explore novel techniques → multispectral acquisition**
3. **Present results on a virtual gallery → online exhibition**

3D Documentation with Photogrammetry (1)

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Acquisition:

- Method used: Structure from Motion
- Sony NEX 6, 16-50mm f/ 3.5-5.6
- 2 Studioflash 1000w
- 2 Studioflash 300w
- Rotating table
- Objects acquired: ceramic vases

3D Documentation with Photogrammetry (2)

Ceramic Vases belong to the Cucuteni-Trypillian, one of the oldest civilizations of Europe, ~4600 - 3500 B.C.
Belongs to the Eneolithic archaeological era
Famous for the elaborate pottery, decoration with swirling patterns
Hand-coiled out of ferruginous clay and burnt
Colors: white and red, brown, black (depending on the temperature of burning)

3D Documentation with Photogrammetry (3)

Pros and Cons:

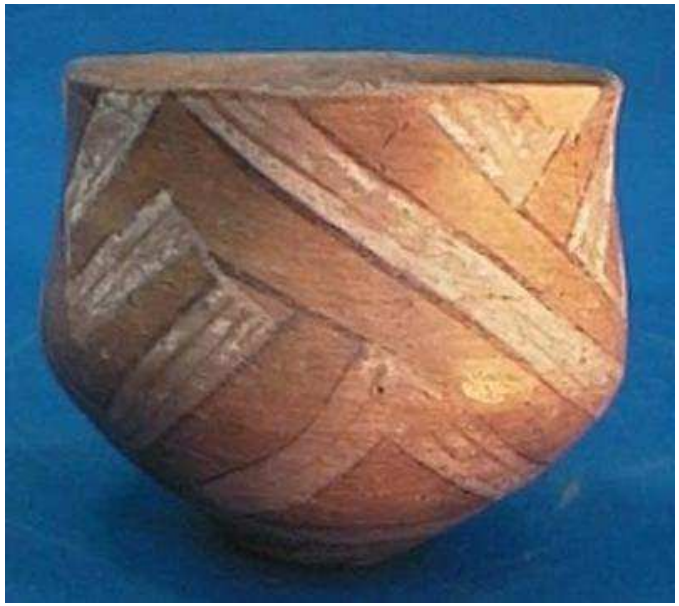
+ The measuring of the imaging subject is performed with a low-cost setup
+ Photometric measurement, following a rule-based procedure
+ Recent technological advances in digital cameras, computer processors, and computational techniques make photogrammetry a portable and powerful technique.
+ The results are dense and precise 3D surface data with a limited number of photos, captured with standard digital photography equipment, in a relatively short period of time.

- Automatisation of the software gives little control over the final product

3D Documentation with Photogrammetry (4)

Processing with Agisoft Photoscan

Ceramic vessel, inv. no. 15894



Ceramic vessel, inv. no. 12136

Ceramic vessel, inv. no. 12143

Multispectral Documentation with Filter-Wheel Approach (1)

