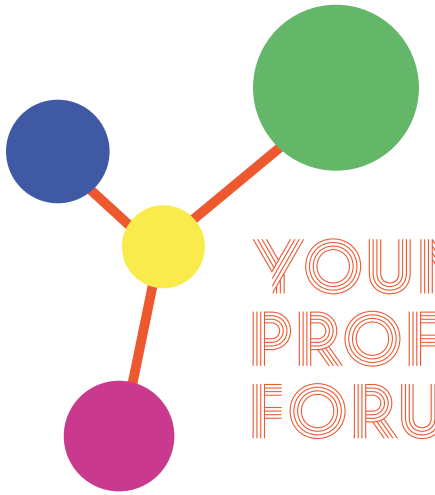
YOUNG PROFESSIONALS FORUM

Proceedings 2021

Centro Conservazione Restauro
LA VENARIA REALE



YOUNG PROFESSIONALS FORUM

PROCEEDINGS 2021

CENTRO
CONSERVAZIONE
RESTAURO
LA VENARIA REALE

YOUNG PROFESSIONALS FORUM

EMERGING SKILLS FOR HERITAGE CONSERVATION

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SUMMARY

INSTITUTIONAL INTRODUCTION

A year and a half ago the Young Professionals Forum was born and since then we have had absolute confirmation of the importance of supporting a community of young professionals in heritage conservation. As you know, our Forum is all about connecting different backgrounds and cultures, contaminating our different perspectives and sharing not only our research and findings, but more importantly our views and vision, about the present and into the future. So thank you to all participants for accepting this challenge, which is a source of pride for our Centre. It is a priority for us to promote new professionalism and mutual collaboration.

We remember the first edition of this Forum as extraordinary and surprising: at that time, in 2020, the health emergency was transforming the way we live, work and meet. But in spite of this, we managed to seize an opportunity: we believed in digital transformation and created an opportunity to meet and exchange ideas, skills and experiences on an international level. This year we have gone a step further: we have created a Community of young heritage professionals who are joined by the most established and well-known figures in the world of conservation, who together can dialogue and work by exchanging important skills.

We would now like to thank the Fondazione Compagnia di San Paolo and the Fondazione Magnetto for their support and for believing in the Centre's activities. This year, too, they have made their valuable contribution.
The Centre is also honoured by the partnership of the major international organisations which, once again, have collaborated in the realisation of the Forum: ICOM, CNR, ICCROM and IIC, which has made a great contribution to the Forum thanks to the scholarships made available. Special thanks also to the University of Turin, as always our travelling companion.
I would also like to thank ICOMOS and the Santagata Foundation for setting up and running the technical tables. In addition, we would like to express our gratitude to the entire SiC and KiCulture group for their constant support and assistance in community activities and the organisation of this event. Thank you for providing the Ki Award, which recognises the project that has demonstrated the most innovative connection to sustainable practice.

Once again this year, several projects were presented in reference to the 4 thematic areas that make up the Forum: Ethics and Practice of Conservation, Diagnostics and Technologies Applied to Conservation, Museum Professions and History of Conservation.
This made it possible to connect in one moment different professionals with different points of view of the same world.
At the Centre we see the Forum as a place for mutual understanding, dialogue between different cultures of conservation and different professional experiences because we believe in building a community that can express itself on the main issues, aspirations and visions related to heritage conservation.

Sara Abram, **CCR Secretary General**
and *Stefano Trucco*, **CCR President**

INTRODUCTION

Compagnia di San Paolo in one of the biggest Foundation in Europe and it is also funding member of CCR.
Compagnia di San Paolo is involved in supporting long term cultural projects devoted to the development of our area, and in specific cases our Foundation decided to join some institutions that can be defined as strategic. To be member of CCR means not only to be part of the Governance, but also to share the same goals and values.

In these years, since 2006, we have seen the growth of CCR, of its role and its activities, and it has been an important experience also for our Foundation. Throughout the history of Centro Conservazione e Restauro it is possible to find all the reasons for understanding what the Compagnia di San Paolo does when it is really involved in long term cultural projects.
In the late '90s, Regione Piemonte started Venaria Reale redevelopment project with the the big challenge to redefine a purpose and a role for the Reggia di Venaria, at that time an abandoned royal palace and that today is one of the most visited cultural site in Italy. In that moment, alongside to have a museum and a place for exhibitions within the palace, there was the intuition to conceive an institute for higher education and research in the field of restoration and conservation. In this place today we see the results of the project that allow us to experience all the potential of a complex cultural project where research and training can contribute from the beginning to the construction of policies for the enhancement of cultural heritage. What makes Venaria Reale unique is the opportunity to have an amazing cultural site and an outstanding centre of research and training in the same place, fostering the new cultural role of the architectural complex.

CCR has been able to create national and international partnerships and has also worked and managed to acquire a strategic role as a centre of specialised skills at the service of this territory and in general at the service of the entire restoration sector that is very important for our country.
Compagnia di San Paolo has worked together with CCR on strategic tools capable of strengthening the institution and it was about two main aspects: internationalisation and building of new skills. There are new challenges that every research institute today must face, not to mention the consequences of the pandemic crisis that we are still living today. But to be international does not only means, you know, bringing Italian restoration excellence to international attention but it means, in my opinion, to be able to interpret the needs that only an international community can express. It means to spread the best practices in our field of research, because the preservation of the heritage belongs to everyone because is the cultural heritage that belongs to everyone.
Besides, the attention of Compagnia di San Paolo Foundation towards the young generations is also fundamental because it's only by creating a community of trained professionals, of aware professionals, that we can ensure the transmission of heritage to future generations. Today it is really an honour for us to be able to see a community of young professionals gathered around this topic working together. A community of well-prepared people with a lot of skills, young people who believe in the value of culture and want to preserve it and make it alive, make it dynamic and make it useful for everybody and not just for a small community.
I want to thank Stefano Trucco and Sara Abram and the whole team of CCR. They were able to take up this challenge and lead this institution towards an international stage and they make it with professionalism, with knowledge and, especially, with the strong love for their work and I feel that these are the three things that you need to achieve great results.

Laura Fornara
Secretary General of Fondazione 1563 per l'arte e la cultura
of Fondazione Compagnia di San Paolo

Good afternoon, good morning, wherever you are.
Distinguished scholars, ladies and gentlemen, comrades and friends,
Thank you for inviting me again to talk to you at this important event. It is an honour for me to be with you again, even virtually.
The title “from conservation to the management of cultural heritage” so very much speaks to the history of ICCROM, which was founded more than 60 years ago to address the issues related to the conservation of cultural heritage. The Rome Centre started more than 60 years ago, which again focused on providing advice and training on technical aspects of conservation today and has grown to address conservation issues in its 137 Member States.
Today, given the spreading of its action, ICCROM is more than just an organisation that provides technical aspects. It also tackles issues concerning cultural heritage and the effects of conflict and war, which were the reason for its foundation, but are still affecting our world today. ICCROM FAR programme tries to address some of these issues by emphasising the protection of cultural heritage as raised since the Second World War and the concerns. At that time, the focus was protecting and restoring the monuments’ physical evidence. With time this is shifted into the emphasis on capacity building in various forms in various aspects of looking at cultural heritage, as reflected by some of the programmes we offer at equal.
It is essential to highlight how we’ve moved from conservation to cultural heritage management. The shift from the technical aspect responds to the globalisation of cultural heritage over the many years. It is also a response to the challenges that heritage has faced. Today, it’s not just about cultural heritage, and the gap between cultural and natural heritage has shrunk. The evolution started 60 years ago, just after the Second World War, when, as I’ve said, the emphasis was on the monuments and sites and aspects of artefacts in the museum.
In other words, we were moving from just emphasising the physical intervention, aiming to ensure the restoration of objects, buildings and monuments to their original state: it refers to the principles of the Venice Charter, which is considered the Bible, in terms of conservation, particularly in the Western world. So, although, as I said, the emphasis was on preventing the negative impact on the monuments, the idea was to take care and make sure that what we preserved and promoted was in its original state as we found it.
Today we have added much more to the way we take care of cultural assets, which is undoubtedly due to globalisation, bringing in other elements and new thought processes from different parts of the world. More charters and more declarations like the Barrow Charter and the Nara declarations have also impacted how we practise heritage management today.
Notably, on issues related to inclusivity in our approach to heritage management, the Barrow Charter introduces what I think is a fundamental concept: the concept of significance. It is mainly related to cultural heritage values, and it goes beyond. In addition, the Nara Declaration, on the other hand, considers intangible aspects of cultural heritage. In other words, it complements what the Barrow Charter does: it gives us another perspective.
Looking at cultural heritage economics training courses now considers the people-centred

approaches, focusing on the well-being of communities. As you know, when we started in conservation, this was much more to do with practitioners, experts telling us what to do with the heritage. The shift also was that heritage no longer just belongs to professionals to institutions, conservators, archaeologists, or architects. We now have issues of communities driving the whole process. The interest is from those who stay or use heritage assets and those affected. In my continent, in Africa, we do have a saying which goes: "Nothing about us without us". In other words, we have to make sure that all people who are affected are involved.

Heritage affects all aspects of our lives and contributes to the well-being of all. This has been emphasised by the current global pandemic and the impact of climate change. I want to return to the worldwide pandemic and perhaps look at the effects for the creative sector. It looks like before. 2015 we contributed about 3% of world GDP and employed more than a million people. Unfortunately, this has been affected in the past 18 months because of the pandemic.

If you look at it in terms of the ripple effect: the cultural and creative sectors are not performing because of lockdowns. It affects family livelihoods. It involves the well-being of ourselves. So we all are affected. Again, a lot of museums have been closed. They are starting to open again, but the numbers have to be controlled, particularly in Europe. The issue of social distancing means that we cannot just have people coming in: we now have to control. So again, this affects not just the matter of employment, but also remember that some museums and heritage sites depend on the tourism industry today to conduct their conservation.

The events brought by COVID-19 and the impact of climate change made us aware of the need to cooperate. They need to make sure that heritage is part of our lives and contributes to our being. We miss a lot of cultural activities because of the restrictions we have had in the past 18 months. We need cultural heritage to recover and alleviate the damages that the pandemic and climate change are inflicting on our society. But, of course, we can argue that both pandemic and climate change are also creating new heritage and new areas of cultural expression and dynamics in our field, and we need to consider them in terms of looking at cultural heritage implementing the processes of restoration.

This is important to consider how we can perhaps get out of the effects of the pandemic and the effects of climate change. As ICCROM, we have also provided some tools to deal with these issues, including COVID-19 and climate change. We have changed how we do things, particularly in capacity building. And I'm sure you are aware since you are working with universities that things have not been the same, and I dare say that perhaps we will never go back to what we used to do at some of the items. Are there to stay? Indeed forums, conferences, and gatherings like these are now happening virtually.

This is not something which we had foreseen. Since we're talking to young people who are also learning to become professionals, I just wanted to share with you some of the statistics coming out of that in terms of heritage science and literature, and therefore influence heritage management practice.

If you look at Italy, it is one of the most significant influencers for the conservation of cultural heritage management issues, and this is just looking at the literature on the web.

What does it mean? There is more significant influence from North America and Europe to the rest of the world regarding how we manage. As I mentioned, perhaps the answer to some of the problems raised by the pandemic and climate change is improving network and collaboration. Here I show you the collaborative networks which existed in 2019. I haven't updated this for some time, and I'm sure it's much less joint activities. Still, perhaps with the technology we now have, we can democratise knowledge, particularly knowledge related to cultural heritage.

As in this conference, we are joined by people from different parts of the world. If it were face to face, perhaps it would have 10-15 people to talk to. So we need to embrace technology to make sure that our practice, philosophy, and theories are shared. The world is very rich in heritage, and we need to share the various aspects coming from multiple parts of the globe.

The future of cultural heritage management rests with the young generation: it rests with you to ensure that these collaborative efforts, to ensure that heritage contributes to the people's well-being and peace, heritage contributes to solutions related to climate change and some of the issues coming out of this pandemic.

Thank you very much, it's always a pleasure for me to be in Torino, and I'm sure we will soon be able to do so in presence. But I thank you also for thinking about the youth. Do you guys are future? Yes, I am sure. Thank you,

Webber Ndoro

Webber Ndoro
ICCROM
Director General

SESSION 1

CONSERVATION ETHICS AND PRACTICE

Michela Cardinali
Sarah Stannage

Young Professional Forum 2021 has proved to be a crucial opportunity for young conservation professionals to meet and actively took part in international working groups, together with institutions and professionals.
Such an exchange between different generations is essential to create and develop expertise, networks, and best practices in order to build a democratic and sustainable future.
We are witnessing a deep transformation that involves several changes in different aspects of our personal, social, and professional lives. These are circumstances we cannot ignore. On the contrary, we have to know them and guide them, playing an active role in every decision-making process. In order to do so, we must look at our future with awareness. We must try and reflect together on some fundamental questions that, as a director and a conservator, I ask myself on a daily basis.
What is the role of cultural heritage conservation in facing the present and future world challenges, such as climate change, fight against inequalities, and support of innovation?
How can we face these challenges?
What can each of us do?
What can I do?
These are the issues that the international community already faces today. It was a great pleasure to find those themes approached in all the projects of our Forum, particularly in the six selected papers. Together with their innovative nature and effectiveness of their proposed actions, these projects were distinguished for the attention paid to ethics and its role in contemporary conservation practices. This includes great social participation, sustainability, and willingness to preserve historical and identity values of different communities, as well as innovation and research. This is what allows us to progress as a scientific community.
Some common values of these projects are the awareness and

the desire to undertake interdisciplinary and hybrid paths, that in a few years will surely generate the «skills of the future», the new integrated and intercultural skills that we really need.
As professors and conservation professionals, my colleagues and I consider the central aim of our work the creation of new meanings and shared knowledge. Thinking about these works I can say that we perfectly reached that aim.
My deepest thanks go to all the young professionals for their commitment and for sharing their experiences and such promising prospects.

Michela Cardinali
CCR, Conservation Laboratories and Advanced Training and Study School Director

We know that conservation of cultural heritage is not just a matter of science, art and technology but one that overlaps with ethics, practice, policy and cultural identity. We can recognise many diverse activities, techniques and technologies in our profession, from pest management to the use of AI (Artificial Intelligence) as a digital and machine learning tool in art conservation. Likewise, there is an intersecting evolution of conservation ethics and practice with humanistic dimensions in fields like authenticity, philosophy, theology, and sustainable development. Finally, there is the realm of policy and cultural identity, where we might include such endeavours that reach up towards national or international laws or reach out towards whole societies.
From the papers submitted this year, it is clear a new generation of professionals are providing an important connection that embraces, and is even driven by, community in conservation ethics and practice.
As new technologies are developed and as innovation accelerates to deal with the crises caused by climate change and Covid-19, never has it been more important to find moments where we can come together to explore the nexus between ethics and practice, to discuss and share our experiences, our research, our insights and our learning internationally for the common good. Supporting a global and diverse representation of early career and young professionals is, therefore, crucial so that we can ensure we meet the current needs, as well as the future needs, of a changing world.
For 2021 the International Institute for Conservation of Historic and Artistic Works (IIC) was pleased to support scholarships for 19 individuals, representing 10 countries, to participate in the Young Professionals Forum.

Sarah Stannage
IIC, International Institute for Conservation
Executive Director

ELABORATION OF NORMS AND CRITERIA FOR INTERVENTION
FOR THE SAFEGUARD OF NÚCLEO PIONEIRO DE GOIÂNIA-GO

Arthur Henrique Araújo Vieira
Federal University of Bahia, Center for the Study of Architecture in Bahia, Faculty of Architecture, Salvador, Brazil

One of the main problems faced by architects and the public authorities working in cities with urban areas protected and recognized as Historical Sites (due to their historical, landscaped and cultural value) is the absence of norms and criteria of intervention within these areas, linked to the economic, social and cultural development policies demanded by contemporary society.

According to the National Historical and Artistic Heritage Institute (IPHAN)[1], in Brazil until 2019, 59 ordinances were published that established guidelines and intervention criteria for urban historic sites, as well as defined the polygonal surroundings of the protected properties, of which only 19 are intended for the urban, architectural and landscape historic sites that add up to 87 listed sets, in which 118 out of a total of 1266 listed properties in the national territory are included. In the absence of a standard that establishes norms and criteria for intervention on protected urban areas, heritage policies face, among many challenges, the difficulty of local actors and public authorities in identifying and recognizing the elements and values that characterize the urban historic sites, its context and its ambience.

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[1] Diogo 2021.

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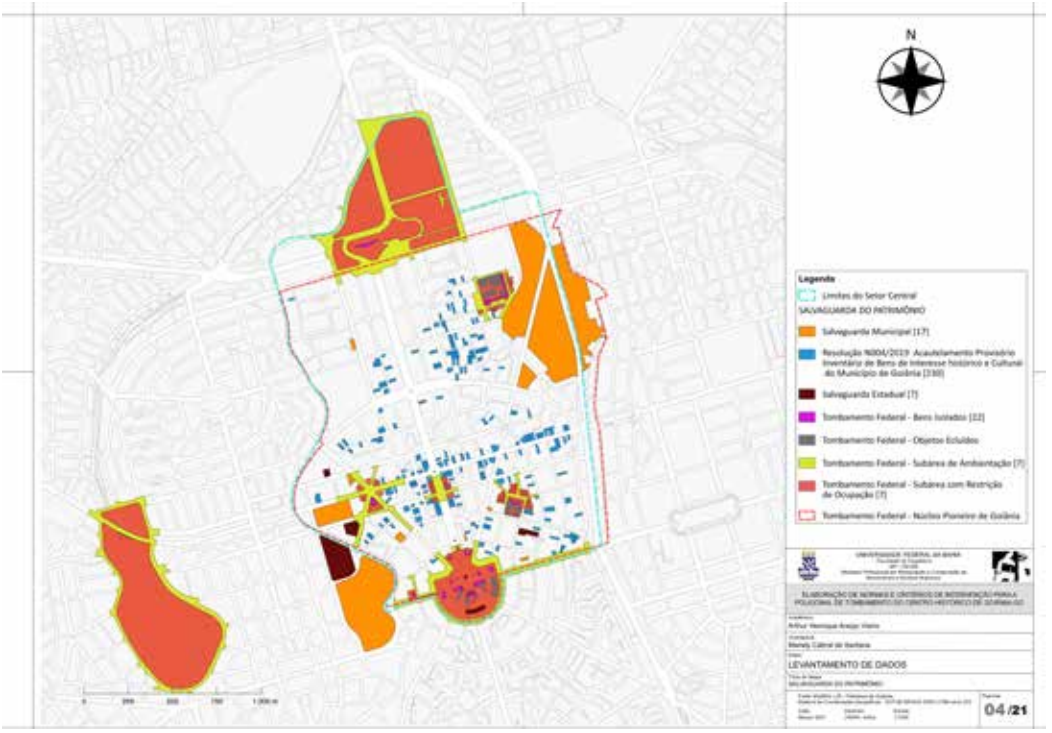

fig. 1

1. Map of monuments and protected areas in Goiânia-GO

Like other Brazilian cities, the city of Goiânia, capital of the State of Goiás – Brazil – currently faces the duality between the conservation of the cultural heritage and the implementation of new policies for development, especially when it comes to the core of the city, known as the Pioneer Nucleus of Goiânia-GO (fig. 1), protected since 2003 by the National Historical and Artistical Heritage Institute – IPHAN, the public entity responsible, at a national level, for the conservation of the Brazilian cultural heritage.

The acceptance of the core of the city as a heritage can be justified due to the conservation of its urban aspects, highlighting the historiographical making of the city and the Brazilian modern urbanism during the first half of the 20th century; and to the public buildings in *Art Déco*, used by the public entities in the most representative buildings of the official architecture and as symbol of power and modernity of the new city that was being built *ex-nihilo*[2] (fig. 2). These characteristics are identified through the connections between the buildings and their surroundings, the making of perspectives and monumental visual cones, the hierarchizing of the transit, aligned to the principles of the modern urbanism devised by the architect Attílio Corrêa Lima in 1932 (fig. 3).

[2] Manso 2001, p. 201.

fig. 2

2. Protected buildings with Art Deco features. a) Goiânia Theater b) Railway Station c) Clock Tower d) Zoroastro Artiaga Museum.

However, the recognition of Goiânia as a national heritage in the 2000's did not generate large-scale actions that sought its preservation or stimulated specific studies for the definition of guidelines, which together with municipal laws, referring to urban planning, would provide for the preservation of heritage, qualification and appreciation of the protected urban space that has been, systematically providing the underutilization, de-characterization and even demolition of a collection rich in history and meaning.
According to Márcia Sant'Anna[3], the origin of this conflict lies in the distancing of discussions that deal with space and urban dynamics, from those that concern the built heritage, understood through its condition of work of art and values of uniqueness and exceptionality, unrelated the context in which it is inserted.

Policies for the preservation of urban areas are built based on this separation and, instead of treating these two (or more) dimensions of the urban object with the same weight or in an integrated manner, they always privilege one or the other. This mismatch can be credited to the "independent" way they are handled.
(SANT'ANNA, 1995, p. 58) (our translation)

[3] Sant'Anna 1995, p. 58.

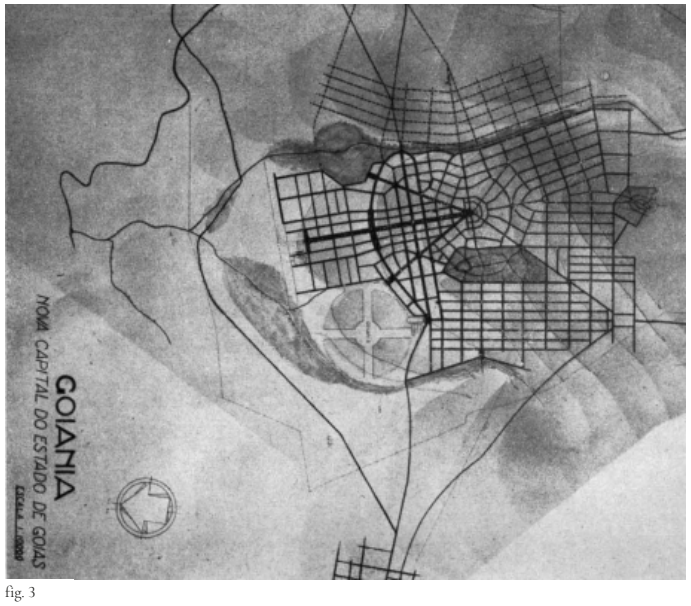

fig. 3

3. Master plan designed by Attílio Corrêa Lima in 1933.

In this way, However, the current perception of the core of Goiânia surpasses the comprehension of its significance given by the Institute, including the growth and diversification of the social and cultural contexts made against the historical extracts, changings, irruptions and continuities on the urban tessiture. The perception also surpasses due to the constant growth of the notion of heritage, demanding a wider analysis of the problems involving the dynamic of the city and the conservation of this heritage.
Under this line of thought, which understands the physical characteristics of the site, but also its appropriations, this work is anchored in a methodological development that starts from the current reading of the territory, through the identification of conflicts and tensions that arise for preservation of the site in question. The methodological process for approaching the place and to conduct the elaboration of studies is based on the principles set by the Ministry for Culture[4] and IPHAN[5] about the conservation and regulation of urban historical sites; and on the theoretical hue about heritage conservation and its contemporary growth, involving the topics on cultural landscape, urban typologies, urban morphology and organization in contact with in loco investigation of the place and its particularities.
The study also contemplates discussions on the management of historical urban sites after its legal protection aiming the conservation of the cultural heritage of the city and the setting of an urbanistic culture related to the conservation based on the urban organization and the management of the urban space.