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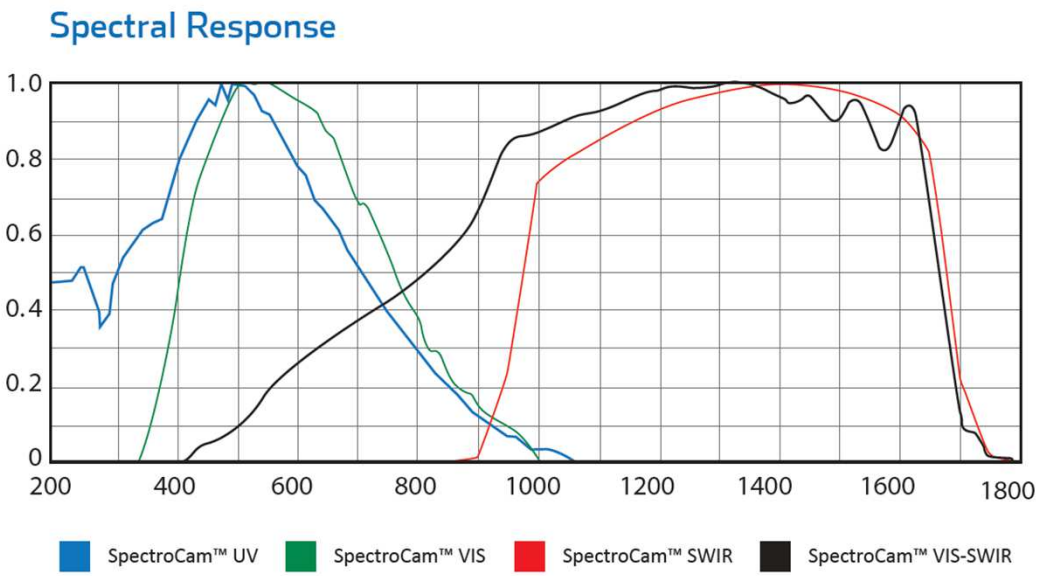
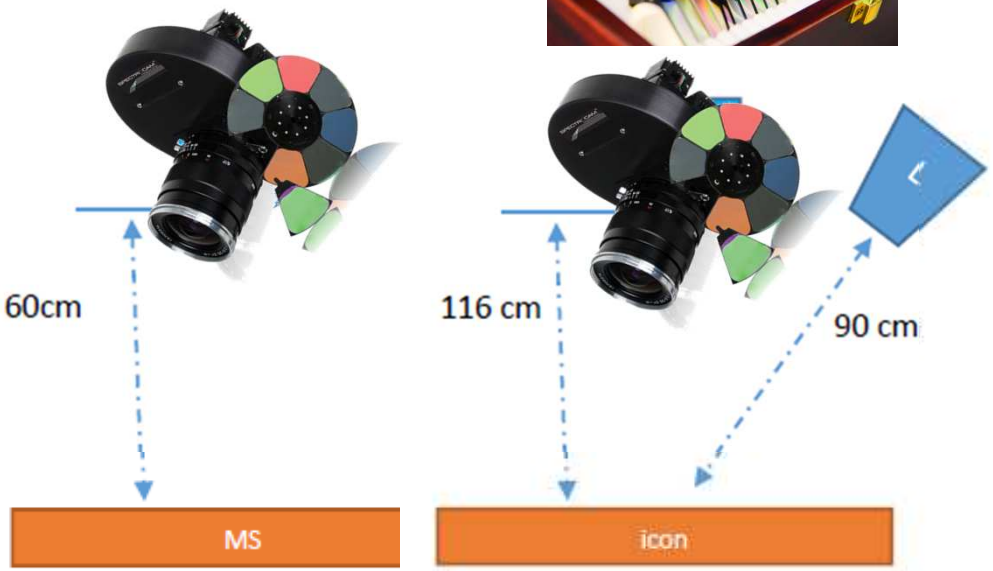
Acquisition:

- Multispectral camera SpectroCam, manufactured by PixelTeq.
- Objects acquired: Byzantine Icons and Medieval Manuscripts.

\+ Incorporated intuitive software: the possibility to provide feedback in real-time.
\+ Interchangeable filters.
\+ Spectral response from 200 to 1800 nm.
-Manual focus: problems in the extremes of the spectrum.
-Low spatial resolution





Multispectral Documentation with Filter-Wheel Approach (2)

Data:

•Registered images in 8 different spectral bands: 425 nm, 475 nm, 525 nm, 570nm, 615 nm, 680 nm, 708 nm, 784 nm.
•Header (.hdr) file useful for reading the data.

Processing:
•Correct for light intensity non-uniformity based on a perfect white diffuser.

Visualization with (free) ImageJ:

•Generate conventional RGB color images.
•False color visualizations.
•Multi-format image input and output.