[4] Ministero dela cultura 2010.
[5] IPHAN 2005.

In summary, the work is structured through the following steps:

1. Characterization and appropriation of the site;
2. Preparation of Diagnosis;
3. Elaboration of theoretical bases for standardization;
4. Development of criteria and guidelines for interventions in the different sectors identified in the research;
5. Development of models, as an exercise to prove the defined criteria for intervention.

Therefore, it was essential to review the information on the studied site, its history, occupation and development, taking as a basic assumption the elements that motivated its protection at the federal level and its relationship with the surrounding area and, consequently, with the entire urban tessiture of the city.
Thus, associated with the in loco observation of the space and its particularities, the knowledge, perception and appropriation of these elements is of great importance and the analysis of how they behave in the face of current urban dynamics, thus shaping the first stage of the work, understanding and ownership of the site.
Then, the elaboration of the diagnosis dealt with the translation of the data values collected into formal attributes and characteristics of the site, which were mapped in a systematic way, through georeferenced databases and photogrammetric surveys, made available by the Municipality of Goiânia. The reading of these maps, superimposed on each other, generated maps of incidence, which made it possible to identify sectors that agglutinate predominant characteristics, characterizing a heterogeneous and diversified territory (fig. 4).
This initial result showed us that, unlike other cities protected by their historical value, such as Ouro Preto (MG) and Olinda (PE), cities declared as Historical and Cultural Heritage of Humanity by UNESCO, in 1968 and 1982 respectively, which are apprehended to from its homogeneous historical extract, the heterogeneous character of the listed area of the city of Goiânia (GO) should be read through its intrinsic relationships between historical and cultural assets and a thriving urban dynamic, its uses and functions, as well as the analysis of the environmental issues, especially about the discussions on sustainability and urban resilience.
This framework ratifies Miarelli Marianni's definition of environment[6], which deals, above all, with the plurality of values from the reading of the city's spaces, in contrast to the initial definition that understood environmental values through their

[6] Miarelli Marianni 1993, p. 12.

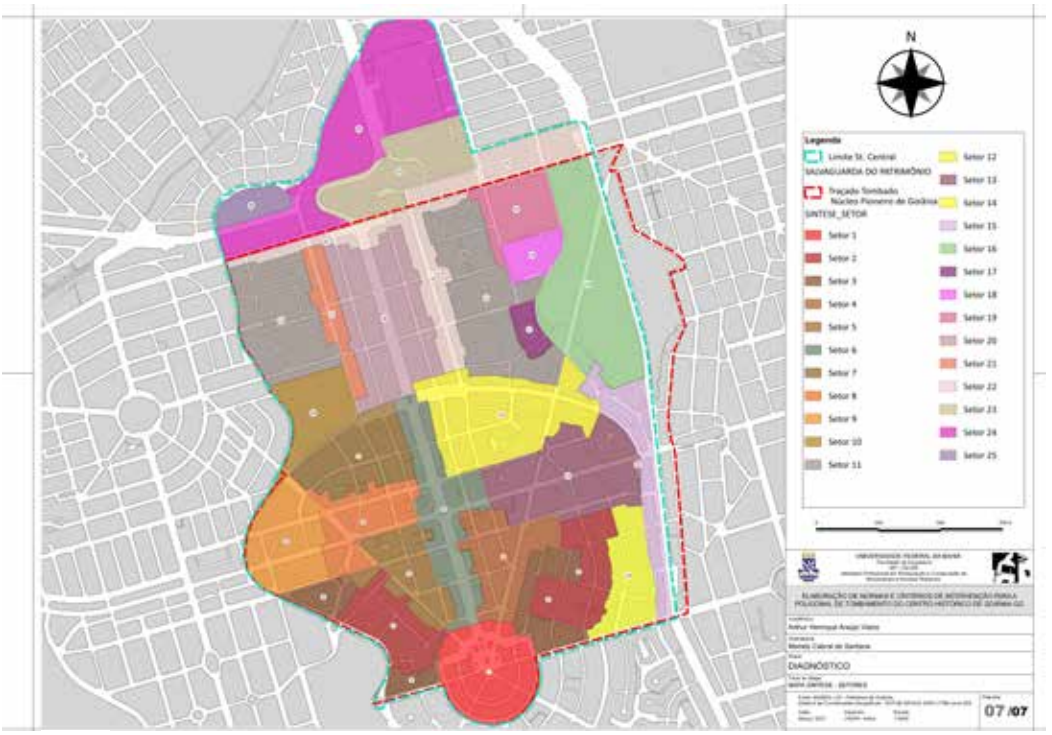

fig. 4

4. Map of sectors

direct relations with an exceptional isolated monument, through its immediate surrounding area and the conformation of the frame. The author therefore states:

The humanized environment is not characterized by its exceptional episodes of human activity, nor by elements that constitute expressions or testimonies of the civilization of certain cultures; all values that, once recognized, must be protected and, therefore, are important for the restoration action[7].

In this sense, considering the diversity of values identified, the standardization project for the Pioneer Nucleus of Goiânia will start from the delimitation of zones with greater or lesser rigor of preservation, understanding that not everything in the territory should be preserved and, therefore, the judgment of value is what will lead the actions in this valued space.
The work presented for now study is still in progress under the Professional MA in Restoration and Conservation of Historical Monuments and Sites (MP-CECRE) at the Federal University of Bahia (UFBA). The goal is to widen the discussions about the notion of conservation of the urban heritage and set norms and criteria for the intervention upon the Pioneer Nucleus of

[7] *Ibidem*, (our translation).

Goiânia, also aiming to determinate clear and compatible guides with the growth and development of the city.
The first results described here will support the continuity of the research development that will result in the normative project for the Pioneer Nucleus of Goiânia, in which readings are incorporated that provide a basis for understanding the object in question as a historical organism, through the understanding of the several temporal stratifications perceived from the ruptures, remains and urban accumulations that resulted in its current configuration.

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PRESERVING THE MATTE:
EVALUATION OF SELECTED ADHESIVES AND FILLERS FOR A CONSERVATION TREATMENT ON A GOUACHE PAINTING BY GINO DE DOMINICIS

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INTRODUCTION

When it comes to contemporary paintings, degradation processes often occur in a very short time. The execution technique can lead to an extremely rapid deterioration, which begins in the early years of their life, usually requiring a prompt intervention. A conservation treatment becomes highly challenging in the case of matte paint, due to its sensitivity to morphological and optical changes. This effect is even more noticeable on gouache paints, as their high pigment volume produces a light-scattering, resulting in a strong matte finish. Additionally, gouache paint layers often start to flake producing the so-called "mud cracking". When thick layers overlap, the solvent can evaporate through the exposed surface only. As a result, a rigid and fragile film is formed on the surface, while the underlying layers maintain a certain degree of humidity. These differences cause significant tensions, resulting in flakes with the typical "cup-shape".
The extreme sensitivity of the gouache painting *Con Titolo* can be addressed to two main causes: the widespread "mud cracking" and the micro-fragmentation of the figurative area, in some regions resulting in color gaps (fig. 1). The brittleness condition did not allow the artwork to be placed upright.

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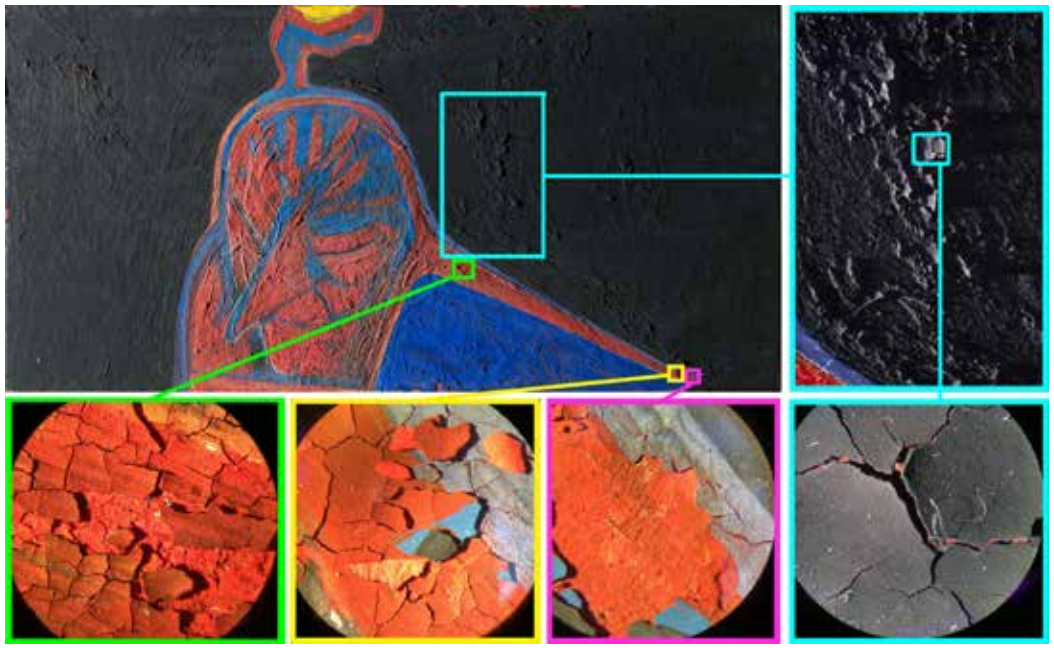

fig. 1

1. Paint surface of "Con Titolo" in ranking light (top left). Details of the "mud cracking", the micro-fragmentation, and color gaps (bottom and right) (courtesy of Opificio delle Pietre Dure).

Eventually, the absence of a protective coating makes the artwork even more sensitive to non-desired modifications of the matte surface. Hence, a conservation treatment and a protection system were needed to fix the detached paint layers while maintaining their peculiar matte finish. At the end of the intervention, the painting could finally be exposed and correctly conserved.

CON TITOLO (1986)

Con Titolo (37,8 x 76 x 2 cm) is a gouache painting on plywood realized by the Italian artist Gino De Dominicis (Ancona, April 1, 1947 – Rome, November 29, 1998) in 1986[1]. The artwork does not have a preparation layer nor a protective coating. It depicts a non-identifiable entity against a black background, suspended in time and space. It is representative of De Dominicis' personal artistic path on the atemporal nature of painting, as a practice able to survive all ages. The painting is currently stored at the Centro Pecci per l'Arte Contemporanea in Prato (IT), and belongs to the Alessandro Grassi Collection, largely dominated by the Transavangarde and the Postmodern Art from the early 1970s to the early 2000s[2].

[1] Pezzato 2020, p. 144.
[2] Pezzato 2020.

EXPERIMENTAL TESTS FOR THE FIXING INTERVENTION

Firstly, experimental tests were performed on mockups to select the most suitable adhesive for the fixing intervention. Only aqueous solutions have been considered, as the compatibility between thesolvent and the detached layers is an essential condition to carry out a stable and effective treatment.
Based on the available literature, multiple products have been tested in the first place, i.e.:

– Klucel® E (**KE**)[3]
– Klucel® G (**KG**)[4]
– Bermocoll® E230 FQ (**B230**)[5]
– Bermocoll® E320 FQ (**B320**)[6]
– 200 (**G200**), 250 (**G250**), and 300 (**G300**) bloom grade gelatine (type B)[7]
– Cold extraction (**c.e.**) and hot extraction (**h.e.**) FU-NORI seaweed (**FS**)[8]
– Cold extraction (**c.e.**) and hot extraction (**h.e.**) FU-NORI powder (**FP**)[9]
– JunFunori® (**JF**)[10]
– Aquazol® 50 (**A50**)[11]

A step-by-step selection process was followed, with the aim of examining the most important properties for the fixing intervention, i.e. optical qualities, adhesive strength, surface-tension[12].

Optical qualities. Mockups were made using plywood panels, whereon black gouache layers were applied to reproduce as much as possible the constituent materials of "Con Titolo". Each adhesive has been tested in three different concentrations, i.e. 1%, 2%, and 3% in demineralized water (dem. H_2O). Only A50 was tested in different concentrations on the basis of the available literature, i.e.5%, 10%, and 20%[13].
The optical properties have been examined using gloss[14] and colorimetric[15] analyses, respectively measuring Δ and ΔE. Measurements were taken before and after the application of the adhesive solutions, and after a 45-days ageing process under UV-B light as well[16].
All the cellulose ethers (KE, KG, B230, B320), the FS (c.e.), the FP (c.e.), the G300, and the JF showedminimal variations in brightness and color both before and after the ageing process (fig. 2). Hence, they have been selected for the second testing.

[3] Klucel® E, Kremer Pigmente GmbH & Co. KG, lot n. 63700.
[4] Klucel® G, C.T.S. s.r.l., lot n. 1659.
[5] Bermocoll® E230 FQ, Nouryon.
[6] Bermocoll® E320 FQ, Nouryon.
[7] Gelatine 200/250/300 bloom grade (16 Mesh; Calfskin), Italgelatine S.p.A.
[8] FU-NORI, Kremer Pigmente GmbH & Co. KG, lot n. 63477.
[9] FU-NORI powder, C.T.S. s.r.l., lot n. 112.
[10] JunFunori®, Lascaux™, lot n. 9567609.
[11] Aquazol® 50, Kremer Pigmente GmbH & Co. KG, lot n. 63901.
[12] Technical specifications of the instrumentation are clarified as footnotes only if cited for the first time.
[13] Arslanoglu 2004, pp. 10-11.
[14] Arroweld Glossmeter Arwe-20/60/85. Only the 85° measurement angle has been examined (ISO 2813).
[15] Konica Minolta Spectophotometer CM-2600d. Only SCI values have been examined.
[16] UV-B light: UV Lamp, Vilbert Loumart (15 W – 312 nm).

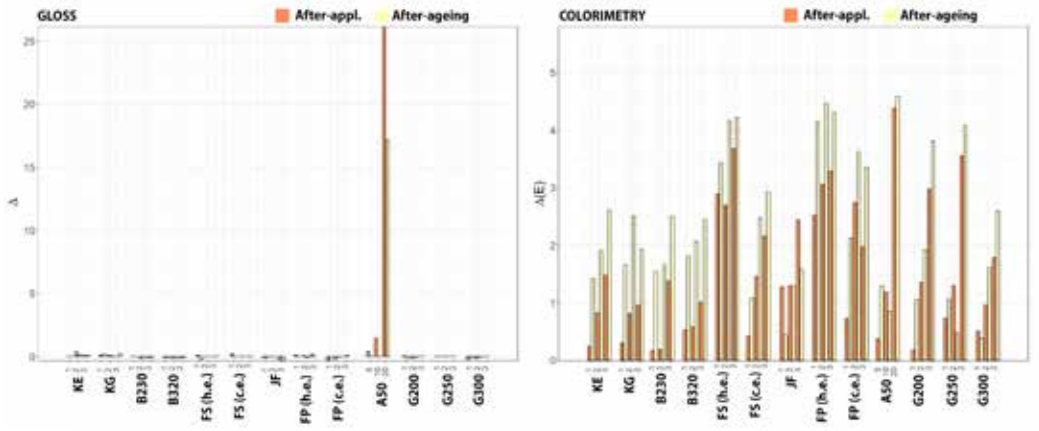

fig. 2

2. Bar charts of the Δ values (left) and the ΔE values (right) resulting from the difference between the measurements taken before the application and after the application (orange bars), and between those taken before the applications and after the ageing process (yellow bars).

Adhesive strength. A peel test was used to evaluate the adhesive strength of the selected adhesives. Linen stripes coated with two gouache layers have been used to simulate the adhesion between the flaking paint and the underground layer. Each pair of stripes has been coupled using a 3% solution of the selected adhesives, then the load and the time to the complete separation have been measured. The FS (c.e.), the FP (c.e.), and the G300 in descending order have proved the higher adhesive strength, while all the cellulose ethers and the JF have resulted in an almost nil adhesion.
Empirical tests have been also carried out. Gouache fragments have been artificially produced and then fixed on gouache on plywood mockups using the aforementioned adhesives. Different concentrations have been tested[17] according to the available literature[18]. All the aqueous adhesive solutions have been examined comparing two application methods: ultrasonic atomization[19] and dripping[20]. The first one could have prevented stains[21], while the second one could have been more effective in the formation of a stable adhesive joint. Then, the adhesive power has been assessed using a metallic spatula.
The 1,5% FS solution, the 1% G300 solution, and the 2% B230 solution, all by dripping, proved to be the most suitable ones for the fixing intervention. Fairly good results have been given by ultrasonic atomization as well, namely in the case of the 0,5% FS solution, and the 1% G300 solution.

Surface tension. As for the dripped solutions, a lower surface tension was required and led to further testing. The adhesion strength of the three FS, G300, and B230 formulations have been examined in hydro-alcoholic solution, using dem. H_2O and anhydrous absolute ethanol (**E**) to lower the surface tension, i.e.:

[17] As for cellulose ethers, FU-NORI seaweed, gelatines, and FU-NORI powder: from 0,25% to 2% in dem. H_2O. As for JunFunori®: from 0,5% to 6% in dem. H_2O.
[18] Carnazza et al. 2018, pp. 120-125; Cumming e Colbourne 1998, pp. 41-42; Feller e Wilt 1990, pp. 102; Geiger e Michel 2005, pp. 194-202; Masson e Ritter 2004, p. 94; Michel et al. 2002, p. 263; Prestipino et al. 2015, pp. 262-269; Reddington e Wheeler 2012, pp. 64-65; Roche e Dessennes 2002, pp. 241-242.
[19] Beuer IH 40 Ultrasonic Nebulizer, (Ulm, Germany).
[20] Insulin syringe BD Micro-Fine™+ Demi (0,3 ml).

– FS (c.e.): 1,5% in dem. H_2O and E (7:3 v/v)
– G300: 1% in dem. H_2O and E (9:1 v/v)
– B230: 2% in dem. H_2O and E (1:1 v/v)

Tests showed that the adhesive strength decreases together with the surface tension. Nevertheless, the former decreases just to a small extent in the case of the FS (c.e.).
The rate of diffusion of the aqueous and the hydro-alcoholic solutions has been further examined using the digital microscope Dino-Lite[22]. The variations in the contact angle in a fixed time showed the lowest surface tension of the FS (c.e.), which was selected for the fixing intervention.

EXPERIMENTAL TESTS FOR GAPS FILLING

At a later stage, tests were performed once more on mockups to select a suitable filler for the color gaps. Two acrylic mediums, i.e. Lascaux™ Medium 2 Matt (**LM2**), and Lascaux™ Sirius® Acrylic Medium Matt (**LSA**), and the Golden® Regular Gel (**GRG**) acrylic gel were selected for the investigation. They would be removed using anhydrous absolute ethanol[23], which does not affect the original layers.
Colorimetric and gloss analyses have been performed on mockups to assess eventual variations after a 45-days ageing process under UV-B light. Their mechanical resistance has been investigated by subjecting the three products to a stress cycle, namely: three days in a humid chamber (74-77 RH%), three days in a hot chamber (40-42 °C) and three days under UV-B light. After repeating the cycle four times, the LM2 has been selected, as it proved to be the most resistant and stable filler.

THE INTERVENTION

At the end of the whole testing, the conservation intervention was performed on *Con Titolo* under the microscope. Firstly, the deposit was removed from the surface by micro-aspiration[24]. Afterward, the fixing intervention was performed using the 1,5% FS (c.e.) hydro-alcoholic and aqueous formulations in combination to achieve both a good diffusion and a suitable adhesive strength. The intervention has been performed treating each single flake at a time. The adhesive was injected under the flaking layers with a syringe with a flexible tap[25] and then slight pressure was applied with a silicone brush. For

[21] Maheux, McWilliams 1995, pp. 19-25.
[22] Dino-Lite Edge Digital Microscope, AM7115MT-FUW, OK® Italy s.r.l.
[23] Anhydrous absolute ethanol, Carlo Erba Reagents s.r.l.; lot. n° V9E092049F.
[24] Portable Standard Surgical Aspirator, FASET S.p.A. Model 206, SN. 120908.
[25] Miraject® Endo Luer syringe, 0.3 x 40 mm.

fig. 3

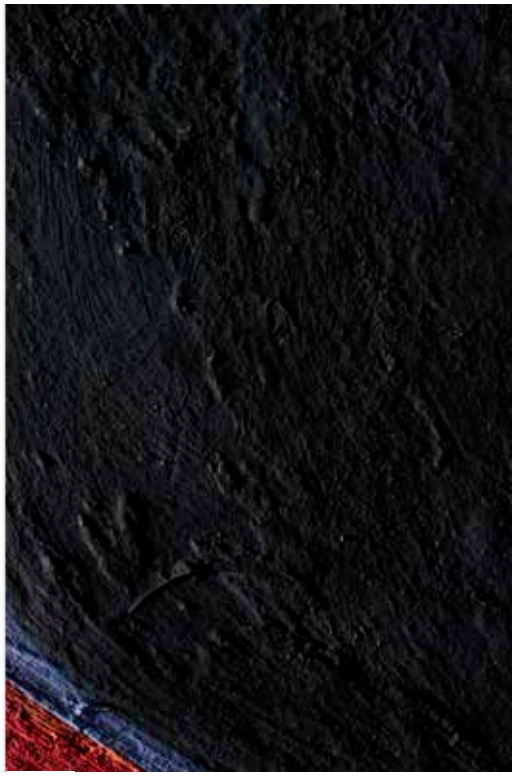

fig. 4

3. Detail in ranking light of the paint surface before (left) and after (right) the fixing intervention (courtesy of Opificio delle Pietre Dure).

4. "Con Titolo" presented in its original frame after the whole treatment: front (left) and back (right) (courtesy of Opificio delle Pietre Dure).

thicker fragments, the 2% FS (c.e.) aqueous solution was used. The ultrasonic atomization of the 0,5% FS (c.e.) aqueous solution was used to consolidate the powdery white trace and the micro-fragmentation on the figurative area.
Thereafter colorimetric analysis was carried out on the artwork, confirming the preservation of its optical properties. Eventually, gaps were filled with LM2 mixed with pigments, and the "chromatic selection" technique was performed using watercolor *Conté a Paris* pencils.

CONCLUSIONS

The restoration of a matte painting can bring several challenging issues, particularly when it comes to contemporary materials and dark paints. The extreme sensitivity of the surface demand a highly careful approach, in our case implemented performing an extensive preliminary investigation. The cold-extracted FS has proved to be the ideal adhesive to fix the detached layers. Its capability to preserve the painting's optical properties, its adhesive strength and its low surface tension allowed to perform the fixing intervention while maintaining the artwork's matte finish (fig. 3). Besides, the LM2 showed excellent results in restoring color gaps as well, while reproducing the artwork's texture and finish.
Additionally, the storage area of the Centro Pecci was monitored to define an effective strategy for the conservation of the artwork. The original frame was strengthened, and a multi-laminated glass was applied on the front (fig. 4).

CONTRIBUTIONS

Conceptualization, C.B.; Methodology, C.B., O.S., C.M.; Investigation, CB; Resources, C.B., S.P., O.S., C.M., R.P.; Writing, C.B.; Review, O.S., C.M., G.L., R.P., S.P. All authors have read and agreed to the published version of the article.

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MARCOLINO GANDINI'S SENZA TITOLO RESTORATION TREATMENT:
CONTEMPORARY ART CONSERVATION ISSUES AND METHODOLOGICAL CHALLENGES

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The approach at conservation of contemporary art manifest some challenges, including lack of bibliography, limited information on composing materials and lack of guidelines of intervention. Furthermore, an understanding of the meaning of the artwork and the artist's approval is necessary for a respectful intervention.

INTRODUCTION

KNOWING THE ARTIST: THE INTERVIEW OF TITO GANDINI

The artist Marcolino Gandini was born in Turin the 6th of March of 1937. Since his youth he frequented the intellectual turinese scene and he studied painting with the artist Felice Casorati.
After an initial figurative phase, inspired by the teachings of Casorati, Gandini experimented abstraction. His models are the Metaphysics of Giorgio De Chirico and Russian Constructivism[1], characterized by a severe and clean style.
He had a very active production and participated at several exhibition in Italy and aboard. He died in 2012 before his exposition *Marco Gandini, Marcolino Gandini – Un incontro di vita ed arte* curated by Pino Mantovani. After his disappearance the Gandini's family preserve his memory. After his disappearance only the Gandini's family preserve his memory, and the artist work suffered a progressive lack of interest.
According to the respect of the artist, in absence of indication of the artist on the conservation of his artwork, before the intervention the artist's son Tito Gandini has been contacted and interviewed. The interview has been made following the INCCA's guidelines[2]. The interview provided valuable information on Gandini's painting techniques and style and made it possible to carry out the conservation of the artwork *Senza Titolo* with the approval of artist's family. The conservative problems of Marcolino Gandini's artworks are well known to his family: «... non è più l'astrazione a dover essere difesa come una minoranza mal tollerata, ma la fisicità dell'opera d'arte da andare a vedere di persona, da restaurare, come identità stessa di un artista ormai crepato da un decennio»[3].
Thanks to the cooperation of the Gandini's family an accurate research was carried out before restoration of *Senza Titolo.*

THE ARTWORK *SENZA TITOLO* AND ITS STATE OF CONSERVATION

The artwork *Senza Titolo* (fig. 1) was made by Marcolino Gandini in 1966. It's a wooden painted tridimensional artwork made of poplar plywood and pine and beech elements. The work of art appears as an abstract assemblage, painted on the front by linear coloured bands. The colours are inspired by nature and the linear and geometric style remembers the musical compositions: «L'armonia dei colori e la sincope profonda delle linee costruiscono nello spazio quello che la musica costruisce nel tempo»[4].
On the back side (fig. 1) there are some inscriptions written by the artist to identify the artwork and its executor its values of *250,000 lire*. Some stamps on the back testify to its exhibition.
In 2003 the work has been exhibited at the *Sala Bolaffi* in Turin and after the artist donated the artwork to MAGA Museum of Gallarate (VA). Since then the painted sculpture *Senza Titolo* was kept in the museum's storage.

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[1] Armiraglio, Gandini 2007, pp. 12-13.
[2] www.incca.org, *INCCA Guide to Good Practice Artists' Interviews*, https://www.incca.org/files/incca-guide-good-practice-artists-interviews.
[3] «... no longer abstraction must be defended as a badly tolerated monority, put the physical nature of the artwork to be viewed in first person, to be restored, as the very identity of an artist who has been dead for a decade.». Words of Tito Gandini written for the text: Fabbri *et. al.* 2020, p. 15.
[4] «The harmony of colours and the profound syncopation of lines build in space what music builds in time». Words of Tito Gandini, *La pittura di mio padre.* In the text Rosci 2003, p. 34.

1. Marcolino Gandini, Senza Titolo, *1966. The front (left) and the back (right) of the artwork before the intervention.*

fig. 1

The state of conservation of *Senza Titolo* was poor, with urgent needs of conservation treatments to guarantee its future usability. In the support there are evident attack by xylophagous insects, and some *lacunae*. The white preparation had cracks, gaps and some incisions especially at the base of the artwork. In the painted surface there were dusty deposits, some humidity stains and dark marks and imprints, due to incorrect handling.

THE DIAGNOSTIC CAMPAIGN AND THE LABORATORY TESTS

Before the intervention, a diagnostic campaign was performed to identify the composing materials of the artwork. The artwork has been observed under UV lamp and has been photographed in IR and IR false colour.
Some fragments of pictorial film have been observed under the microscope and three different layers were identified: one layer of white preparation and two chromatic layers. Under the green and the yellow bands has been identified a different coloured layer (fig. 2), throught to be change made by artist himself.

2. A fragment of pictorial film of Senza Titolo *under the microscope 30x. There are three different layers: 1 the preparation, 2 brown layer of overthinking, 3 two hands of yellow paint.*

3. The samples covered by Standard Soil after the cleaning tests.

fig. 2

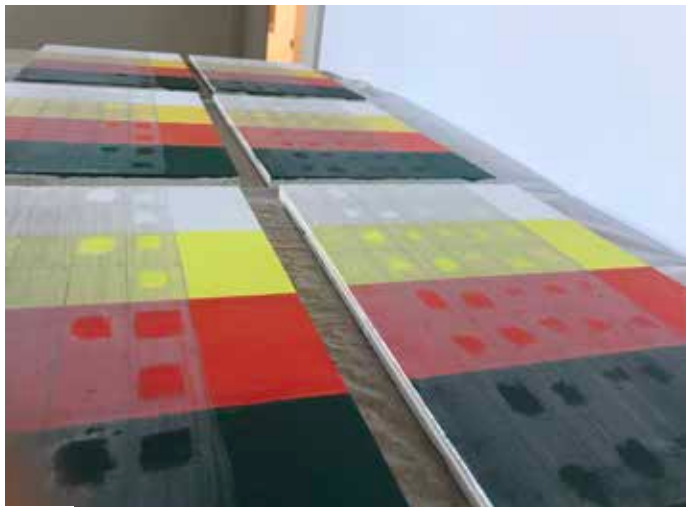

fig. 3

With the examination of Fourier Transform Infrared Spettroscopy (FTIR) were identified the alkyd preparation and the acrylic-vinyl binder of pictorial film, realized using house-paint. The composition of the paint was compared with X-Ray fluorescence to the Morgan's® colour chart of 1981. Morgan's paint® is a line of colours, currently owned by J Colors, widely used by Marcolino Gandindi[5] and many others Italian artists in the 1960s.
In collaboration with J Colors company, some laboratory tests were made. Six different samples were prepared and painted with acrylics Morgan's Paint®, with vinyl Polycolor® of Maimeri and with Morgan's Paint® with added Vinavil®. The colours were choosen to resemble those found of the artwork *Senza Titolo*: white, green, yellow and orange (fig. 3). All the samples were covered with Standard soil to replicate dirt deposits[6]. A surface pH and conductivity were measured with Agarose and solutions

[5] Mantovani 2012, p. 17.
[6] Ormsby *et al.* 2010, pp. 78-79.

4. The artwork of Marcolino Gandini Senza Titolo, *exposed after the conservation treatments ad MADRE Museum of Naples.*

pH and conductivity adjusted were made. The agarose pellet was set over the paint for five to ten minutes, the results of pH were 6.5 to 8 and of conductivity about 250 to 1270 mS/cm**.** These measurements were useful for the creation of aqueous solutions pH and conductivity adjusted. The use of pH and conductivity values of solutions similar to those of the paint film avoids the risk of surface swelling[7]. The solutions tested was: water solutions pH 5, 6 mS/cm; pH 6, 1 mS/cm, pH 6, 4 mS/cm, pH 6, 6 mS/cm, pH 6, 10 mS/cm, pH 6, 6 mS/cm with citric acid; pH 6, 6 mS/cm with 0,5% of surfactant Ecosurf EH-6®. The best solutions were tested also with make-up sponge and on microfiber cloth. Other methods were also tested: the Nanorestore Gel Peggy 5® and Peggy 6® and with the choosen solution with the silicone gel Velvesil Plus®. Each test was evaluated with a 0-10 scale and the results were observed graphically using a *Kiviat* diagram. The solutions most effective were the pH 6 6 mS/cm, pH 6 6 mS/cm with Triammonium citrate and the pH 6 6 mS/cm with 0,5% of surfactant Ecosurf EH-6®. The selected solutions were then tested on the artwork's surface.

THE CONSERVATION OF THE ARTWORK AND ITS FINAL EXPOSITION

The conservation of the artwork aimed to carry out reversible and recognizable interventions with the support of investigations and the understanding of constituent materials. At first the intervention has been focused on the support with anoxic disinfestation treatment to remove the presence of xylophagous insects. At the end of the permanence in anoxic atmosphere for forty days a solution of permethrin in mineral spirit was applied on the back to prevent future attacks.
For the cleaning of paint layer, in order to reduce the moisture supply to the surface, the artwork was cleaned with make-up sponges, only moisted with the chosen solutions. All artwork's areas were observed under a microscope before, during and after the cleaning process as well as the make-up sponges to identify any minimal losses of pigments and avoid abrasions of the color or other surface changes often found with other methods of cleaning.
After the cleaning process the losses in the paint film were filled with microcrystalline wax, pigmented and worked with dental probe, this method made possible creating a reversable and recognizable surface imitation together with the hard task to match the color and surface texture of monochromatic strips of paint. The artwork then returned to the museum with conservation and maintenance instructions as well as a cover in TNT designed for protect the artwork from dust and from fingerprints during handling.

[7] Cremonesi 2011, pp. 82-86.

fig. 4

At the end of the conservation the artwork *Senza Titolo* was exposed at MADRE museum in Naples (fig. 4), for the exhibition dedicated to *Marcello Rumma*.
It is currently back in the Maga's storage facility, but the Gandini family's intention is to hold new exhibitions dedicated to the artist Marcolino Gandini, to honour his artistic production and his memory.

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METHODOLOGICAL APPROACH TO A RESTORATION ARTEFACT:
THE INTERVENTION ON A STUCCO FRAME FROM THE HOUSE OF THE CRYPTOPORTICUS IN POMPEII

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INTRODUCTION

The present paper concerns the study and the methodological approach to a "restoration artefact". Specifically, the reproposal of a stucco frame in II Pompeian Style from the *oecus triclinaris* of the House of the Cryptoporticus (Reg. I, Ins. 6,2) in the Archaeological Park of Pompeii and datable to the early Augustan Age.
The peculiarity of this artefact lies in its conservation history, which has led to the coexistence of at least three different phases on the object. The original phase is recognizable in fragments of the Roman age, recovered during the excavations (fig. 1). The first conservation treatment, datable to the first thirty years of the 20th century, is expressed by the use of the fragments for the philological reproposal of the original aspect of the frame. This reconstruction is also the reason why the object is called a: "restoration artefact". Finally, the last intervention that included securing the object and filling, was carried out after the removal of the artefact from the original wall.

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TECHNIQUE AND MATERIALS

As mentioned above, the original elements are no more than a few fragments. For this reason, many of the observations on the technique can only be hypothesised, although they are supported by ancient sources and the study of archaeological evidences.
By observing the surface, it is possible to notice the differences of technique between the original elements and the twentieth-century reconstruction (fig. 2).
For example, in the reconstruction the typical marks of the tools used to make the mouldings are missing. Also, the decorative details are far more simplified compared to the original elements.

The discriminating factor for the recognition of the elements is certainly the chemical composition of the mortars. The results of the IR spectroscopy analysis revealed that the samples taken from the elements classified as original, were composed exclusively of calcium carbonate. On the contrary, the remaining spectra recorded the presence of calcium sulphate, a material strongly discouraged by Vitruvius himself due to its insufficient resistance.

STATE OF CONSERVATION

Originally, the artefact was covered by a thick layer of incoherent deposit that concealed its heterogeneous nature and major conservative issues. Following preliminary dusting, a glossy film was observed over the entire surface, identified as Paraloid B72, probably applied during the last intervention. On the surface of the original elements, on the other hand, there were particularly tenacious layers of coherent grey deposits. There are many missing modelling elements, especially at the corbels and the acanthus leaves, as well as numerous cracks and fractures.
From the conservative point of view, except for localized phenomena of decohesion and exfoliation, the main problems were represented by surface coherent deposits and especially by fillings and numerous layers of mortar, attributable to the last intervention. The result was a confusing overview and a compromised understanding of the object since it was often difficult to distinguish the original elements from those belonging to the intervention of the early 1930s.

fig. 1

1. The original fragments of the frame are highlighted in red.

INTERVENTION

Considering the conservation of the work of art a categorical imperative of the treatment, the main aspect was the restitution of a correct understanding of the evident heterogeneity of the frame, explanatory of its conservation history and its intrinsic nature as a restoration artefact.
For an operation such as cleaning, a compromise had to be reached. It was important to obtain a good level of cleaning to ensure proper legibility of the different phases, but without emphasizing any further the heterogeneity.
Also, the different properties of the mortar's materials had to be considered during the intervention aimed at treating safely the substrate. In particular, the cleaning of the mortar composed elements attributed to the first restoration, made of a carbonate and sulphate mixed binder, required a reasoning on the support, as well as on control systems of the cleaning methods used on the surface.

Preliminary dusting and dry cleaning was carried out to remove the incoherent and semi-coherent deposits. A latex-free polyurethane sponge was used for the latter.
To remove the glossy film of Paraloid B72, the solubility test proposed by Paolo Cremonesi was first conducted, leading to the selection of three different mixtures of Ligroin and Acetone[1]. On the elements of the first intervention, the use of solvents was sufficient to obtain a good level of cleaning.
On the contrary, the areas characterised by the presence of

[1] LA4 (60% Ligroin, 40% Acetone, fd 77), LA5 (50% Ligroin, 50% Acetone, fd 72) and LA6 (40% Ligroin, 60% Acetone, fd 67).

fig. 2

2. An example of the reconstruction of the the kyma lesbio*: the missing decoration is made with simple volumes.*

residual mortar from the last intervention, required a more in-depth operation. For this reason, it was decided to use compress of ammonium bicarbonate in Agar, providing good level of cleaning but confined to the surface.
However, this type of treatment did not give any kind of result on the original elements so a less invasive and more selective alternatives such as LASER technology was selected.
Two types of lasers were used: the Laser Smart Clean II Short Free Running for general cleaning, thanks to its more homogeneous and controlled action and the Laser EOS 1000 Long-Q-Switch for refining[2].
The final result is a far more uniform overview where it is still possible to appreciate the differences between the surfaces.
The exfoliation phenomena were treated by using the K52 adhesive from Kremer Pigmente at 5% in ispopropyl alcohol, which was injected under the lifted areas, which were then put in their correct position.
The localised phenomena of decohesion, on the other hand, were treated using nanolime, in particular the product Calosil IP25 at 5% in ispopropyl alcohol.

The other fundamental issue was the reflection on the aesthetic presentation of the artefact.
From the beginning, it was clear that the lighter-coloured fillings in the lower moulding and on the sides of the upper moulding were extraneous to the artefact, the result of a fairly recent restoration. The study of the artefact confirmed that in its conservation history, these fillings represent a last phase of intervention, following the removal of the frame from the wall on which it was placed. In short, it is an intervention that is not part of the philological reconstruction of the frame, which took place following the discovery of the original fragments, and therefore cannot be considered a characteristic part of the artefact.
The plasterwork, composed of gypsum and calcium carbonate, also created an obvious aesthetic disturbance in terms of colour and shape, contrasting with the rest of the frame. For all these

[2] The parameters are: Laser Smart Clean II Short Free Running: energy of 200 mJ per pulse (minimum selectable energy), operating with a fluence range between 2.8 J/cm2 and 11.3 J/cm2 and varying the frequency from 3 Hz to 6 Hz. On the *kyma lesbio* decoration, the energy was increased to 300 mJ per pulse, operating with a fluence range between 4.2 J/cm2 and 17 J/cm2 and using a frequency of 10 Hz. Laser EOS 1000 Long-Q-Switch: Energy of 130 mJ per pulse (minimum settable energy), with a fluence range of 1.8 J/cm2 to 7.4 J/cm2 and a frequency of 3 Hz.

fig. 3

3. Removal of the fillings of the most recent intervention.

reasons, it was decided to remove the fillings.
The mortar level was lowered mechanically using an ultrasonic scaler and then removed carefully using a scalpel once the end of the grout was approached. The operation was facilitated by using water to soften the material (fig. 3).
The mortar did not turn out to be particularly tenacious, so it was possible to proceed with removal without using systems that could create mechanical stress to the artefact.
To create the new fillings on the frame, mortar tests were first carried out in order to select the most suitable chromaticity and grain size. The colour of the intervention of the first thirty years of the 20th century was used as a reference and the same mixture was used for each filling, in order to uniform the already very heterogeneous appearance of the frame.
A mortar made with a hydraulic lime was also selected to increase its strength. In terms of colour, it proved to be the one that came closest to the mortar of the first intervention and that matched the various phases.
In the case of the plastic elements, it was decided to "imitate" the choice of reintegration of the first restoration: for the *kyma lesbio* decoration, only the volume was suggested, while the geometric forms, characterised by simple volumes, were reproduced by using the repetitiveness of these elements (fig. 4).

fig. 4

4. Execution of the new in tone fillings.

The pictorial retouching, aimed at a general balancing of the artefact, was obtained by lowering the tone of the points that created a visual interference on the artefact. The areas were retouched with a light glaze using Windsor & Newton watercolours.
In conclusion, the restoration of the stucco frame from the House of the Cryptoporticus was focused not only on the fundamental aspect of conservation, but also on the restitution of an object the importance of which lies especially in its complex previous restoration, without which the work itself would not exist.

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CHARACTERIZING POLYCHROME AND GILDED BRONZE STATUES OF OSIRIS

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ABSTRACT

This contribution presents some results of my doctoral research, which I have been pursuing since 2019 in Cairo (Egyptian Museum and Cairo University) and Venice (Ca' Foscari University). My study focuses on polychromed, gilded and inlaid bronze statues of the god Osiris. This category of artefacts consists of a major production of the sculptural repertoire of the First Millennium BC. Osiris is the most often represented deity throughout this long period. Thousands of bronze effigies or this god were discovered throughout Egypt, either buried under the pavement of sacred spaces (Serapeum of Saqqara, the temples of Medinet Habu or Karnak, ...) or still in their functioning position, such as in Ayn Manawir. This immense corpus has been little studied so far, and always in the framework of studies based on a single or very few pieces.
All collections of Egyptian antiquities include Osiris bronzes. In most cases their provenance is unknown (except, fortunately, for most of those in the Egyptian Museum). A large-scale study of pieces from various collections allows me to group these statues according to stylistic, iconographic and technological criteria and by this to associate some pieces of unknown provenance with sculptures found in excavations. It also gives the possibility to place in the chronology uninscribed statues, by comparison with pieces with a dedication that often provides indications for a dating. This part of the work, which is made in collaboration with Egyptologists, is accompanied by analyses which I carry out at the Egyptian Museum. Thanks to various devices, I analyse a large number of statues in order to identify the composition of their alloys and of their ornaments (polychromy, gilding, inlays) and to characterize their manufacturing process (hollow cast, solid cast, made in several pieces fixed together or from a single mould, etc.).
I am also concentrating on a series of pieces just extracted from the basement of the museum. No information was kept concerning the provenance of these pieces; most of these statues come from excavations of the late nineteen or early Twentieth Century. These bronzes are still covered with corrosion and the soil from the archaeological ground. My work at the museum includes the cleaning and conservation of these pieces, in order to make them suitable for display in the galleries, and I will take this opportunity to include them in my doctoral dissertation. These statues' ornamentations have generally faded or almost disappeared due to a long stay in the archaeological ground or in museum storages, but some remains allow us to reconstruct their original appearance. And part of my research aims first of all, to explore non-invasive methods of analyses, cleaning and conservation of the polychromy, gilding and inlays. I proceeded with analyses and examination to identify the nature of the alloys and inlays. It was indeed a common practice, for more than a thousand years, to insert or apply other materials on bronze statues. In the framework of the analyses done a series of statues selected for the study, I selected various types on inlays: glass, lapis lazuli, gold, copper, electrum, arsenical bronze, black copper, calcium carbonate, Egyptian blue and hematite.
A peculiar case is that of Egyptian blue, a copper-based paste. In the case of the statues that I am analyzing, it appears that Egyptian blue, usually used as an (costly) coloured paste, often entirely disappears under other materials, such as lapis lazuli (a semi-precious stone from Afghanistan) or blue glass. Thanks for the portable non invasive techniques of multi-spectral images [the exceptional near-infrared luminescence (IRF)]. I do not know yet with certainty what could be the reason for inserting such an expensive material in non-visible spots, but after investigated also a series of objects from the tomb of Tutankhamun, it appears that it may have been used as a sort of the glue to fix the blue inlays, while filling the empty spaces around the edges of the inlays with the same colour.

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ELECTROLYTIC PROCESSES AS CONSERVATION PRACTICES:
APPROACHING THE BEST SURFACE APPEARANCE OF TARNISHED SILVER OBJECTS THROUGH CONTROLLED CLEANING

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INTRODUCTION

Silver (Ag) is a noble metal, whose chemical and physical properties, and in particular its shine, make it a material that has always been used to make objects of great value. The surface appearance (mirror polished, matte, oxidized, decorated with niello, etc.) of silver objects depends though on taste and historical-artistic interest over time, their social function and intended use.
According to the composition and microstructure of the metal, surface treatments, use and repeated cleaning and especially the aggressiveness of the environment, silver artefacts often tarnish in a heterogeneous manner with colours ranging from yellow, brown, blue to black depending on the thickness of the tarnish[1].
This affects both their aesthetic and historical values.
Sulphur-based acid gases, in the presence of moisture, are the main cause of tarnishing by forming silver sulphide (Ag_2S).
Handling of the objects also leads to the formation of silver chloride (AgCl)[2]. Furthermore, the common presence of copper (Cu) in the metal leads to the presence of additional corrosion products (Cu_2O, AgCuS, Cu_2S)[3].

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[1] Costa 2001.
[2] *Ibidem.*
[3] Tissot *et al.* 2016.
[4] Palomar *et al.* 2018.
[5] Basilissi *et al.* 2021.
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[10] Degrigny *et al.* 2016.

There is no doubt that tarnish removal is required on historic objects which are deemed to be shiny. Three approaches are possible: mechanical, chemical and electrochemical[4].
Treatments by mechanical action involve the use of abrasive materials that have many undesirable side effects on artworks including uncontrolled loss of the original material and decorative surface treatments[5].
Chemical treatments are considered to be aggressive processes as they change the composition of the metal surface, while the retention of corrosive chemicals in the metal can restart corrosion[6].
Electrolytic reduction processes have been developed as a less invasive and more ethical alternative as they reduce the compounds that make up the tarnish into metallic silver particles, thus limiting the loss of constituent material[7]. However, if not properly performed, side effects such as black spots, in the case of alloys with a high concentration of copper[8], are provoked on the metal surface. Furthermore, over-cleaning is very common when heterogeneous tarnish is electrolytically cleaned by immersion at a cathodic potential not adapted to all tarnished areas (yellow-brown versus blue-black).
It is to cover these drawbacks that the open-source electrolytic pencil (Pleco) has been developed by the research unit of the Haute Ecole Arc Conservation-restauration (HE-Arc CR) in collaboration with FabLab[9], both located in Neuchâtel. This new technology allows the identification of silver tarnish, its local cleaning and is specifically adapted to composite objects containing organic materials associated to silver-based components that cannot be immersed.[10] However, its use requires further study for greater control of electrolytic processes and a better understanding of its possibilities, both as a diagnosis tool to correctly identify reduction potentials and as an operational tool for electrolytic cleaning.
This was the reason for setting up this PhD project at the SAGAS Department of the University of Florence, entitled *Determination of electrolytic parameters for the cleaning of silver artefacts* carried out in collaboration with Opificio delle Pietre Dure in Florence and HE-Arc CR and which aims to properly clean silver tarnish with Pleco to obtain a surface appearance that meets conservation, historical-artistic and aesthetic requirements.