Multispectral Documentation with Filter-Wheel Approach (3)

Guidelines:

- There is a various number of multispectral acquisition approaches, that cover a higher (hyperspectral) or lower spectral range. The higher the spectral resolution, the easier it is to recover the spectral signature and perform quantitative analysis.
- In a multispectral acquisition, attention has to be given to a light source with good emission in the targeted spectral bands.
- An appropriate light source will improve the capabilities for focus adjustment.
- For the filter-wheel camera, depending on which part of the spectrum needs to be documented, corresponding filters need to be chosen prior to the acquisition.
- If the space constraints together with the field-of-view of the camera don’t allow an acquisition of a full object, then multiple acquisition can be performed or a limitation to principal details is recommended.
- Repeatability of acquisition experiment adds value to the robustness of the results.

Virtual exhibition

- The platform used was Omeka.net: http://romanianculturalheritage.omeka.net/about
- Enables the uploading of multimedia file format, along with Dublin Core Metada fields
- Facilitates the grouping of the multimedia files into category, collections and exhibits
- Free for storage less than 500 MB
- Two main galleries of exhibitions: spectral documentation and spatial documentation
- Each object is presented in an exhibition.
- Workshop at the museum for the launch of the website - December

Guidelines to self

Throughout COSCH:

- I've gained **cultural heritage maturity**
- Prior planning is essential
- Collaboration, cooperation, communication
- Proximity rather than remote

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MULȚUMESC!

Guidelines for the presentations during COSCH's final conference which entitles

"Guides to good practice in documentation of cultural heritage assets"

The following guidelines intend to give a frame in which important and interlinked outcomes of the Action's work (presentations at the final conference, texts for the final book) have to be prepared.

In this sense it is important to realise the frame in which the Action has to be seen and had been conducted:

The main objective of the Action is to realize an interdisciplinary cooperation, on a concerted European level, to ***prepare a novel, reliable, independent and global KNOWLEDGE BASE facilitating*** *the* ***use*** *of today's and future* ***optical measuring techniques*** *for the* ***documentation of European cultural heritage.***

As the presentations selected for the final conference (texts for the final book) are representing major contributions from / for the Action it's important to take the responsibility to communicate the work in a fundamental, transferable and understandable way. Ideally the audience (present at the conference or having access later on to the presentations / reports) should be able to directly draw conclusions for their own work.

In this context it is important to understand, that COSCH is based on interdisciplinary cooperation, why the use of optical measuring techniques has always to be seen as instruments to follow specific application goals. The presentations – which might be understood as guides – therefore have clearly to put the application into the centre and to explain workflows, technology used, problems faced and results in the context of the application goals.

For these reasons the Action has agreed on a process which should help to assure quality and joint appearance. This includes a time frame for the preparation of presentations and book texts and responsibilities for internal coordination.

Presentation structure and content

- The following questions have to be addressed:
    1. Which cultural heritage (research) question(s) is addressed?
    2. Which recording technique(s)/method(s) were used and why?
    3. How has technology been used?
        1. Acquisition
        2. Processing
        3. constraints (for measurements, processing, realisation of work)
    4. How did the data of the recording technique(s)/method(s) support the cultural heritage tasks?
        1. relevant (characteristics of) content, which is inevitable to answer CH question
        2. identified factors having impact on the content
        3. measures to be taken helping to assure required content
    - What are the limitations and sources of error?
    - What are the benefits of the recording technique(s)/method(s)/data in comparison to traditional methods?
    - Which COSCH Primary Tasks (PT) and sub-tasks (st) are addressed (see COSCH MoU)?

Deadlines and process

- Please use the structure of the provided template in the sense of the above mentioned intentions.
- Please provide a presentation title and an abstract of 300 words until 10 July 2016.
- Please provide your presentation slides until 15 September 2016.
- The presentations will subsequently be reviewed. A feedback will be given until 1 October asking for necessary improvements. In case of strong disregard of these guidelines a presentation might be cancelled.
- The presentations will be made public through the COSCH website. Please sign the copyright agreement.

Internal coordination:

- Presentations of short term scientific missions which are supporting a case study have to be connected to the case study presentation in order to avoid redundant / overlapping content. A mutual exchange between contributors has to be expected.