A RESEARCH TO SETUP CONTROLLED ELECTROLYTIC PROCESSES

This work is carried out in parallel with the ASTEC project coordinated by HE-Arc CR, which investigates the fundamental

1. (a) Cross-section of the Pleco electrolytic cell; (b) Picture of the electrolytic device; (c) LSV plot. Electrolyte: KNO3 1% (w/v); scanning rate: 10mV/s; working electrode: silver-based coupon (Cu 7%) tarnished by gas exposure of two still-warm boiled eggs for two hours. Two peaks are visible: the first of Ag2S reduction has a start at -0.95 V/GC and a maximum at -1.25 V/GC, the second probably of Cu2S reduction starts at about -1.2 V/GC and has its maximum at -1.6 V/GC. Fluctuations of currents become more pronounced (up to 0.2 mA) beyond -1.2 V/GC.

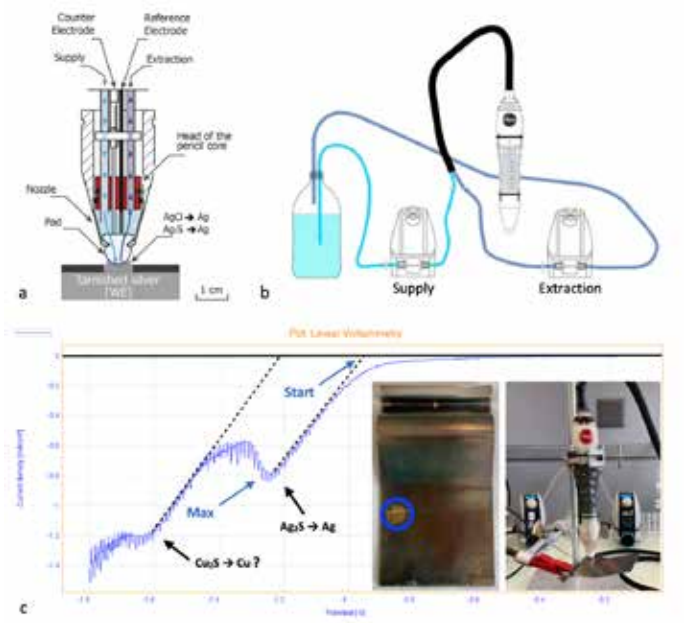

fig. 1

principles of the electrochemical reactions that occur during the electrolytic reduction of silver tarnish.
Both projects are conducted in partnership with museum institutions in order to involve the curators in our discussions on the best level of cleaning to achieve. Indeed, this is a matter of debate, as the usual over-cleaning of surfaces does not take into account the historicity of heritage objects. In Florence, we work on artworks from the Gallerie degli Uffizi, Tesoro dei Granduchi. These are presumably Ag-Cu alloys.
Metal coupons made of Ag-Cu alloys and simulating the appearance of these objects (chiselled, curved) are used to investigate the compounds formed during artificial tarnishing and their electrolytic cleaning. Exposure to aggressive gases is favoured to processes by immersion to mimic better heterogeneous tarnishing.
The Pleco is used to identify the different forms of silver tarnish and study the best conditions for their local and controlled electrolytic cleaning. Figure 1a shows the three-electrode pencil cell. The polyvinyl formal micro-porous foam constituting the pad at the end of the nozzle of the Pleco connects the electrolytic cell containing a glassy carbon (GC) rod (reference electrode) and a platinum wire (counter-electrode) to the working electrode (tarnished object). Two hoses supply and extract the electrolyte inside the cell using diaphragm pumps and renew it continuously (fig. 1b). Linear Sweep Voltammetry (LSV) is considered to investigate the nature of silver tarnish and define the adequate parameters of its cleaning (fig. 1c). Indeed, this

2. Artificial tarnishing methods applied on Ag-Cu coupons (5cmx2cm). From top to bottom: exposure in a sealed desiccator to liquid albumen, Na2S solution and boiled eggs. Tarnished coupons (3 per method) are shown in comparison to a non-tarnished one.

fig. 2

highly sensitive surface analysis technique clearly shows the presence of silver tarnish through the reduction peaks and allows the selection of the most appropriate conditions for electrolytic cleaning (fig. 2).

PRELIMINARY RESULTS

Three different tarnishing agents based on the release of sulphur-based acid gases are currently tested on metal coupons placed in sealed desiccators: liquid albumen, Na_2S solution at pH 7 and boiled eggs. According to the tarnishing method, the temperature varies while the exposure time remains constant. Figure 2 shows that albumen only creates slight tarnish (yellow-brown) compared to Na_2S solution (brown) and boiled eggs (blue, the thicker tarnish of the three). Furthermore, heterogeneous tarnish is observed on all coupons.
LSV plots are used to compare the nature of compounds formed on the surface of the coupons (fig. 3). With liquid albumen, some Ag_2S is obtained (in reference to fig. 1c) while another reduction peak (not identified yet) shows up at low potentials. Both liquid

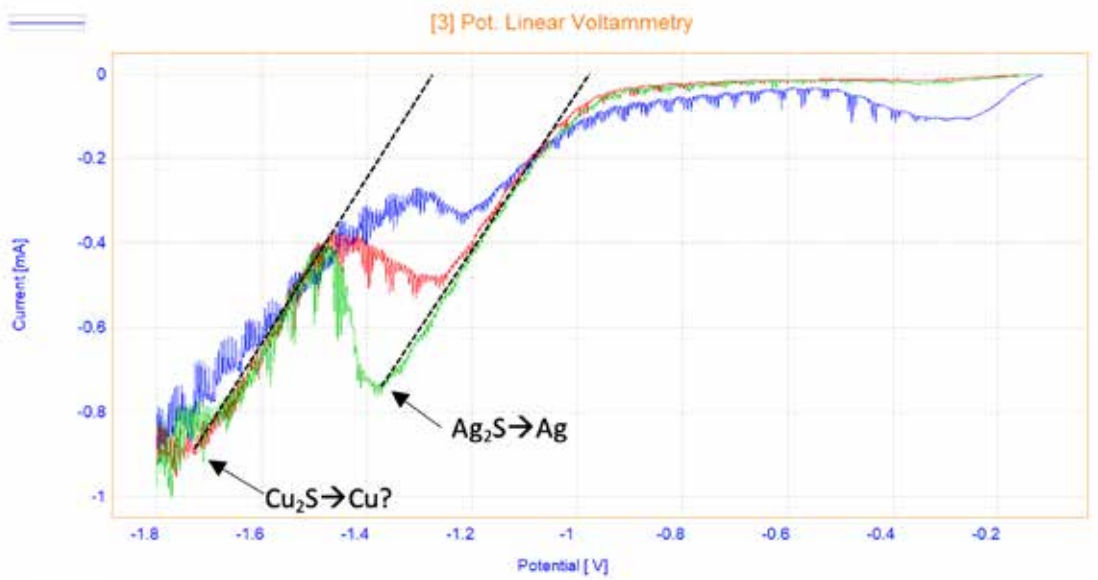

fig. 3

3. LSV plots performed on three Ag-Cu coupons tarnished according to the three methods different methods (albumen in blue, Na2S solution pH 7 in red, and boiled eggs in green).

Na_2S and boiled eggs provide two cathodic peaks, the first being attributed to the reduction of Ag_2S and the second to Cu_2S or a Cu/Ag/S compound (in reference to fig. 1c). As expected, the blue tarnish obtained with boiled eggs, which is thicker than the brown tarnish, gives a larger Ag_2S peak.

The application of LSV with the electrolytic pencil, however induces some difficulties related to the circulation flow of the electrolyte. The continuous change of the contact surface creates fluctuations in the currents measured that might hide small reduction peaks, limiting then the correct interpretation of the results (blue plot on fig. 3 for the whole potential scan and red/green plots beyond -0.8V/GC). In order to properly visualize the cathodic peaks produced during silver tarnish reduction, it is necessary to optimize the supply and extraction flows of the electrolyte. In parallel the size and shape of the pad at the end of the nozzle (fig. 1a) have to be adapted. The function of the pad is to keep the metal to be cleaned wet and to allow continuous renewal of the electrolyte without leakage. At a specific flow, the larger the size of the pad, the lower the current fluctuation observed but the more difficult it is to renew the electrolyte solution in contact with the surface. In addition, larger pads provoke an ohmic drop and the shifting of reduction peaks towards more negative potential values. It is therefore necessary to both adapt the values of the supply and extraction pumps and the size of the pad to allow an adequate identification of tarnishing compounds and definition of the cleaning parameters.

CONCLUSION

As the cleaning of silver tarnish is still carried out using traditional, difficult to control and highly subjective techniques, this project is of technical and scientific importance as it aims to make electrolytic cleaning processes, considered to be the most ethical among cleaning methods, controllable, safe, effective and applicable. It therefore meets the needs of conservators but also those of curators in charge of collections who are involved in defining the most appropriate level of cleaning for tarnished silver objects.

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SESSION 2

DIAGNOSTICS AND TECHNOLOGIES APPLIED TO CONSERVATION

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The humanistic value of our patrimony is strictly linked with her conservation for the future generations. The causes for all the alterations that the object can suffer in her live can to come from many different situation, but all of them are directly linked with a change, physical or chemical, of their material or structure. This mean that the science must to have a high contribution in the discussion about the conservation program or actions made on the object, because the change are generated or are the consequence of a chemical o physical action of the matter that compose the object.
The conservation of an object is part of a process where any scientific presence is very important and no anyone is more important of the others. The think that a restorer it's an art crafter is very old and have not a right link with the reality of the knowledge that he need for their job. This oblige that a right scientific approach must to be made in a continuous exchange of knowledge or relationship with the specific scientist involved in this part of the process.
This obvious concept must to be improved in the conservation culture with a more important knowledge of the possibility for the different contributes that the sciences of the matter can give in this particular field.
For many years all the persons that worked in the conservation used the analysis and the science principally for studies and characterization of the materials and the artistic technics. Also the study for new products are made principally to verify the behavior of that and if there are if theri are able to answer the interest asked for the restorer. This approach must to be increased. The scientist must to start to work and understand that they must to be involved in a lot of conservation process segments, for example during the treatment to use technics able for an objective result evaluation and, also, for the monitoring of the changes that can arrive in the time in the objects.
This must to be the new frontier and challenge for the next generations and the possibility offer by cultural events, like that of the Youth Forum, are very important to create a net of contacts that can help each one of us with a more wide confront between the different sciences that work, sometime alone, in this field but that all of they have the same interest, the conservation of the cultural and historic patrimony of the humanity.

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THE ANTIFUNGAL EFFECT OF A TRADITIONAL TREATMENT
ON NEW SPAIN MAIZE STEM SCULPTURES

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The term lightweight sculpture is used to define those sculptures manufactured with low weight materials[1]; such property made them very portable and can be used in processional rites. These artworks were typically made during the colonial period (16th – 18th century) and throughout Michoacan and the central part of Mexico, nevertheless, they can be found in the whole Latin-American territory. Nowadays, the technique stills alive and is practiced in Patzcuaro and Tzintzuntzan, Michoacan.
Lightweight sculpting constitutive materials were very eclectic. Nevertheless, the main structural material was the maize stem. Traditional descriptions suggest that before the sculptures were built, the maize stems were washed and boiled in water and herbs to prevent fungal infestation. Until now, the specific herbs used have not been identified, however, studies suggested that the mechanics behind the boiling treatment was extracting sugars and starches to remove the feeding source for the microorganisms[2].
In previous studies, were studied three aspects: First, the effectiveness of the boiling treatment that inhibits the fungal growth[3]; second, the morphological and chemical differences between the lower and upper maize stems[4] nd finally, the chemical and morphological decay on maize stems under different conditions of relative humidity and temperature[5].
The many results allowed to define a methodology, however, the contribution and impact of the treatment in terms of sustainability was missing.
In Mexico, the common disinfection method used in maize stems by conservators is applying fumigants, such as pyrethroids or phenylpyrazoles. However, many recent studies have identified that both products are pollutants for water and ground[6] and also, toxic for humans and fauna and flora species[7]. The previous defines the necessity of developing sustainable strategies for conservators. Therefore, the article presents the results regarding the traditional antifungal effects on maize stems sculptures and a reflection of its contribution in terms of sustainability, not only as a practical methodology but also as a model that can be replied at different contexts.

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MATERIALS AND METHODS

Plant material
Maize stems (Zea Mays C.) recollected during the harvest period were used. The bark, nodes, and punctual zones with physical damages or by pathogens were removed. The stems internodes were cut into five cm long fragments and classified into lower (LSS) and upper stem sections (USS) according to the distance from the root plant[8]. In addition, dissociated and naturally aged samples from a New-Spain sculpture (NSS) were analyzed and compared with the treatment results.
Boilling treatment
The samples underwent four different boiling treatments with distilled water: 0 min (control), 20 min (T1), 40 min (T2), and 60 min (T3). Finally, the samples were dried at 20°C[9] (fig. 1).

Fungal growth test and DNA identification
Soluble sugars and starch were measured by the anthrone method. The samples were incubated in PDA (Potato Dextrose Agar) growth media for five days and finally, the fungal strains were isolated. The DNA was extracted from the isolated strains and the ITS region was amplified by the PCR (Polymerase Chain Reaction) method.

RESULTS

Soluble sugars extraction
According to the anthrone method results, the concentration of soluble sugars in the USS is higher than in the LSS. In addition,

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[1] Zarate-Ramírez 2020.
[2] Araujo-Surez, *et al.* 1989; Orozco 1970; Amador-Marrero 2002.
[3] Ortega-Ordaz *et al.* 2018.
[4] *Ibidem.*
[5] Ortega-Ordaz *et al.* 2020.
[6] Melin *et al.* 2020.
[7] Vidau *et al.* 2009; Kolumbaeva *et al.* 2013; Gao *et al.* 2020.
[8] *Ibidem.*
[9] Ortega-Ordaz *et al.* 2018.

1. *Maize stems boilling treatment.*

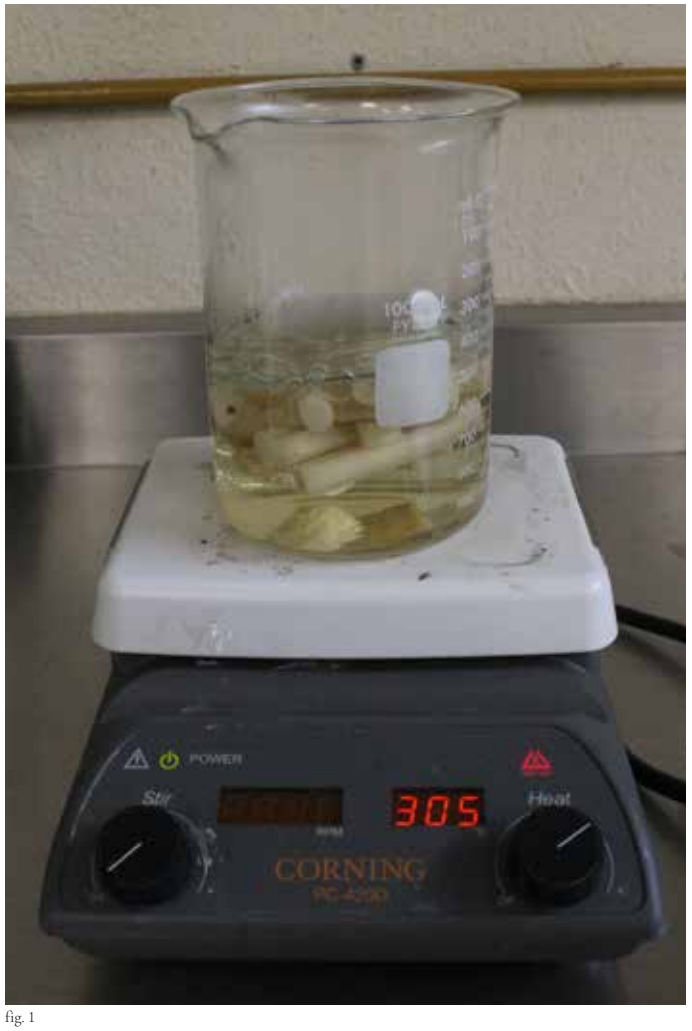

fig. 1

it proved the efficiency of the treatment extracting soluble sugars. Due to the different content of sugars at the samples, the obtaining of constant concentrations of carbohydrates were at different times: For the LSS was at 20 min (T1) and for the USS was at 40 min (T2). The starches content was not altered by the boiling treatments.

Inhibition of the fungal growth and DNA identification
During the incubation period, it was observed the growth of fungal strains at both control samples and the total inhibition at all the treated samples.

The DNA results were classified in two: On the one hand, three species from the genre *Fusarium* and *Arthrinium* were identified in both control samples (USS and LSS), some of them associated to fusariosis. On the other hand, four species from the genre *Fusarium* and *Aspergillus* were identified in the NSS, which are pathogenic and cause fusariosis and rot (fig. 2).

2. *Microbiological growth in the PDA media on the first and third of incubation. The sugar extraction with all the treatments inhibited the fungal growth.*

DISCUSSION AND CONCLUSION

According to the results, the concentration of soluble sugars is higher in the USS than in the LSS. Most of the carbohydrates concentrate in the higher parts of the plants because they are destined to the fruit ripe[10]. Contrary to this, the lower accumulation of sugars in the LSS makes them vulnerable to physical and pathological damage[11].
In addition, it was demonstrated that the treatment allowed the extraction of the soluble sugars, which stores in the parenchimatic tissues and are a carbon source for the fungal growth[12]. Therefore the boiling treatment significantly decreases the possibility of fungal infestation by species that causes fusariosis and rot. Consequently, the treatment was an empirical procedure to extend the sculpture's lifespan and a possible explanation for the many New Spain sculptures conserved up to date without evident fungal damage.
All treatments inhibited fungal growth in the maize stems. However, to ensure its long-term preservation, it is important to complete the whole sugars' extraction. Due to the different soluble sugars content at the maize sections, the method should apply different times for each one to fully extract the

[10] Wang *et al.* 2012.
[11] Najar *et al.* 2014; Ortega-Ordaz 2018, p. 58.
[12] Goodsman *et al.* 2013; Najar *et al.* 2014.

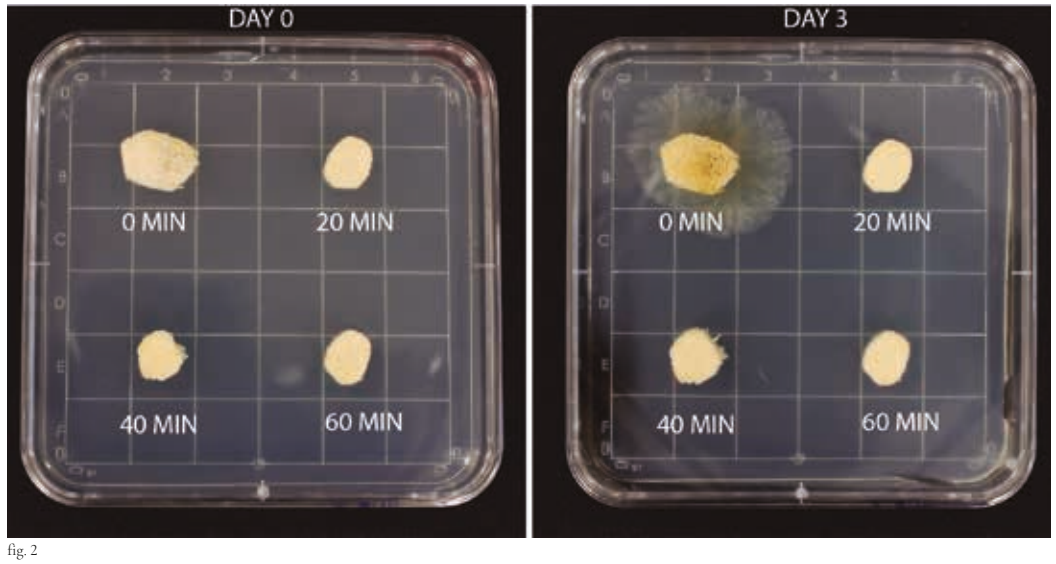

fig. 2

carbohydrates without damaging the structural tissues: On the one hand, 20 min for the LSS and on the other hand, 40 min for the USS.
Independently of the treatment's efficiency and the previous results, the main contribution is not just the development of a method for the conservation practice, but rather a researching model that explores the potential effects of a traditional treatment constructed by empirical knowledge. The treatment is a protocol useful for both: Conservators specialized in lightweight sculptures and artists that keep alive the lightweight sculpting tradition.
The importance of researching traditional treatments is that they can be applied to different contexts and adapted to specific problematics allowing the transformation and readaptation of many established conservation practices – sometimes unconsciously constructed without taking into account the environment nor the social users – into more approachable solutions. Even though sustainability stills unaware for many institutions of the cultural sector – especially in developing countries like Mexico – it is necessary to consider it within the theory and practice that leads conservation.

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INSTRUMENTAL TECHNIQUES AIDING OVERPAINTS REMOVAL – MA-XRF IMAGING SUPPORTED WITH OCT IN CONSERVATION PRACTICE

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INTRODUCTION

In daily practice of every conservation-restoration workshop treatments include removing unoriginal layers, especially paint layers and varnishes, which is often a substantial part of the work. In some cases, it is difficult to distinguish between the original or older layers and overpaints as well as assess the extent of the degradation of the underlying layers. The aim of this work was to support the conservation-restoration process of extensively overpainted 18th c. oil painting on canvas with two modern diagnostic techniques: macro X-ray Fluorescence scanning (MA-XRF) and optical coherence tomography (OCT) imaging. The conservation-restoration of the painting was done in the years 2013-2016. The intervention was focused not only on the painting layer, but also on the canvas support. During the conservation-restoration process, of great importance was to remove secondary layers negatively affecting the aesthetics of the image and thinning of the darkened and dirty varnish, which was a layer added during one of past renovation interventions. Distorting the actual appearance of the composition, thick overpaint layer was visible in the photograph, even in visible light (fig. 1).
The painting derives from a Calvary of Pakość, established in the

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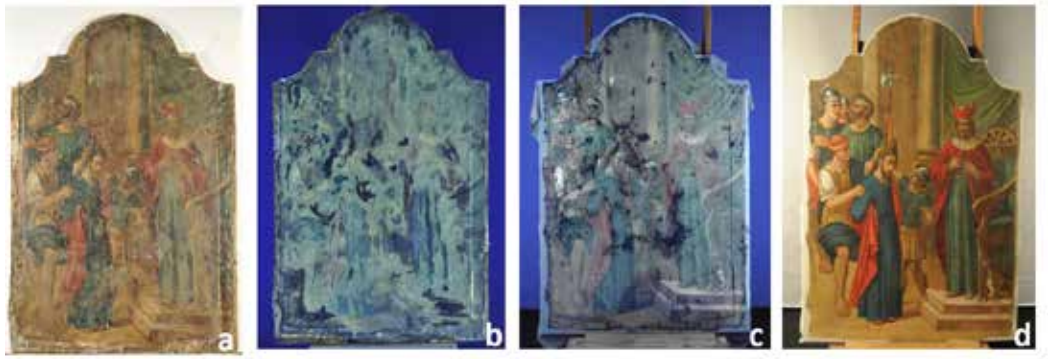

fig. 1

1. Painting Christ before Caiaphas: *a) photo (VIS) before conservation-restoration; b) photo of UV excited fluorescence before conservation-restoration; c) photo of UV excited fluorescence after conservation-restoration; d) photo (VIS) after conservation-restoration (credits: A. Faron).*

17th century. Calvaries were complex of chapels, widely diffused in some European regions that time. Calvaries were designed to resemble Jerusalem; they recreated the Holy Land, bringing it closer to places far from biblical sites, and enabling the faithful to make a pilgrimage. In Italy a similar phenomenon exists in the North and is called "Sacri Monti"[1]. Painted in the 18th cent., by an unknown author, in oil technique on canvas, the painting 'Christ before Caiaphas' is placed in the main part of the altarpiece in the chapel named 'House of Caiaphas and Prison'. Over the course of centuries, before recent conservation works, the painting was restored and overpainted at least three times and it was relined on new canvas with starch-based adhesive and varnished at least two times.

METHODS – TECHNICAL OUTLINE

MA-XRF scanning was employed using the M6 JetStream system from Bruker Nano GmbH. It allows scans up to 70 cm x 55 cm with lateral resolution up to 50 µm and comprises an x-ray source working at 50 kV/600 µA conditions with Rh anode and polycapillary optics. The image is captured in colour by two cameras with the maximum working area 30 x 22 mm² and 11 x 8 mm² respectively. A camera with high magnification allows setting the distance from the tested object. By precisely adjusting this distance the size of the x-ray spot on the object can be modified and thus it determines the resolution of the scanned area. This diagnostic technique has gained great popularity and has been willingly chosen as a non-destructive testing technique used among conservation scientists for nearly a decade[2,3,4,5,6,7,8,9,10,11] especially when working with polychrome surfaces.
Optical Coherence Tomography (OCT) is an interferometric non-contact and non-invasive technique of depth-resolved imaging within media that scatter and/ or absorb near-infrared light moderately, allowing obtaining cross-sectional images of

[1] Bliska-Wodecka 2003, pp. 93-116.
[2] Dik, Koen *et al.* 2008, pp. 6436-6442.
[3] Alfeld *et al.* 2011, pp. 157-163.
[4] Bull *et al.* 2011, pp. 668-73.
[5] Janssens *et al.* 2013, pp. 399-425.
[6] Olszewska-Świetlik *et al.*, 2015.
[7] Alfeld *et al.* 2015, pp. 795-805.
[8] Targowski *et al.* 2015, pp. 167-177.
[9] Monico *et al.* 2015, pp. 14129-14133.
[10] Faron 2017.
[11] Łydżba-Kopczyńska *et al.*, 2021, pp. 384-400.

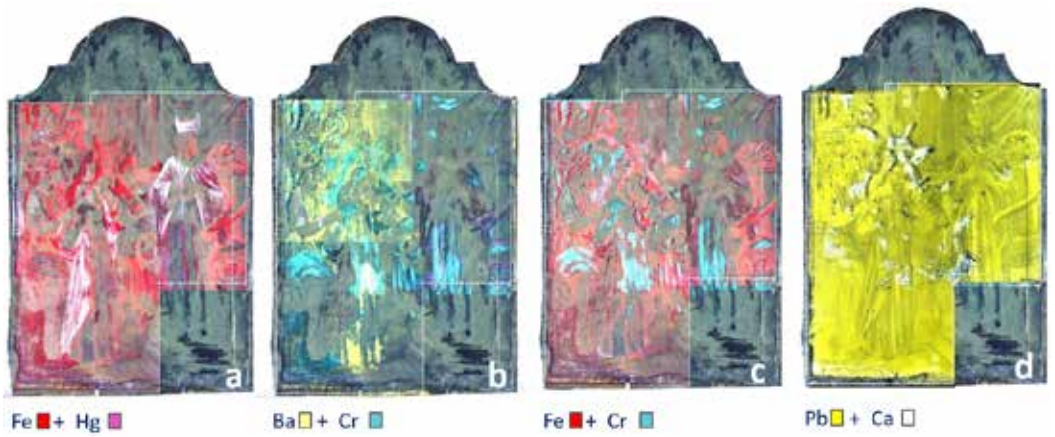

fig. 2

2. Elemental distribution maps combined in a graphic software by superimposing them to assess and identify painting materials. (credits: A. Faron, M. Iwanicka, P. Targowski).

the object's structure as well as 3D datasets. For the examination described herein, a high resolution (2 µm axial, 12 µm lateral) spectral-domain OCT instrument was used, allowing scans up to 12 x 12 mm². Implementation in art conservation is widely spread, literature from the field gives a lot of case studies[12,13,14,15] and information about the development of the method[16]. Both methods are non-invasive and non-contact, providing practical information about the structure of layers and surface topography (OCT) as well as chemical composition of the materials constituting the artwork (MA-XRF).

METHODOLOGY

A considerable amount of data was collected as a result of the macro X-Ray Fluorescence analysis of the painting *Christ before Caiaphas*. Therefore, a fragment of the painting was chosen that reflected the most demanding problems for planned restoration treatment, especially large amounts of broad overpaints. A graphic software was used to stitch elemental distribution maps from different scans and compare the distribution of various elements. The combined scans were superimposed on the photo of UV excited fluorescence (fig. 2). It was possible to place the maps precisely in the same location and on the same scale as the visible overpaints. One, two, or three maps were applied simultaneously, with a layer's opacity lower than 100%. However, the more maps were placed on one image at once, the worse was the readability of the whole illustration. In most cases, the results were satisfying in case of overlaying two maps at the same time. All maps were placed separately on layers whose opacity was adapted to each situation. Often, in the case of overlapping two maps, the blending mode was set for 'multiply' instead of the default. When the third and fourth layer was added they

[12] Iwanicka *et al.* 2016a, pp. 75-84.
[13] Liang *et al.* 2007, pp. 171-176.
[14] Iwanicka *et al.* 2016b.
[15] Iwanicka *et al.* 2020.
[16] Targowski, Iwanicka 2012, pp. 265-277.

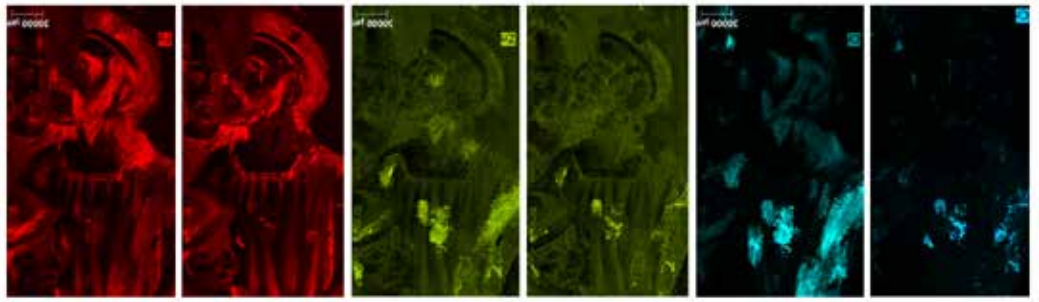

fig. 3

3. Elemental distribution maps of the chosen area (iron (Fe), zinc (Zn), chromium (Cr): a) Fe, before cleaning; b – Fe, after cleaning; c – Zn, before cleaning; d – Zn, after cleaning; e – Cr, before cleaning; f – after cleaning. (credits: A. Faron, M. Iwanicka, P. Targowski).

were adjusted so as not to lose previous information, maintain legibility and not change the intensity of individual areas of element distribution. Also, in the map processing software (M6, version 1.2.0, Bruker) it is possible to combine the results of several elements simultaneously.
Performed non-invasive monitoring removal of overpaints and secondary varnishes by means of optical coherence tomography wasn't novel. At Nicolaus Copernicus University in Toruń such diagnostic procedure had been implemented earlier[17], parallel to other European research centres – Florence (2007)[18] and Nottingham (2008)[19]. Therefore, this case wasn't focused on assessing the possibility of conducting such a survey in general, but simply it was employed as a complementary and cross-reference method in relation to MA-XRF. For OCT, scanning spots yielding the most information were those on the edge between the preserved paint layer and overpaints, whereas for the most representative MA-XRF mapping, strongly overpainted areas were chosen.

RESULTS

Analysis of the acquired information enabled characterization not only of original paint layers but also the secondary alternations (overpaints and putties) applied during past renovations. Furthermore, thanks to particular maps (e.g. Pb distribution) it was possible to locate the amount and range of losses in the ground layer. Elements presented in overpaints in the largest amount were: iron, zinc, chrome (fig. 3). However, macro XRF cannot provide direct information regarding the structure of layers, which was, in turn, obtained by OCT. Among numerous benefits of this diagnostic technique, those of the most interest for conservation-scientists, in this case, is the possibility to measure thickness, sequence and condition of layers present in the object's stratigraphy.
During cleaning in the same area, OCT measurements were taken before, during and after overpaints and varnish removal.

[17] Iwanicka *et al.* 2013, pp. 27-29.
[18] Fontana *et al.* 2007, pp. 661808-1-661808-7.
[19] Liang *et al.* 2008, pp. 713915-1-713915-9.

4. Assembled tomograms illustrate the process of overpaints and secondary varnish removal (credits: A. Faron, M. Iwanicka).

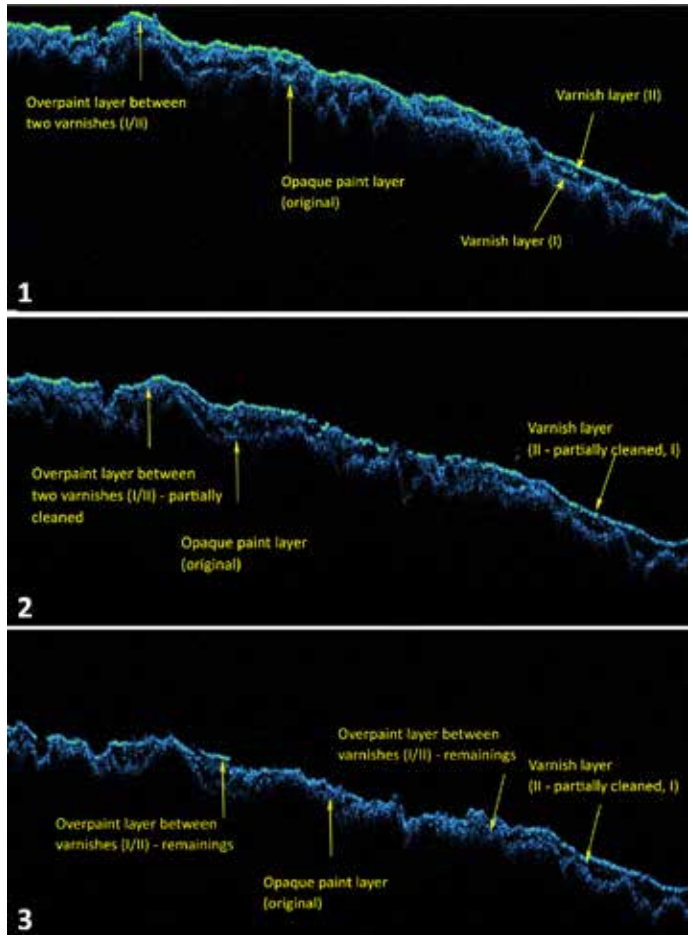

fig. 4

Three measurements were selected to discuss the results (fig. 4). Among selected tomograms in the first one there is original paint layer visible, varnish layer (original (I)?), overpaint between two varnishes (original (I)/II) and a varnish layer (II) on top. The second measurement was taken after cleaning the monitored place with a cotton swab moistened with a solvent. The third OCT scan was made after assessing with a naked eye that the results of cleaning was satisfying.
In the tomograms showing stratigraphy of overpainted parts there is a distinctly visible interface between original paint layer, overpaints and secondary varnish layers. In the case of a diagnosed spot where there was also a sample for stratigraphic analysis of the cross-section taken, the sequence of layers was consistent with the tomographic image.

CONCLUSIONS

As a result of the conducted interdisciplinary research and subsequent treatment of the painting, it was confirmed that the advantages of MA-XRF combined with OCT not only limited the risk of the intervention but also helped to develop knowledge considering painting materials.

On elemental distribution maps collected before the overpaints removal, it was possible to assess that the original paint layer was in excellent state of conservation. It enabled us to decide to uncover the oldest, well-preserved parts, obscured by improper restorations.

In the case of comparing iron distribution maps before and after overpaints removal on the discussed area, iron was also detected in layers that were classified as original, therefore it might become less differentiable as a secondary layer. A higher concentration of one element visible as more intensive colour in a particular place cannot be the only reason for describing it as an 'overpaint'. There is a necessity to compare other elemental distribution maps – those demonstrating elements which don't appear in the original and generally, according to the best knowledge, are treated as more modern materials. Among such elements, chromium can be included, which was found in brushstrokes that clearly indicate an overpainted area and contain iron as well.

Gradually performed cleaning treatment with chosen solvent solution monitored with OCT brought positive effects. There was a noticeable interface of each layer and while conservation works, it was possible to follow the decrease in thickness of secondary, undesirable layers. The last measurement confirmed that the original paint layer remained untouched, even protected by thin film of original varnish. The outcome of this experiment compared with MA-XRF elemental distribution maps, acquired before and after cleaning, confirmed that removed layers were overpainted areas.

The substantially overpainted historical painting was a challenge, but in the end, the work undoubtedly brought significant solutions to tackle such problems in prospective restoration projects. Previous works on the use of MA-XRF in the conservation of paintings didn't present a similarly comprehensive study on this subject.

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The study was part of the author's master thesis completed and defended in 2016 at Nicolaus Copernicus University in Toruń (Poland). Assistant professor Elżbieta Szmit-Naud supervised conservation-restoration of the painting.

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DIGITAL ELEVATION MODELS
FOR THE ASSESSMENT IN THE DIAGNOSIS PROCESS OF CULTURAL HERITAGE

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INTRODUCTION

Among all digital technologies used in everyday life by a conservator-restorer, the digital 3D modelling by means of photogrammetry, provides a wide collection of data of the cultural object. Its digitalization should be one of the designed steps during the study, intervention or conservation of any cultural asset as a way to obtain more information but, in any case, the virtualization eases the study from different points of view of the physical state of the object in a specific moment. This way, some researchers verified[1] the possibility of evaluating the deformation change between two different 3D models from the same wooden paint, registered in 2002 and 2015 in different locations, conditions and with different devices and methodology.
Physical alterations such as support deformation, craquelures, volumetric loss or deposits from different causes are reflected in a geometrical change of the object volume so that the 3D registration of the object throughout time and the periodical virtualization facilitates the evaluation of its physical evolution[2]. Several techniques are needed to diagnose the state of conservation of most of the cultural assets, and these techniques usually involve imaging procedures like X-rays, 3D photogrammetry or scanning, IR spectroscopy or even

[1] Palma *et al.* 2019.
[2] Díaz Martínez *et al.* 2018; Palma *et al.* 2019; Werbrouck *et al.* 2011.

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1. Orthomosaic and DEM obtained from the Crucified Jesus model.

fig. 1

thermography methods. All these methodologies are helpful to register both the micro and macro geometry of any sort of cultural object. As an example of using different techniques for the diagnosis of cultural objects, Cozzolino *et al.*[3] combined the use of photogrammetry to create the 3D model with a GPR survey. Other examples of the application of various techniques and 3D surveys for the diagnosis of cultural assets can be found in a large amount of publications[4].
Focusing on the technique proposed in this paper, the 3D model that is generated during a photogrammetric or scanning recording will provide the base information required for the creation of the Digital Elevation Model (DEM). The DEM, also known as Digital Terrain Model, is a colour scale image which shows the difference in height of the documented object geometry from a projection plane. Burrough[5] describes the DEMs as "any digital representation of the continuous variation of the relief over space". These maps have been widely exploited in other areas with cartographic, topographic and geographic purposes since the 70' and 80' decades, as they basically display the variance of the elevation of a terrain surface[6]. Nevertheless, it is possible to find this technique implemented in the field of archaeology through the use of LiDAR, which consists in a technique capable to provide 3D terrain point data with high accuracy from large scale surfaces[7]. Many publications gather the application of this methodology and the generation of a DEM from the data collected[8].
The study of the surface texture of the cultural object, even in a microscopic mode by means of a 3D model, has stood out as one

[3] Cozzolino *et al.* 2020.
[4] Adamopoulos, Rinaudo 2020; Antón, Amaro-Mellado 2021; Tissen et al. 2020.
[5] Burrough 1986.
[6] Ackermann 1999.
[7] Werbrouck *et al.* 2011.
[8] Devereux *et al.* 2008; Kasai *et al.* 2009; Liu 2008.

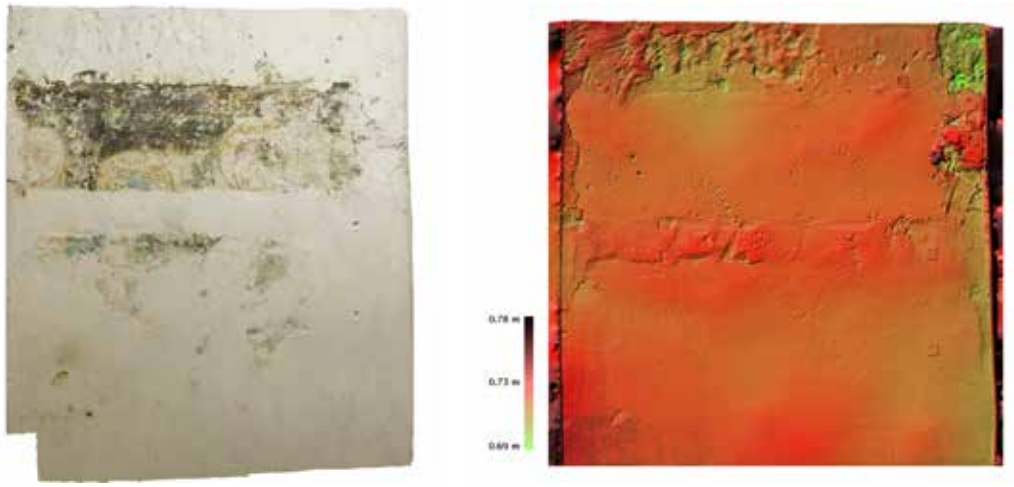

fig. 2

2. Orthomosaic and DEM obtained from the Mural Painting.

of the main sources of information for all the cultural researchers. Maté González *et al.*[9] the study of cut marks on bone surfaces has become fundamental for the interpretation of archaeological sites and prehistoric butchery practices. Due to the difficulties in the correct identification of cut marks, many criteria for their description and classifications were suggested. This article presents an innovative methodology which supplements the microscopic study of cut marks. Despite the benefits of using scanning electron microscopy (SEM can be considered as an example of the application of micro-photogrammetric methods for the study of the surface of archaeological remains. Although the creation of 3D models and consequent maps may present errors derived from the data registered or the modelling procedure, the accuracy is highly relative allowing any technical analysis. Fisher & Tate[10] gives a wide overview of the errors concerning the DEMs.

The study of non-accessible cultural assets, due to its size or location, is one of the main advantages of these pictures. As only a scaled 3D model is required for the creation of the DEM, this methodology can be applied in almost any conditions.

In the case of mural coatings, for instance, it is sometimes difficult to diagnose it without scaffolding or installing complex structures. Archaeological sites are also similar examples where the original remains can limit the accessibility. Pérez-García *et al.*[11] show a case study which was successfully registered by means of photogrammetry despite of the space restrictions of the archaeological site.

The main objective of this research is the demonstration of the usefulness of the DEM creation for the assessment during the diagnosis process in any sort of bidimensional cultural object. For this purpose, two different cultural objects were digitalised by means of a photogrammetric methodology and then, the photographs collected were managed with a specific software that could generate both the 3D model and the DEM map.

[9] Maté González *et al.* 2015.
[10] Fisher, Tate 2006.
[11] Pérez-García *et al.* 2019.

MATERIALS AND METHODS

This study pursues the application of Digital Elevation Model maps to the diagnosis of cultural objects so that it can be a useful tool for the conservator-restorer. For this, two different case studies are presented. A mainly bidimensional geometry was established as a basic requirement for this research in order to simplify the methodology and present higher quality results.

The cultural objects selected for this study are preserved in Iglesia de San Andrés y Santa Capilla of Jaén (Spain). Regarding to the shape of the temple and supported by other local authors, this church was probably settled over the remains of a Jewish synagogue according to Chamorro Lozano[12]. During the XIII century, the Mudejar building gained the condition of parish until 1843, when the brotherhood of Noble Cofradía de la Limpia Concepción de Nuestra Señora acquired the custody of this institution[13]. The structure of the original temple was modified by the acquisition of diverse adjacent buildings and the construction of a new chapel, defining the complex preserved nowadays. The church is based on a basilica-shaped design with three naves limited by four columns. The ceiling is covered by a wooden reproduction of the original coffer which was destroyed in the XVIII century.

Unfortunately, there are few references related to the origin of both case studies. In particular, the mural painting investigated in this research was discovered recently, near the high altar during a restoration, so it is not mentioned in any bibliography. Nevertheless, it seems that it is the oldest remain preserved from the original temple. With regard to the other case, the crucified Jesus named Cristo del Remedio is a wooden paint dated in 1731 and it is placed in a chapel next to the Capilla de Ánimas[14]. It was fabricated with the shape of a crucifixion but the figure of Jesus Christ is painted instead of representing the volume[15].

The methodology used in this study is based on a photogrammetric recording of the object. This technique involves its photograph from different points of view guaranteeing an overlapping of at least a 70% between the photographs and the complete registration of the object surface. With all these pictures taken during the photogrammetric process, the specific software can calculate the relative position of each shot and generate a point cloud which can be transformed into a 3D model. The

[12] Chamorro Lozano 1971.
[13] Fernández Hervás, n.d.
[14] Higueras Maldonado *et al.* 1985.
[15] Fernández Zamora 2006; Ortega y Sagrista 1961.

main reason to select photogrammetry instead of other sort of digitalization procedures lies on the democratic value and accessibility of this widespread technology. As the materials needed are, basically, a photography camera, good quality lighting and, in some cases, a tripod for support, photogrammetry is a suitable method for any project which cannot appeal to the use of more sophisticated equipment. Even sometimes, the software involved in the virtualization of cultural objects can be open-source, reducing the costs of the procedure and improving the availability of this methodology[16].

In particular, the equipment used in this research was a Nikon camera body (model D7000) with adaptable focal length lenses with a range from 18 to 105 mm (model AF-S DX Nikkor 18-105mm ED VR) and a tripod for the height regulation of the camera. Concerning the focal length, it was set in 25 mm due to the space restrictions for maintaining a continuous distance between the camera and the cultural object while taking the photographs. Finally, also a MSI computer model GS63 Stealth 8RD was employed for the processing of the images.

Likewise, the photographic parameters were established in manual mode with an ISO 200, f/7.1 and 1/10s exposure time in the case of the crucified Jesus and, for the mural painting, the ISO value and the diaphragm aperture were the same but the exposure changed to 1/3s. An automatic white colour balance was used in both cases as the colour management was performed directly afterwards with the computer.

Then, all the photographs were analysed using the Agisoft Metashape software (professional edition, 1.5.2.7838 version) to generate a virtual 3D model that constitutes the information from which the DEM map is designed. Some target points were generated with the same software and were placed surrounding the cultural asset as a reference for the programme to size the object and, subsequently, locate orientate the DEM map.

The workflow followed in the photogrammetric software began with the orientation of the photographs with the consequent optimisation of the alignment. The next step involves the creation of a dense point cloud but, in the latest versions of the software, it is possible to create the 3D mesh skipping this stage. Nevertheless, as the DEM can be created from either the point cloud or the mesh, it could be interesting to compare the results. Then, different measures were introduced between the targets because the software cannot calculate the DEM without scaling the model. Specifically, the projection data selected for the DEM creation was planar and the projection plane with markers from the vertical axis. Lastly, the DEM maps were exported in TIFF format.

[16] Higueras *et al.* 2021.

RESULTS AND DISCUSSION

The results demonstrate that DEMs are suitable images for the assessment in the diagnosis process, as they can be useful when combined with the study of the surface texture of the object. These maps enable the study of non-accessible cultural heritage and give tips for a better conservation-restoration proposal.

In this research, the best results and the higher resolution of the DEMs were acquired with the dense cloud. In the following tab. 1 and tab. 2, all the information regarding the photogrammetric workflow and the extracted information from the procedure are detailed. Particularly, the high accuracy of the models with less than 1 mm and the huge resolution of the maps are remarkable. Moreover, the time spent in the creation of the DEM is quite short if comparing with other steps in the workflow.

As a drawback, the current methodology used for the creation of DEMs is not specifically developed for its application in the cultural heritage field since there are some aspects, such as the orientation of the model with respect to the projection plane, which are not well adapted to this purpose. Additionally, one of the main disadvantages in relation with the cultural heritage area is the scaling requirement of the 3D model for the DEM generation. For this, the use of targets provided by the same software facilitates the sizing procedure although, it will not always be possible to pose them over the cultural object due to conservation reasons.

In the used software, it is possible to assign a minimum of 2 colour values to the DEM through the appearance preferences. The default colours consist of 5 tones assigned from 0 to 1, which will be the maximum height of the model. However, the changes in height are represented with a colour ramp resulting in a map that shows a continuous gradation for the human eye. In Werbrouck *et al.*[17], the authors recommend a maximum of 10 colour levels in the whole picture in case of a greyscale image to make them distinguishable.

Concerning the quality of the colour map generated, the weight of the files produced should also be considered. As it is expected, there is a proportional augment in the file weight when the quality of the DEM increases. In the case study of the crucified Jesus, the size of final DEM created was 284 MB and 230 MB regarding the mural coating.

Analysing the results obtained in the procedure previously exposed, DEM maps reveal interesting information related to the morphology of the original cultural assets. In both cases, some milimetric details like the union between different tables in the matter of the wooden paint and the incisions of the saints' names represented in the mural painting, are highlighted with

[17] Werbrouck *et al.* 2011.

Table 1. Data related to the photogrammetric procedure.

Case Study	Nº Photo	Disperse Point Cloud	Dense Point Cloud	Faces	Nº Targets
Crucified Jesus	101	147.185	5.175.865	4.530.795	18
Mural Painting	58	93.645	87.200.666	5.278.123	4

tab. 1

Table 2. Resolution and error data extracted from the process of the photographs.

Case Study	DEM Resolution	Orientation Error (pix)	Target Error (pix)	Scaling Error (m)	Overall Processing Time Consumption	DEM Time (sec)
Crucified Jesus	12009x24388 0.107 mm/pix	0.401 – 1.542	0.492	0.000249	5h 17 min 13s	67
Mural Painting	9118x10103 0.18 mm/pix	0.284 – 0.845	0.285	0.000714	9h 25 min 52s	39

tab. 2

the DEM. Additionally, the DEM of the mural coating reveal the deformation of the wall, emphasizing with an intense red the parts which stand out. This is remarkable data which may involve the structure of the own building.
The DEM maps obtained in this research are also presented in the fig. 1 and fig. 2.

CONCLUSIONS

The DEMs are very easy and accessible pictures that can be obtained from a simple digital 3D modelling of any cultural asset. The technical requirements for the photogrammetric recording are a camera, a tripod and good lighting conditions, making this methodology an affordable procedure.
Although this technique is not exactly developed for this purpose, the suitability for the diagnosis of the physical state of conservation of determined cultural assets with space restrictions and limited accessibility conditions is remarkable. One of the main advantages of this technique is the non-invasive aspect. Furthermore, these maps can be processed with any image editor software for the purpose of obtaining more accurate data. In combination with other diagnosis methods, the use of DEM can become a useful procedure for the conservator-restorer.
Some aspects that may improve the applicability of the technique in this field are the colour management of the resulting maps and the development of more precise tools for controlling the relation between the projection plane and the 3D model. Likewise, the use of different software for the creation of DEMs and their comparison with diverse case study could be the next step in this research line.

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NEW COMBINED NON-DESTRUCTIVE TOOLS

FOR AN EXPEDITIOUS IN SITU MECHANICAL CHARACTERIZATION OF HISTORICAL MASONRY WALLS: AN EXAMPLE FROM THE MEDIEVAL TOWN OF CAMERINO (CENTRAL ITALY)

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INTRODUCTION

Most of the Italian historical and cultural architectural heritage is in high seismic hazard areas like the Apennine Mountains. Over the last seven centuries, there have been between 20 and 30 larges, damaging quakes in the central Apennines, according to UCL's Institute for Risk and Disaster Reduction. In this regard, the 2016-2017 seismic sequence has just been the second disastrous event, which stroke the Central Italy in the last decade, involving tens of municipalities distributed among four different regions and producing heavy damage, as well as about three hundred of casualties. These events highlighted the need to protect this patrimony and hence prevent further fatalities, carrying on more studies on the structural system (mortars and masonry stones) of historic buildings, for defining the earthquake resistance[1] and the material deterioration to identify the appropriate conservation and restoration interventions[2]. In this sense, an important role is played by mortars, used to bind building blocks such as stones and bricks, and to fill and seal the irregular gaps between them. However, the characterisation of historical masonry buildings

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[1] Penna *et al.* 2014; Binici *et al.* 2016.
[2] Penna *et al.* 2014; Binici *et al.* 2016.

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through a creation of a comprehensive database of the mechanical properties is generally problematic, mainly due to the high heterogeneity of the building materials[3] and the impossibility of using invasive techniques that could damage historical structures. For these reasons, a new non-destructive (NDT) multidisciplinary methodological approach has been developed testing different buildings in the historical centre of Camerino, strongly damaged by the 2016-2017 seismic sequence, to obtain a large amount of information of different masonry buildings, useful to correlate the composition and mechanical behaviour of both masonry mortars and stone elements. This multidisciplinary research strategy was based on a series of techniques, such as X-ray diffraction, scanning electron microscopy and microanalysis, differential scanning calorimetry, calcimetry, Fourier transform infrared spectroscopy, analysis of the soluble salt by conductivity and dosage of anionic species by ion chromatography, particle size analysis, porosimetric analysis. In this work a non-destructive mechanical characterisation of building elements based on the use of the Equotip hardness tester[4], an easy to handle and electronic rebound-based device, and a high-resolution macro photograph named "Macro-photo", is presented. The use of Equotip allowed the study of both superficial and internal strength of historical mortars and stone elements through two different probes available from Proceq[5], whereas the "Macro-photo" tool provided sedimentological information on stone elements made up of sandstones for a better understanding of their unintended transformations (alteration) linked to the agents in the built environment such as salts, water, ice, biological colonization, atmospheric pollution. The data collected using this multidisciplinary approach represent essential information to identify guidelines for conducting advanced restoration techniques on ancient building and hence, decrease their vulnerability in relationship with their earthquake resistance, particularly important for villages that stand on high seismic hazard zones.

THE ARCHITECTURAL HERITAGE OF THE TOWN OF CAMERINO

The town of Camerino is located on top of a hill, between the valleys of the Chienti and Potenza rivers, within the Camerino basin in the Marche Region. This area deserves particular attention for its great historical and cultural richness with settlements dating back to prehistoric times, until the period of maximum splendour in medieval times, under the lordship of the da Varano family. During this period, the town considerably increased

[3] Liberatore *et al.* 2019; Clementi *et al.* 2020.
[4] Mammoliti *et al.* 2021b.
[5] Proceq 2019.

1. Location of the buildings examined in this study. Camerino town (Central Italy).

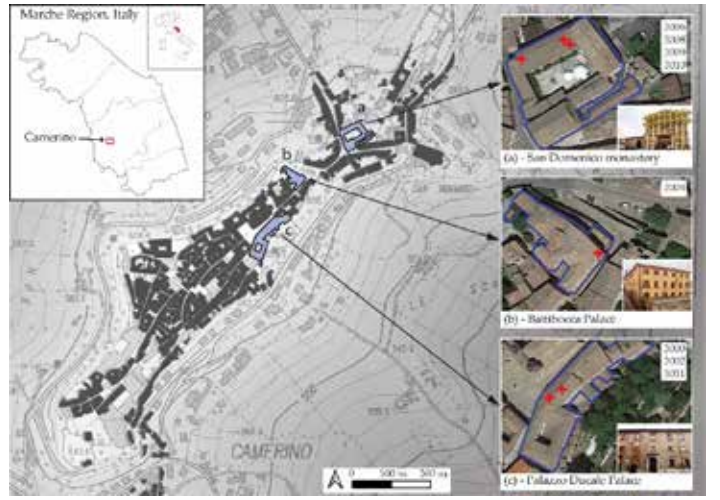

fig. 1

its architectural value, due to its typical medieval layout with imposing defensive walls and numerous historic buildings.
The choice of buildings to conduct this new study of mortar characterisation was determined not only by their historical period and type of masonry but also because the damage reported after the earthquakes of the 2016–2017 seismic sequence of Central Italy has permitted the testing of the core of the masonry, which now exposed to the surface. Those were chosen are, respectively (fig. 1): *Palazzo Ducale Palace* (XV century), *Battibocca Palace* (XVII century), and the *Monastery of San Domenico* (XIII–XVI century).

METHODOLOGY

The in-situ mechanical characterization was performed using for the first time Equotip, a rebound hammer used in rock mechanics for quickly estimating the strength of the materials without inducing any damage. The EQ hardness value is expressed as the L index (*Leeb number*), calculated from the ratio of the rebound velocity to the impact velocity, multiplied by 1000. The sedimentological information of stone raw materials used in ancient constructions were obtained with the "Macro-Photo" tool, an *in-situ* granulometric sandstone analysis useful to characterise the stone elements and reconstruct their origin. This is essential for two reasons: identifying the best solutions for the conservation-restoration of ancient and historic buildings made up of sandstones and localising the quarries to extract the sandstones used in the construction of ancient buildings and monuments. The tool consists of a bell-like cover with an external

2. Self-made "Macro-Photo" instrument compost of: Bell-like structure; LED stripes; Granulometric scale.

fig. 2

handle, equipped of a white LED light and a transparent grain size scale that fits onto the masonry wall surface. The camera is inserted into a 10 cm hole diameter (fig. 2). This device can be applied also to semi-planar or non-smoothed surfaces, thanks to a soft plastic edge that fit as well as possible the irregular surface. Indeed, the internal LED light aims to reduce external noises such as sun light or artificial lighting, to obtain standardised picture, and reduce differences between different camera resolutions, enabling the use of smartphones and other devices.

MASONRY WALLS

The buildings chosen in this study are well representative of the built cultural heritage of the Central Italy, with their masonry walls representing a very common construction type for the area, composed of a three-leaf (stone or brick) masonry. Two external leaves made of stone or brick masonry are constructed at a distance, whereas an internal leaf is filled with a loose, low strength material, made of stone fragments and/or bricks and mortar (i.e. sack stone masonry). The in-situ measurements with EQ were carried out exclusively on the ancient mortars between stones and/or brick elements, on both the masonry face and core of the building's walls. All the surfaces have been smoothed manually before testing to avoid the influence of roughness on the rebound

3. Grain-size classes distribution [%] resulting from the sedimentological analyses performed with the "Macro-Photo" technique. The grey columns are referred to the historical masonry stones granulometry. The blue and orange ones to the Palazzo Ducale Palace Colonnade and the Orto Botanico outcrop, respectively.

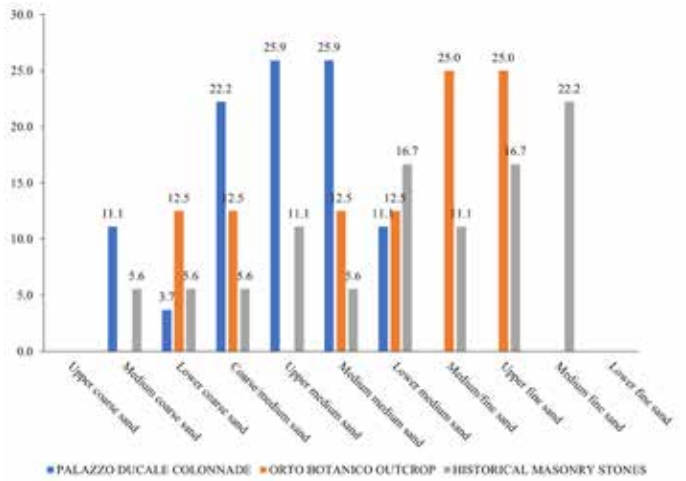

fig. 3

and both single impact and repeated impact strategies have been adopted for comparison. In particular, the following procedure has been adopted for each masonry mortar examined within the bed joint, with 60 repeated impacts on the same point (i.e. repeated impact test method), followed by 10 single impacts, separated by at least a plunger tip (i.e. single impact test method). At the same time, the same procedure was performed on samples of mortar with known composition in order to validate the results obtained from the historical masonry mortars.
Equotip results showed different behaviours between the mortars of masonry core and masonry face, with the first displaying a higher quality in comparison with the latter. The in-situ measurements were validated through the Uniaxial compressive tests, taken in the laboratory[6]. Regarding the sedimentological characteristics of the stone elements of the historical masonry (grey columns) with the "Macro-photo" tool, the study shows high variability in terms of grain size (fig. 3), interpreted as different provenance of each stone from several historical caves near the town of Camerino, or different strata thickness on the same outcrop.

THE STONE COLUMNS OF PALAZZO DUCALE

The rebound data collection with the Equotip hardness tester were also undertaken on the sandstone columns of the Palazzo Ducale, to evaluate both the superficial and the internal rock hardness/strength of these elements. To do that, two different EQ probes were used: the frontal section D (impact body 27 mm long) for the superficial evaluation, whereas the thin DL face section

[6] Mammoliti *et al.* 2021c.

4. a) The location of the measurements made with EQ. All the columns have been tested using the probe D, and two of them (identified with red circles) have been tested with the probe DL; b) The two different EQ probes used.

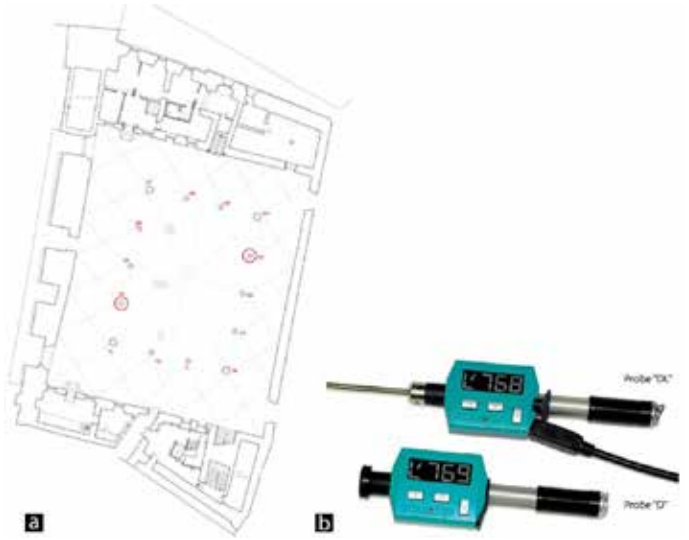

fig. 4

(impact body 82 mm long) is used to access tight spaces and hard-to-reach surfaces. The last measurement was possible with the permission of the Superintendent of Cultural Heritage. In fact, two not visible holes (4 cm deep and 4 mm wide in diameter) were drilled and in which the DL tip was used (fig. 4a-b). In order to better identifying mechanical characteristics of ancient historical buildings with high heritage value, the recognition of the quarries from which the sandstone blocks were extracted could represent a strategic solution on which undertaking destructive tests. For this purpose, the "Macro-Photo" was used to perform sedimentological characterisation of the sandstones blocks of the ancient buildings in Camerino, identifying grain size, sorting, roundness, and sphericity ranges. The EQ testing on the sandstone columns showed that the internal portion of the sandstones (examined with the DL probe) is constantly higher in terms of quality, as evidenced by the higher value of Leeb number. This is similar with the results obtained on the three-leaf (stone or brick) masonry where the portion at 4-5 cm depth has the highest quality. The macroscopic examination of the blocks already offers indications of the alteration processes that have occurred on the colonnade of the Palazzo Ducale in Camerino. A 20% reduction in resistance due to the most superficial altered layer was observed. The sedimentological analysis conducted on sandstones outcropping under the Palazzo Ducale and in the Orto Botanico have shown similar physical properties to the ones of the studied colonnade; therefore, these could be the possible historical sites from which the sandstone materials must have been at least partially extracted. The sedimentological study conducted on the Palazzo Ducale colonnade, and the Orto Botanico outcrop shows a more homogeneous distribution for the monolith data respect to the ones of the outcrop. The dimensional range are slightly different; indeed, the grain size distribution range from the columns are distinguished by the absence of the finer classes. In fact, the columns monolith was extracted from the thicker strata inside the litofacies *Arenacea* while the sampling of the outcrop was conducted also to the thinner ones.

CONCLUSION

This study aims at defining an innovative NDT approach for the evaluation of the strength of historical mortar and stone elements, focusing on: a) a quick, easy-to-use, in situ, and relatively economic device, named Equotip hardness tester, applicable to any ancient masonry mortars; b) the "Macro-Photo" tool, an in-situ granulometric sandstone analysis useful to characterise the stone elements and reconstruct their origin of excavation.
The proposed method is useful for acquiring mechanical information of materials in territories with high cultural heritage. Chemical-physical analyses are necessary to obtain data about the mixture composition. For these reasons, both the mechanical and chemical aspects of the masonry mortar will be coupled together in order to improve the methodology. This approach represents a fundamental strategy to obtain a general framework of their conservation state and the basic damaging mechanisms of historic materials, that are indispensable for their appropriate and effective protection and safeguarding.

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OPTICAL ROUGHNESS MEASUREMENTS

IN THE EVALUATION OF ACID CLEANING TREATMENTS FOR THE REMOVAL OF CALCAREOUS DEPOSITS IN CERAMIC MATERIALS

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INTRODUCTION

Ceramic materials are widespread in cultural heritage. They exist since prehistoric times (14000 – 9000 B.C.E.) and, indeed, are even part of our daily lives. From a conservation point of view, archaeological ceramics, understanding those that have been recovered and studied trough an archaeological perspective, are very interesting objects. Pieces discovered both buried in soil or under the water, can present calcareous deposits coming from minerals (rocks and animals). These deposits might hide important information and decorative motifs located on the ceramic surfaces. For this reason, it usually becomes necessary to remove such deposits[1].

The removal of calcareous deposits can be done by mechanical means, however, the high hardness and adherence of the deposits to the ceramic materials make these treatments quite risky. On the other hand, chemical treatments are very effective, but again may damage the ceramic by affecting the original materials. However, there is no agreement in the conservation field about the conditions of the chemical cleaning treatments. Moreover, little has been studied about the consequences that archaeological ceramics might suffer. The fact that some of the minerals that are part of the deposits' composition can also be found in the ceramic materials, makes it more difficult to find a chemical treatment that affects neither the original ceramic components nor other ceramics features (colour, roughness...).

In this way, roughness is one of the physical properties of ceramic materials that may be altered after the cleaning treatments. This feature is defined as the irregularity of a surface, at macro (cm, mm), micro (µm) or nanometric scale (nm). As surfaces are the interphases between the objects and the external conditions, roughness becomes a very important property in cultural heritage field[2]. In fact, roughness influences pollution adherence, biological colonization and breakage[3]. Therefore, the conservation of materials is linked to their surface and these, in turn, to their roughness[4].

As optical micro-roughness has been commonly used as a non-destructive technique in the evaluation of surface changes in cultural heritage stones[5], it was selected to study the ceramic surfaces at micro scale (µm). The equipment used just needs to be in contact with the surface for several minutes (the length of the measurements depends on their resolution), to scan it with three light sources. It provides 2D and 3D topographic maps, and from the high resolution photographies obtained, it is possible to calculate the roughness parameters[6]. Roughness parameters are defined by Standard ISO 4287:1984: *Ra* is the arithmetic mean of the absolute values of the deviations from the profile average, *Rq* the deviation from the square root of the measurement profile total and *Rz* the sum of the vertical distances of the five highest-peak- and the five deepest-valleys-values of each measurement. Among them, *Rz* was chosen for being considered the best one as it gathers the most representative values[7].

MATERIALS & METHODOLOGY

Ceramic specimens of 5x5x1 cm were modelled with a red commercial clay (Sio-2® ARGILA) and fired up to different temperatures (650-1100ºC) with a muffle furnace (SNOL 30/1300 L), reproducing archaeological ceramics firing range temperatures (Shepard, 1980, p.414). The heating rate was set at 2ºC per minute and 5 minute soak. Later, calcareous deposits were artificially growth with a mixture of lime putty and sieved soil (3:1 mass) on one of the specimens' surfaces. In order to favour the carbonation process they were introduced into a climatic chamber at 20ºC, 60% RH and 1600 ppm of CO_2 flux for ten days[8] (Dycometal CCK -25/81).

Acetic and nitric acid (AA and NA for short, respectively), were selected as the chemical products to be used, as they are recommended since the 80s onwards[9]. Cleaning treatments were developed following the next criteria: minimum product concentration and treatment time. In this way, two solutions with

[1] Carrascosa Moliner 2009.

[2] Barberio *et al.* 2015; Celma Cervera *et al.* 2017; Grissom *et al.* 2000; Iglesias-Campos *et al.* 2015, 2017; López *et al.* 2018.
[3] Falchi *et al.* 2019; Comite *et al.* 2017; Hodson *et al.* 1997; Miller *et al.* 2012.
[4] Fort *et al.* 2013.
[5] Comite *et al.* 2017; Kompaníková *et al.* 2014; López-Arce *et al.* 2010; Perez-Monserrat *et al.* 2017.
[6] Miller *et al.* 2012.
[7] Perez-Monserrat *et al.* 2017; Vazquez-Calvo *et al.* 2012.
[8] Sáenz-Martínez *et al.* 2019.
[9] Berducou 1990; Crisci *et al.* 2010; Fernández Ibáñez 2003; Tennent 1999.

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Specimen	Product	Concentration (% vol.)	pH	Treatment time 1	Treatment time 2
C650 AA	CH_3COOH	1%	2.76	30′	
C800 AA					
C1000 AA					
C1100 AA					10′
C650 NA	HNO_3		1.16		
C800 NA					10′
C1000 NA					
C1100 NA					10′

tab. 1

Table 1. Cleaning treatments designed and used for the removal of artificial calcareous deposits from ceramic specimens. Concentration, pH values and treatments time are included.

each acid were prepared at 1% voL concentration. Next, one ceramic specimen of each firing temperature was introduced into 300 mL of each acid solution for 30 minutes. Afterwards, the deposits were mechanically removed with wooden sticks, as they have been previously soften by the chemical processes. For three specimens, (C1100 AA, C800 NA, C1100 NA) it was necessary to repeat the treatment, but in this case the immersion time was reduced to 10 minutes (tab. 1). Finally, the desalination of the ceramic specimens was pursued by immersion to remove the soluble salts product of the chemical reactions[10] (calcium acetate and calcium nitrate).
Before the carbonation process and after the cleaning treatments, micro-roughness measurements were carried out with the portable and non-destructive TRACEit optical surface roughness (OSR) tester (Innowep®) with the following conditions: the measuring field was 25 mm^2 and the resolution along the Z and the X/Y axes was 2.5 µm. Five measurements were done on one of the ceramic faces surface, one on each corner and another one in the centre. Roughness parameters were calculated with the equipment software following standard ISO 3274:1996. To create the 3D topographic maps the data obtained were analysed with Gwyddion® 2.54 version. Besides, for each ceramic specimen average values were calculated, as well as absolute and relative variation of *Rz* parameter.

RESULTS AND DISCUSION

All the cleaning treatments resulted effective as they removed the artificial calcareous deposits. These results can been observed at first sight and have also been demonstrated by thermogravimetric techniques[11]. Regarding the changes in micro-roughness, most of the data of *Rz* parameter do not show high increases. However, high decreases are detected in high firing temperature specimens after the acid cleaning treatments (C1000 AA and C1000 NA) (fig. 1).
In the 3D topographic maps, the differences can be observed, being lighter areas higher values of roughness and dark ones, lower values. In this way, variations are more visible in C1000 AA (fig. 1) and C1000 NA (fig. 2) ceramic specimens, in correspondence with roughness data. In order to analyse 3D maps, it is important to bear in mind that *Rz* parameter is calculated from the five highest and lowest peaks. Therefore, the images show darker and lighter areas when the variations are higher.
According to the results, micro-roughness data demonstrate that cleaning treatments did not leave remains on ceramic surfaces, as their values did not increase much in most of the specimens, meaning that they have been effective. Besides, higher variations are linked to a reduction in roughness values, which mean that the surfaces have been soften (> -20%) but does not imply a higher vulnerability to external conditions. However, it is not yet clear the reason of these variations, as calcareous remains are higher for lower firing temperatures[12]. Nevertheless, the data obtained show that treatments are safe for the ceramic specimens, regarding their surface roughness.

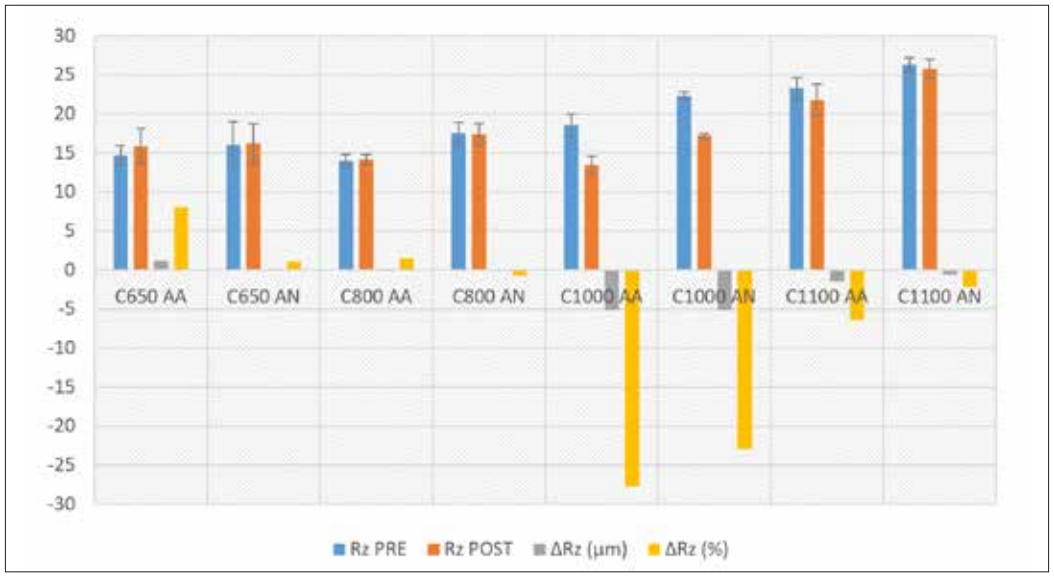

fig. 1

1. Micro-roughness porosity values (Rz) and their variation (ΔRz) of the ceramic specimens before the carbonation process (PAT) and after the acid cleaning treatments (AA and NA) (POST).

CONCLUSIONS

In conclusion, the acid cleaning treatments have been effective as roughness values have not increased much in comparison with the pattern samples, which means that the ceramics' surfaces remained unaltered. In fact, highest variations implied a decreased on *Rz* values, found in ceramics specimens fired at high temperature (C1000 AA and C1000 NA). This roughness reduction implies that surfaces are softer, meaning that their ceramic specimens'

[10] Unruh 2001; White *et al.* 2010.
[11] Sáenz-Martínez *et al.* 2021.
[12] *Ibidem.*

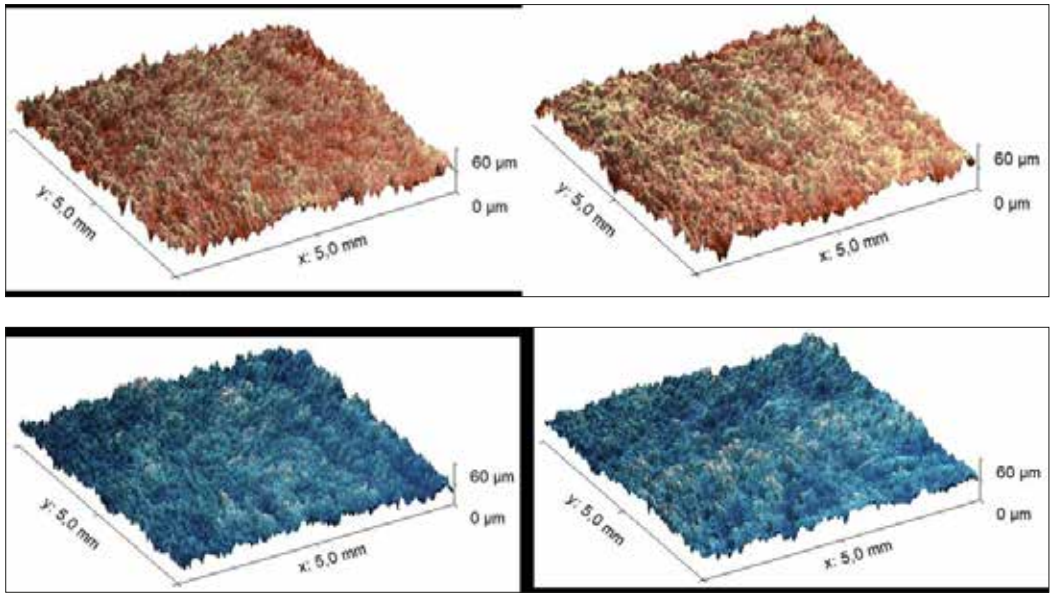

fig. 2

2. On the left, 3D representation of micro-roughness on C1000 AA ceramic specimen before carbonation treatment (PAT) (Rz= 18.76 ± 0.81 µm). On the right, measurement done after the acetic acid cleaning treatment (POST) (Rz= 13.71 ± 1.53 µm) (Gwyddion ®).

3. On the left, 3D representation of micro-roughness on C1000 NA ceramic specimen before carbonation treatment (PAT) (Rz= 22.47 ± 2.29 µm). On the right, measurement done after the nitric acid cleaning treatment (POST) (Rz= 17.03 ± 2.05 µm) (Gwyddion ®).

resistance to external conditions is not compromised. In this way, the preservation of the ceramics is guaranteed, as their exposure has not increased after the treatments. Besides, roughness values also demonstrate that the acid cleaning treatments were effective as they did not leave traceable remains on ceramic surfaces. However, the higher reductions found on C1000 AA and C1000 NA specimens, might be due to thin remains on surfaces, although thermogravimetric analysis contradict this theory.
Taking all this into consideration, optical roughness as a non-destructive technique has been a very useful tool to study possible changes in micro-roughness after the cleaning treatments.

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MICORR APPLICATION:
A DIAGNOSTIC TOOL FOR CORROSION FORMS ON HERITAGE METAL ARTEFACTS

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[1] Bertholon 2001.

MATERIALS AND METHODS

The objects studied in this work are part of a corpus of four similar bracelet (wristband) drafts discovered on the archaeological site of "Bussy/Pré de Fond" in the Fribourg Canton in Switzerland. The site dates back to the first Iron Age during the Hallstatt culture Ha D2-3 (620 – 450 BC) and the objects were found in a bronze workshop in the process of being shaped.
A first description of the objects was realized under binocular detailing locally and progressively the different strata, coding them[1] and locating each stratum versus another with a scalpel. This process allowed to draw a stratigraphy of the strata from the most external ones to the metal. The most representative structure was then constructed digitally using the MiCorr application.
After approval from the owner, a sample was taken from one end of bracelet n°11, considered to be the most representative of the whole corpus (fig. 1a), using a Dremel circular drill and embedded in epoxy resin (Specifix-40, Struers) to observe the sample in cross-section. The surface of the sample was polished with 800 and 1200 silicon carbide polishing disks (LAMPLAN), followed by final polish with 6 µm, 3 µm, 1 µm and ¼ µm diamond paste (LAMPLAN). For metallographic observations, additional final polishing was later performed with a colloidal silicon suspension (LAMPLAN final liquid), and the sample was then etched with an ethanol, hydrochloric acid and ferric chloride-based reagent to reveal the metal microstructure.
The unetched and etched cross-section was observed with a KEYENCE VHX-7000 digital optical microscope in bright (BF) and dark field (DF) modes. The sample was then examined by SEM with a JEOL JSM-7001F coupled to an Oxford EDX detection system at 20 kV. The corrosion products were then analysed by µ-Raman spectroscopy using a HORIBA Labram Xplora spectrometer equipped with a 532 nm laser, the Raman spectra were collected for 300 seconds at a power of 0.55 mW and are reported without baseline correction.

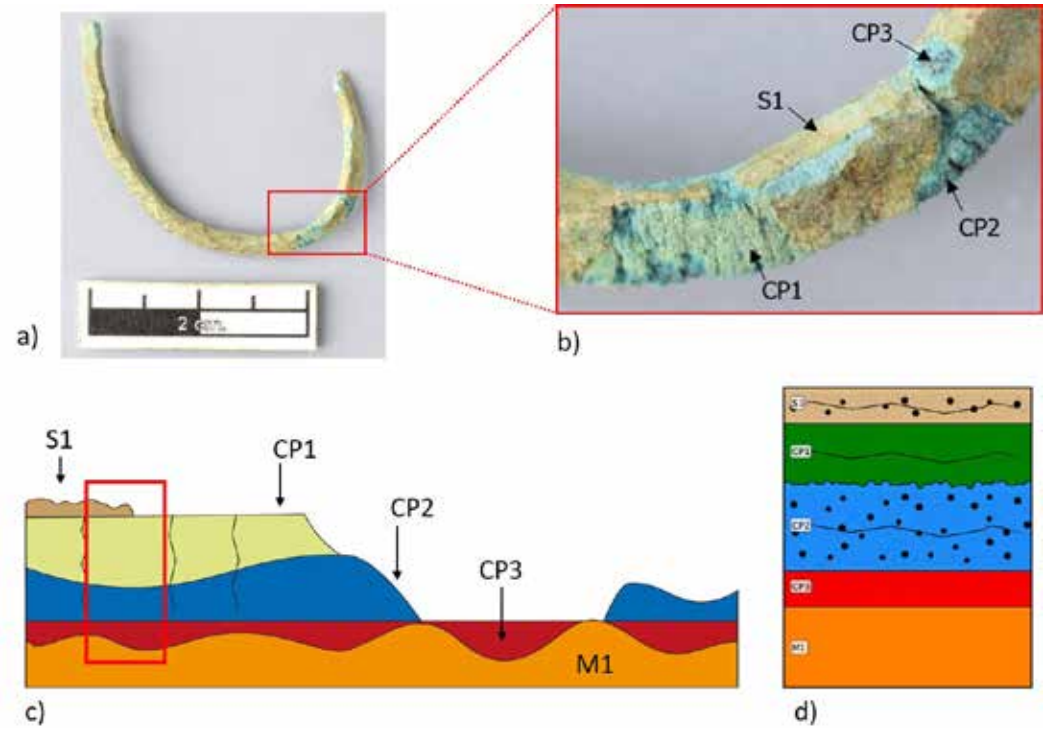

fig. 1

1. The conservation-restoration professional approach: a) photographical documentation of bracelet n°11, b) observation and coding of the strata under binocular, c) schematic drawing of the stratigraphy observed on the whole object and d) construction of the digital representation of the corrosion structure selected in the red frame (Figure 1c) using MiCorr application.

RESULTS AND DISCUSSION

The first visual observation of bracelet n°11 under binocular, from the upper to the lower strata, showed that a discontinuous light brown sediment (S1) was present on the external surface of the object, then three different corrosion products were observed: an external green CP1, then a blue CP2, both cracked, and a red CP3 adhering to the orange metal (fig.

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1b). As indicated above, a schematic representation of the whole stratigraphy of strata could be deduced (fig. 1c). The representative corrosion structure located in the red frame was then used to construct the MiCorr digital representation (fig. 1d). For each of these strata, different information regarding the morphology, texture, microstructure, composition, and interface were introduced in the MiCorr application and a selection of them are reported in tab. 1.

For observation in cross-section, dark field examination is closest to observation under binocular in terms of the colours of the different strata and is used to make comparisons between the two approaches and establish correspondences in the description of corrosion structures. The dark field image of the sample of bracelet n°11 in fig. 2a shows the presence of a thin discontinuous green layer (CP1), a thick continuous blue layer (CP2), and a thin continuous red/orange layer (CP3) at the interface with the metal, while the metal (M1) appears dark brown. A new MiCorr digital representation was made based on these observations (fig. 2b).
The metal composition obtained by SEM-EDX analysis is of approximately 91 mass % of Cu and 8 mass % of Sn, allowing the designation of the alloy as a bronze. The elemental mapping (fig. 2c) realized on the sample in cross-section permits to discriminate the metal (Cu-rich zone) from the corrosion products (impoverished in Cu and enriched in Sn, O and external elements such as Ca and P). Three distinct corrosion products are observed based on their elemental composition, corresponding to the CPs previously identified by binocular observation and OM. The green external CP1 stratum presents a local enrichment of Fe and P, the intermediate blue CP2 layer contains less external polluting elements, and the internal red thin CP3 layer has more Cu, while containing less Sn and other elements.
µ-Raman analyses were performed on the three identified strata (fig. 2d). The analysis point R01 performed on the external green CP1 was too disturbed by the fluorescence signal and a phase identification was impossible. Analysis point R02 was performed on the blue CP2 layer, the spectrum obtained shows a broad peak at 560 cm^{-1} which can be attributed to SnO_2 cassiterite nanocrystals thanks to the comparison with the work of Ospitali *et al.* 2012. The analysis point R03 was performed on the red CP3 layer and the obtained spectrum shows the typical main peaks (145, 218, 632 cm^{-1}) of the RRUFF Raman reference spectrum of Cu_2O cuprite[2].
The information obtained from the cross-section study is also introduced in the MiCorr application and is reported in tab. 2.

[2] Lafuente *et al.* 2015.

Table 1 Information available in the search engine by stratigraphy representation of MiCorr application under the binocular mode. The morphology and texture information are relative to the characteristics of the single strata while the interface information is relative to the interface of the stratum with the adjacent superior one.

	Morphology				Texture			Texture	Interface			
	Continuity	Colour	Brightness	Relative thickness	Compactness	Cohesion	Hardness	Cracking	Profile	Transition	Roughness	Adherence
S1	Discontinuous	Light brown	Matte	Thin	Non-compact	Powdery	Soft	Simple	Straight	Sharp	Smooth	Inseparable
CP1	Discontinuous	Dark green	Matte	Medium	Compact	Tough	Soft	Simple	Straight	Sharp	Smooth	Loosely
CP2	Continuous	Blue	Submetallic	Thick	Non-compact	Powdery	Very soft	Simple	Irregular	Diffuse	Uneven	Adherent
CP3	Continuous	Red	Submetallic	Thin	Compact	Powdery	Very soft	No crack	Straight	Sharp	Smooth	Loosely
M1	Continuous	Orange	Metallic	Thick	compact	Tough	Soft	No crack	Straight	Sharp	Smooth	Inseparable

tab. 1

Table 2 Information available in the search engine by stratigraphy representation of MiCorr application under the cross-section mode. The morphology, texture, microstructure and composition information are relative to the characteristics of the single layers while the interface information is relative to the interface of the layer with the adjacent superior one.

	Morphology		Texture	Microstructure	Composition			Interface		
	Colour	Thickness (µm)	Cracking structure		Main elements	Secondary elements	Compounds	Profile	Transition	Adherence
CP1	Light green	50-100	Branched	Crystalline microstructure	Sn, O, Cu	P, Fe, Ca, Si	Not identified	Straight	Sharp	Adherent
CP2	Blue	100-200	Branched	Crystalline microstructure	Sn, O, Cu	P, Si, Ca	Cassiterite (SnO_2)	Wavy	Diffuse	Adherent
CP3	Red	10-20	Branched	Crystalline microstructure	Cu, Sn, O	P, Si, Ca	Cuprite (Cu_2O)	Bumpy	Sharp	Adherent
M1	Dark brown	500-1000	Simple	Equiaxed grains (10-50 µm), inclusions, twin lines and slip lines	Cu, Sn			Bumpy	Semi-gradual superior	Adherent

tab. 2

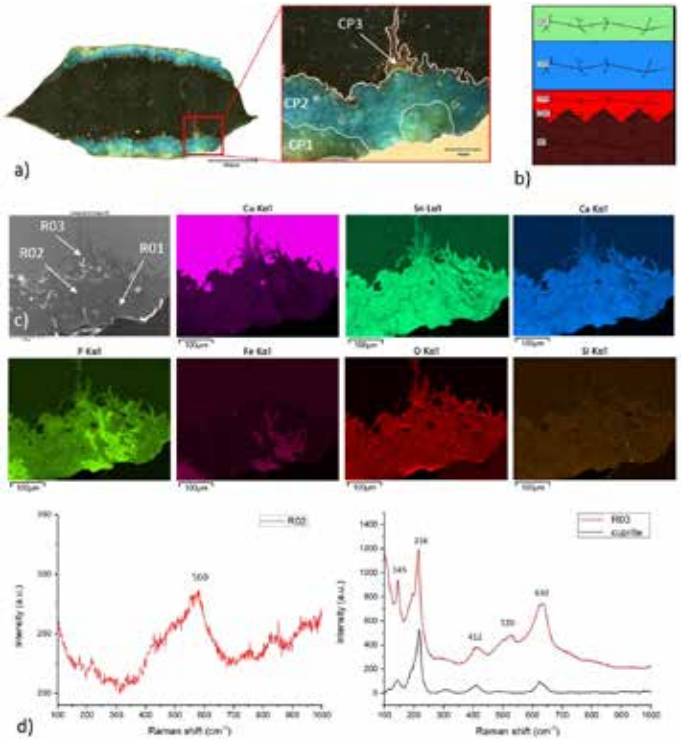
Three CPs were identified with both approaches, but some differences between the two observation methods should be noted. The outer sediment layer (S1), easily identified by the conservator, was barely visible as a thin dark yellow layer in the cross-section and could have been interpreted as part of CP1 if observed only under cross-section. On the contrary, the presence of a CM1 stratum was only revealed through cross-section observation. Moreover, the information obtained by the conservator approach such as brightness, compactness, cohesion and adherence is lost in the scientist's approach, while the physico-chemical characteristics obtained by the scientist are not easily accessible to the conservator. The differences observed underline the necessity and complementarity of these two approaches.

Overall, the complete characterisation of the sample showed a corrosion structure typical of an archaeological bronze. The object has a first stratum of cuprite at the interface with the metal, the first compound often to be formed during the corrosion of bronzes[3], accompanied by decuprification, a phenomenon commonly observed on archaeological bronze objects buried in moderately aggressive natural conditions[4]. The local enrichment in Ca, Fe, Si and P in the CPs was previously observed on archaeological objects and can be attributed to the diffusion of these elements from the burial soil[5]. The conservation condition of the object is stable as no chlorinated compounds were detected which could lead to active corrosion (bronze disease). The conservation of the original surface allows to identify the corrosion form as a Type I according to Robbiola *et al.* 1998 classification. However, the flaking of the corrosion strata CP1 and CP2 is preoccupying since some information about the object could be lost. It can be linked to the fact that the corrosion stratum CP2 is non-compact and decreases the physical cohesion of the object.

The precise documentation of the strata allows moving further into the treatment proposal and its discussion with the stakeholders. However, the aim of MiCorr is not to propose conservation treatments, but to help conservators in the diagnosis of the corrosion forms encountered.

In practice, conservators who usually describe the corrosion structures of metal objects under the binocular mode can match the stratigraphy(ies) obtained with those of the database under the two existing observation modes. As an example, the MiCorr digital representation of the corrosion structure obtained under binocular of another draft of a bracelet from the Bussy/Pré de Fond corpus (bracelet n°23), reported in fig. 3 (step 2), is quite comparable to that of bracelet n°11 studied in the previous

[3] Robbiola *et al.* 1998; Scott 2006.
[4] Robbiola *et al.* 1998.
[5] *Ibidem.*



2. a) Optical microscopy in dark field mode of the unetched sample of bracelet n°11 with detail of the area chosen for SEM-EDX and Raman analysis. b) MiCorr digital representation of the corrosion structure observed in OM-DF. c) Secondary electrons image (with detail of the Raman analysis points) and elemental mapping of the principal elements for the selected area of the corrosion structure. d) Raman spectra obtained for the points R02 and R03 (overlapped with the RRUFF reference spectrum of cuprite RRUFFID=R140763).

fig. 2

sections (fig. 3– step 3). The interest of this approach can be seen here, as it avoids the need to take additional samples from a corpus of objects when one of the representative objects in the corpus has been studied in depth. Thus, the data obtained on bracelet n°11 and reported in MiCorr provides access to levels of information that can help making relevant diagnosis without sampling the other objects in the corpus (fig. 3 – step 4).

CONCLUSION

The combined use of the study of corrosion structures by conservators and scientists in the construction of the MiCorr database and in the daily work of these professionals should improve the understanding of the corrosion forms observed on heritage metals and help in the diagnosis of unknown ones. The MiCorr application was created to foster interdisciplinary dialogue between the communities involved and to connect different classes of data, which are rarely put in parallel. The optimisation of the search engine by stratigraphy representation should facilitate collaboration between

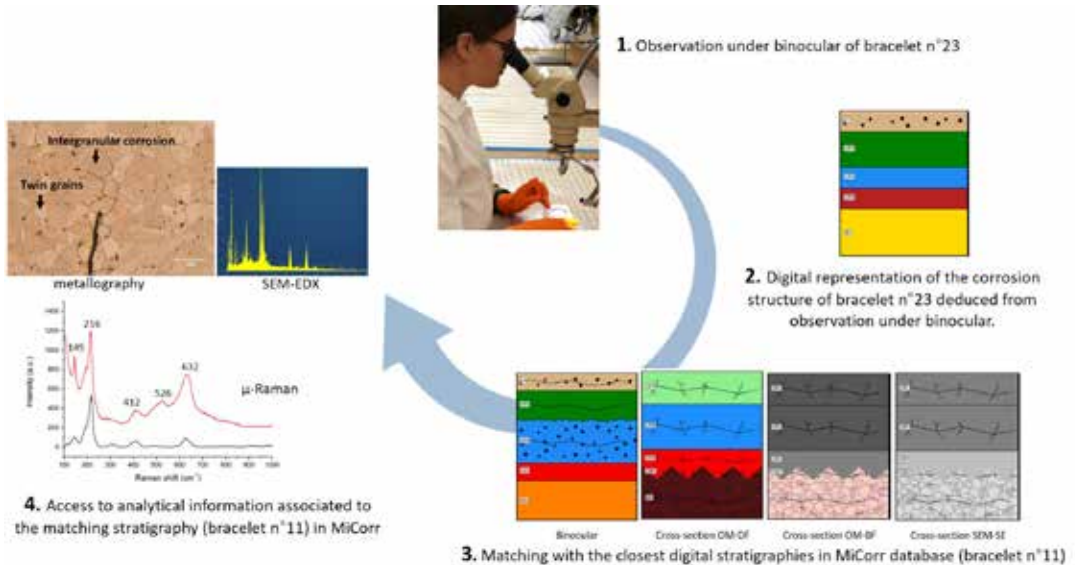


fig. 3

3. The steps of the MiCorr application as a support for the diagnosis of corrosion forms on the objects of the Bussy/Pré de Fond corpus: the example of bracelet n°23 (not sampled) matching with bracelet n°11 (sampled).

experts, by integrating a dialogue vocabulary specific to each observation mode and research field. Many conservators are currently contributing to the enrichment of the database within the MetalPAT project by providing objects with specific corrosion problems. It is hoped that this participatory initiative will meet the needs of the conservation community while allowing a better understanding of complex corrosion forms rarely been addressed before.

ACKNOWLEDGMENTS

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SESSION 3

MUSEUM PROFESSIONS

Sara Abram
Alberto Garlandini

The session about the museum professions is central to the Forum, precisely because the Forum was created with the intention to understand the nature of the professions of cultural heritage currently, and their future. First of all, we should ask ourselves how our preparation can contribute to the life of the museum. Probably today the conservator is an ally of the museum both for the safeguard of works of art and for the ability to offer new ways of reading, understanding and communicating museum collections.
The museum is the place where different skills in conservation are much valued: they produce new information, new languages and new interpretations. By keeping together different fields and disciplines, such as history of art, science and the study of artistic technique, through conservation practice we can broaden the range of information available and engage visitors in new knowledge experiences, exploring different perspectives to understand and appreciate a work of art or a cultural testimony.
During the third orientation week dedicated to the Forum's Community, the director Christian Greco from the Egyptian Museum in Turin offered some interesting remarks about the professions of cultural heritage and especially about the relationship between conservation, culture and society. As we could observe also during the pandemic, the theme of fruition and enhancement involves more and more those who deal with conservation: the fragility of our cultural heritage and the importance of caring of it has become a symbol of our feelings and needs.
Fruition and enhancement are some of the main themes that has emerged from the abstracts we received, together with the connection between research and conservation on one side and communication and dissemination on the other side. For example, Leticia Gondim from Brasil focuses on this topic, stressing that "Museums are living, and dynamic spaces, which besides housing and conserving objects, also generate research and communication". Someone else showed a very interesting

approach to digital communication, such as Veronica Tronconi, from Italy: her analysis is based on some recent case studies and underlines how new tools are not enough if we don't develop an organic communication project. Maria Barajas Rocha from Mexico presents a very well-conceived application, designed to involve visitors in the conservation using the so called "Heritage Interpretation Theory".
Some other papers help us to introduce some new connections in the Forum and generally into conservation processes. An example is the relationship between history of art and social science, like Eleonora Casarotti from Italy is going to do through her case of study in the anthropological field. Another example comes from the intervention by Nagmeldeen Hamza from Egypt, who invites us to better explore the significance of the museum objects through the lens of social history and several other disciplines.
Another fundamental topic introduced in this session is that of the growth and specialization of our professions based on sustainability and prevention, like Suzana Kasovska Georgieva from North Macedonia presented with her contribution.
We really hope that the Forum, thanks to contributions coming from different countries and experiences, can help us better understand how young professionals imagine their future, what kind of role they would like to cover in a museum, how they see the relationship between them and other professionals who work in the museum and what tools they need to achieve their objectives. These views were shared with some notable experts from international organizations, and we would like to thank them all for listening and contributing.

Sara Abram
CR, Secretary General
Alberto Garlandini
ICOM, International Council of Museums, President

THE REMAINS OF THE SACRED PRECINCT OF TENOCHTITLAN IN MEXICO CITY.

A NEW APPROACH FOR THEIR EXHIBITION AND CONSERVATION

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Among the great amount of amazing archaeological sites in Mexico, the remains of the Great Temple of Tenochtitlan, located in the main square of Mexico City, can be considered unique. This important area has been studied by the specialists for more than 40 years, since the unexpected discovery of the monolith depicting the moon goddess *Coyolxauhqui* in February 1978.
Because of that event, Mexico's National Institute of Anthropology and History (INAH) managed to carry out one of the most ambitious and long running archaeological programs in order to study the area on which a large part of the Sacred Precinct of Tenochtitlan was built. A group of different professionals such as archaeologists, conservators, biologists, anthropologists and architects – first leaded by Eduardo Matos Moctezuma and then by Leonardo López Luján –, have studied this area with the objective of reconstruct the life on Tenochtitlan[1].
Another important moment occurred when, in 1982, the archaeological site showing the Great Temple remains was opened to the public. Some years later, on 1987, the Great

[1] López Luján 2015, p. 325.

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1. Great Temple archaeological site beneath Mexico City's downtown.

fig. 1

Temple Museum was founded in this place as well. Located aside the archaeological remains, this museum offers the visitors a new and more intimate approach to the Aztec culture (fig. 1). Because of all the research results and the indisputable importance of this site, Eduardo Matos Moctezuma also founded, in 1991, the Urban Archaeology Program, a parallel research program which is currently leaded by Raúl Barrera Rodríguez. The Urban Archaeology Program complements the Great Temple Project and focuses its work on the delimitated area on which the Sacred Precinct of Tenochtitlan was built. As a result of the archaeological research and also in addition to the information of the historical documents, the specialists know that the Sacred Precinct had an extension of 500 m², and today, it has been delimited along different streets and plazas around the Great Temple archaeological site in Mexico City's downtown[2] (fig. 2). As professionals have expected, different results and findings have taken place along the research work in this area. In some cases, and depending on the importance and the exact location of each one of these remains, the Aztec buildings have been restored and delimitated in order to work for their exhibition to the public. In each one of these locations, the archaeological remains have been analyzed, stabilized and then covered and protected with different architectural and museographic solutions beneath the actual streets, or inside some of the newer constructions. These solutions, in which the visitors can see the pre-Hispanic remains on a sharing nature that combines our past with our present, are called "archaeological windows". Each one of these windows bring the possibility to look at a part of the Sacred Precinct of Tenochtitlan beneath our actual Mexico City. The archaeological windows can also be

[2] Matos Moctezuma 2016, p. 4; Barrera Rodríguez 2016a p. 7 and 2017b, pp. 22-24.

fig. 2

2. Location of the Sacred Precinct of Tenochtitlan (Based on Arqueología Mexicana *n 33 - Barrera Rodríguez 2009).*

described as communication spots, in which the visitors have the opportunity to see a combination of human and material testimonials of Mexico City's history and nature.
Nevertheless, after the years we have detected some problems related to the nature of these windows and to what they can offer to the visitors. On the first hand, there is a need to do a lot of work in order to maintain and to conserve each one of these archaeological remains and its museographic solutions. Besides, it seems that people have a lack of understanding when they see one or more of these places.
Each archaeological window shows the remains of the most important Aztec buildings inside the Sacred Precinct, but at the same time, each one of these spots is conceived as an independent and unconnected site. This fact inevitably generates some gaps among these important points of access, and because of that, it is difficult to conceive the integral area as an assemblage of remains that are part of a whole, showing the Sacred Precinct of Tenochtitlan beneath today's Mexico City.

A DIFFERENT APPROACH TO REMAINS OF TENOCHTITLAN´S SACRED PRECINCT

In order to integrate some of the essential remains that can be seen through the archaeological windows, and also looking

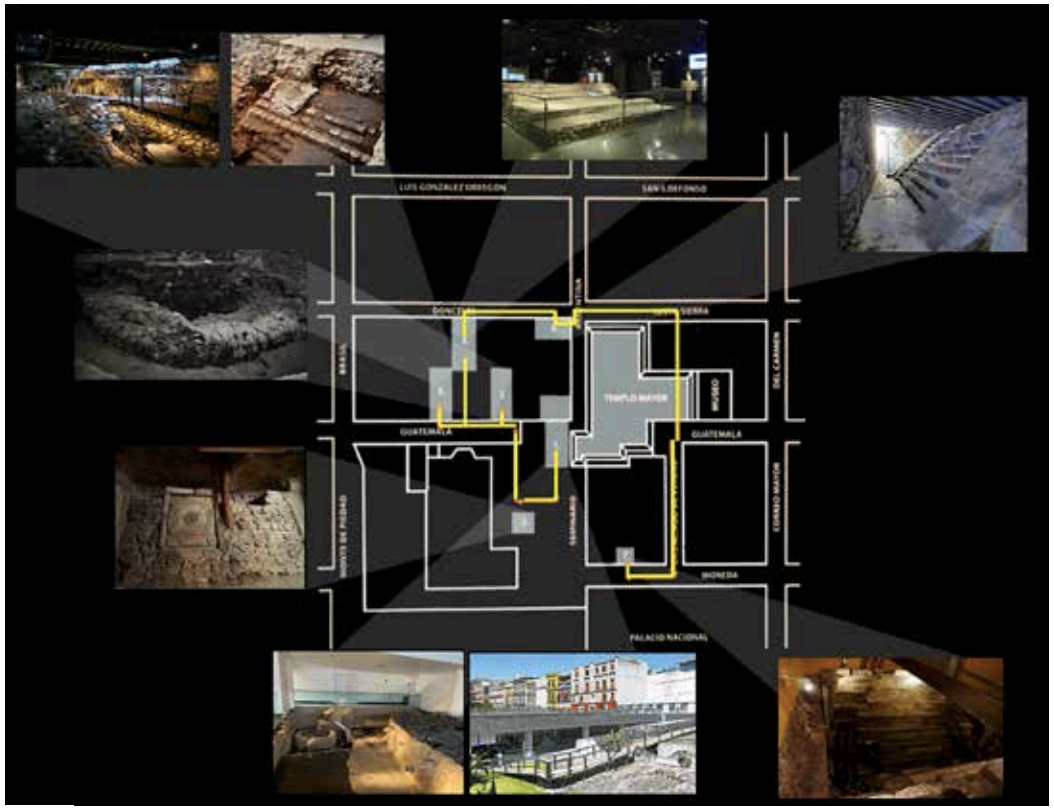

fig. 3

3. Route throughout the archaeological remains.

forward to offer to the public a clearer message about this unique place, we are working on a communication project that can contribute to this imminent fragmentary landscape. At the same time, we want to share with the visitors the importance of the coexistence between Mexico City's different moments and the permanence of the main pre-Hispanic sacred buildings beneath the actual constructions.

The project we are working in, proposed a route throughout the most outstanding archaeological remains of Tenochtitlan's Sacred Precinct. In order to delimit the proposal and to define this route, several considerations were taken into account: the main theme ("thesis") or message that we want to share with the program; the location and the context of each one of the spots and of the whole route; and also, the state of conservation of the archaeological remains.

Based upon these criteria, a route or circuit throughout seven archaeological windows was defined. For this circuit, we are working in the development of an audio guide tour with podcasts that can be offered to the visitors. This audio guide is being processed using the heritage interpretation methodology: the theory of Meaningful Dissemination of Heritage Knowledge (or "Divulgación Significativa del Patrimonio", in its original Spanish name), developed in México by Manuel Gándara. The theory proposes a methodology that can also be seen as a tool for preventive conservation, because among its main objectives, it pursues to show the visitors the values of this archaeological heritage in a different way, and also to help them gain a more caring and responsible perspective about it, fostering a sense of stewardship (fig. 3).

As a result of their visit, people will be able to relate what they are observing to their personal experiences in their present. Hopefully, the visitors will be engaged with the care and the conservation of the material testimony of their own history; of their own past and also of its relevance to their own present. Because of these reasons, we think that this program, -which will use a clearer and more attractive language-, will also seek to offer a more significant experience, and to generate important cognitive and emotional links between the visitors and their archaeological heritage[3].

Seeking to achieve these objectives, the project proposes the development of seven independent podcasts. These podcasts will talk respectively about each one of the archaeological remains that will be seen throughout the visit. At the same time, the podcasts will share a unique story based on the main message or thesis of the program: "The Sacred Precinct of Tenochtitlan: a story beneath our feet is right there, waiting to be told".

This heritage interpretation methodology also proposes that for the design of a program, we have to focus our work in specific goals or objectives which turn out to be the guide of the project at all times. These objectives can be synthesized in what Gándara calls "The communication by objectives model". This model is based on the next specific questions and answers[4].

– The purpose of the project. (Why do we want to communicate something…) We want to communicate this heritage in a different way, and to contribute for a better understanding of this unique area and its outstanding values.

– To whom. The program is going to be offered to the visitors that go to the Great Temple archaeological site and museum. Most of these visitors are Mexicans who already knew about this site, and who have a high school educational level.

– The main message or thesis of the program: "A story beneath our feet is right there, waiting to be told".

– About What: Invite the visitors to think about the importance of a sacred place laying beneath them, and to imagine all the things that happened there at that time.

[3] Gándara 2016a and 2018b.
[4] Gándara 2021.

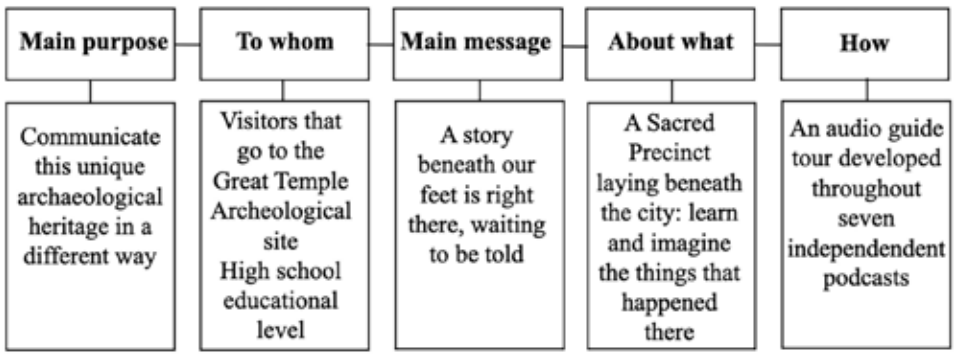

fig. – Tab. 4

Image/Table 4. "The communication by objectives model" proposed by Manuel Gándara Vázquez.

– How. The interpretation media that we propose, will be an audio guide tour developed throughout seven independent podcasts that, together, will tell a whole and unique story. Once the scripts are defined and ready, the production for these podcasts will take about two or three months (fig. – Tab. 4).

THE PODCASTS' CREATION

While working in the scripts for the audio guide tour throughout specific podcasts, we have detected some important issues that have to be considered. Based on Gándara's heritage interpretation methodology, this communication project looks to offer a different experience considering at all times that this is a *non-formal* educational context. People will visit this area because they want to; and therefore, we will bring them some tools in order to help them get a motivating and significant experience. Under this perspective, the information given through the podcasts has to be limited and carefully selected. We are also conscious that one of the advantages podcasts have, is precisely the possibility to share the information to the visitors in a more intimate way. This particularity will ease to get their attention. With the listeners' attention, everything could be possible. Describing and sharing in an organized way some stories about people and events, we will contribute for the visitors′ imagination and will also gain their attention[5].
As a result of these considerations, the different podcasts will seek to engage our future listeners. The episodes that will accompany the visitors throughout Tenochtitlan′s Sacred Precinct have to be unique, reflexive and enjoyable. Their structure and timing will also be carefully defined and will follow the storytelling technique. Each podcast will be constituted by three main acts: a concise introduction to the most important characters or places and to the conflict of the story; the development of the story and finally, the conclusion. The way the conclusions are going to be presented is also really important. We are working to present memorable closures for each one of these episodes; and, also, to offer the visitors some details that will make them want to know more about these stories.
Right now, this communication program is underway. We are working with the commitment that this project will have really good advantages, and also thinking that, as interpreters and creators of this audio guide materials, we are part of a collaborative work based in Gándara's heritage interpretation methodology. This work attempts to bring a better experience to the visitors, to provoque their thinking and reflections and, certainly, for gaining their commitment to this place's care and conservation.

[5] Hethmon 2018.

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THE SEPIK MASKS AT THE QUAI BRANLY MUSEUM – JC:
ESTABLISHING A COLLECTION (1914-1999)

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How did the masks of the Iatmul people of Papua New Guinea arrive in Paris? Who were the actors of the purchase or the donation? What was the reason for it? How were these objects documented?
My fieldwork on the Iatmul masks at the quai Branly museum brought to light and deepened the documentary and geographical gaps.

FOREWORD

The research object emerged during a fieldwork undertaken in August 2011 among the Iatmul population in Papua New Guinea, a language group inhabiting the middle Sepik region.
Attention was drawn to their traditional masks, called *abwan* in the vernacular, which embody the ancestors. These objects can be seen during rituals and dances; that's when I first asked myself some questions. What has changed in the creation of the masks with their commodisation? Has the creation of the masks been adapted to the taste of the buyers?

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1. Show in front of the haustambaran. Kanganaman, *08/08/2011.*

fig. 1

THE TRADITION TODAY

The masks are usually created and kept on the first floor of the men's house, or *haustambaran*[1] (fig. 1), which personify the female ancestors, stored after their use until the natural disappearance of the materials that constitute them. Nowadays, the masks are kept in the same place, but to be sold and used for the tourist shows that take place in the community space in front of the ceremonial houses, or men's houses, where all the big ceremonies take place. When the masks are sold and taken to a gallery, museum or private collection, they lose the spirituality linked to Papuan beliefs.

THE MUSEUM AS A FIELD

I decided to do a survey at the quai Branly museum, called "ethnological", after my first visit. The objects illuminated in glass boxes (fig. 2) inside a large dark space stimulated my critical sensibility and my desire to know.
Some data on the objects are not mentioned or known. With these gaps, does the museum have the right to claim to be "ethnological"? Furthermore, were the information and objects collected by anthropologists? How was the collection of masks from the Iatmul population built?
I was able to find two types of data on the objects collected. Some of the information was available on a computer program called TMS Objects (The Museum System Objects), which contains all the museum's "carefully" catalogued objects; another

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[1] The term is in Tok Pisin language, "the language contact". So defined by Bateson 1971, p. 289.

fig. 2

2. Oceania section, permanent exhibition. Quai Branly museum, Paris.

program, DocMuséale, collects all the correspondence between the museum and donors, ethnologists, collectors and dealers.

THE QUAI BRANLY MUSEUM

The museum, also known as the Museum of the First Arts, is not a new museum, since it has acquired the objects collected by two Paris museums: the Museum of Mankind, from which it receives 280,000 pieces, and the National Museum of African and Oceanic Art, from which it has integrated 30,000 works[2].
The team behind the design of this museum was thinking rather of building an institution to show the foundations of art anthropology by presenting these societies as the reserves of original (or even "first") humanity. It should be remembered that the design of the museum is based on the gathering of French ethnographic collections, with the idea of restoring these societies to the scientific field of anthropology, from a social, political and artistic point of view, and to create links with current French society through a scenographic architecture that enhances the aesthetic character of the objects on display.
This museographic orientation is deficient in the balance between aesthetic disruption and cultural otherness. The public should be informed about the process of creation of the objects on display, as well as the expectations of the creators and local "receivers" of these artifacts, in terms of the meanings they are invested with. The symmetrisation between "the West and the Rest" did not succeed, despite the desire to visually enhance the objects to raise awareness of diversity[3].
The birth of the quai Branly museum has thus stimulated

[2] Brutti 2009, p. 316.
[3] Taylor 2008, pp. 2-3.
[4] Stéphane Martin, 10 years of the quai Branly symposium.

several discussions and debates on the function of the museum of anthropology and ethnology in terms of representation and the way in which the message of anthropologists is transmitted[4].
The museum cannot be defined as a museum of ethnology, since it does not represent present and past forms of life, as do the "museums of civilizations"[5], and does not stage a disciplinary discourse. The collections gathered at the quai Branly museum are too lacking in geographical and historical data, which, in an exhibition, would contribute to offering a panorama of the world's cultures. In addition, today, ethnographic collections can no longer represent a particular culture in isolation[6].

ARCHIVES

The data from the archives relating to the Iatmul masks allow us to observe that the descriptive part of the objects differs according to the profile of the person who hands over the work to the museum. We will examine the respective specificities of the various documents according to their origin, using two computer systems.

1. TMS OBJECTS (THE MUSEUM SYSTEM OBJECTS)

The objects are digitized and classified in a data system called TMS Objects (The Museum System Objects)[7]. The inventory was carried out by Grahal, a company that deals with heritage management and inventory. The curators catalogued the objects. The program facilitates the research of information on the objects collected. At the Museum of Mankind, the information was available on paper. Once the person has located the card that interests him, he opens a drawer and consults the cardboard card connected to the structure by a metal rod[8]. This way of presenting information derived from the collection in the field[9]. The TMS Objects program has digitalised the information and iconography related to each object present in the museum. The object is recorded singularly, but there are links that allow for an easy research.
On the first day I had already listed 64 objects and I had classified them in order of the date they entered French collections, from 1914 to 1999.
Starting from this discovery I analytically examined the data of each object present in the program. I followed the numbering of the objects which is regulated by the standards of the

[5] See, for example, the current "National Museum of the History of Immigration" was called "National Museum of African and Oceanic Arts" until 2003 and, between 1931 and 1935, "Museum of the Colonies". Palais de la Porte Dorée, Paris.
[6] Taylor 2008, p. 2.
[7] Beltrame 2012, pp. 1-14.
[8] Beltrame 2012, p. 1.
[9] De L'Estoile 2007.

fig. 3

3. 71.1961.103.307, Mask Lambanti. Kalimbit village, East Sepik Province, Papua New Guinea.

inventories: the first number indicates the collection to which it belonged before, then the date of entry of the object in the collection. Then, the number of the collection in the year: 1 donation or 1 sale by the same person on the same date; at each change of date of the year when the object entered the French collections, the number of the collection changes. Finally, the number of the object (enumeration). The number 71 indicates the Museum of Mankind and the number 72 the National Museum of African and Oceanic Arts (MNAAO), from where the objects were transferred in 2002 and 2003 respectively.

2. DOCMUSÉALE

The DocMuséale[10] is accessible with a personal identifier. The search of the printed correspondences was done first by the number of the object, then by the names of the donors / sellers / anthropologists and, finally, by the names of the museums where the objects were previously kept. Each number defines the document and groups together a series of other documents that are related to the main theme of the set given by the title that we find next to the number.

Compared to the collection of "La Korrigane", the work is more complete and the information more numerous. We will proceed in the same way with Philippe Peltier, whose "Purchase Mission Report" I have analysed.

The five participants of the "La Korrigane" collection were all sons of wealthy families. They all had different backgrounds and aspirations, but the passion for travel united them. Paul Rivet, director of the Ethnographic Museum of Trocadéro (MET), had presented to the French Museums Direction the project of a twenty-six month trip around the world with the objective of completing the collection for the future Museum of Mankind It will replace the MET in 1938 and will open with the exhibition on the voyage of "La Korrigane".

The interest of the five travellers of "La Korrigane" was to show the public the richness of the artistic invention of these distant populations and with this expedition they marked a passage from the cabinets of curiosity to the first scientific journeys and thus to the birth of the ethnological discipline and of ethnographic museums. It was no longer "anthropology cabinet", ethnographic work was based on the object and the ethnographer's profession on the museum. The Museum of Mankind combined ethnological and art museums: the former in the permanent galleries, the latter in the temporary exhibitions.

[10] Source: http://archives.quaibranly.fr:8990/ , consulted on 28/06/2017.

[11] D003639/45694 – Report on purchase missions to Australia and Papua New Guinea between July 1991 and August 1992, there is the "List of works acquired for the National Museum of African and Oceanic Art" and, on pp. 58-62, there is the mask bought in Korogo, pp. 54-61 D003639/45743 – Mission Peltier: work acquisition, there is the price of the mask bought in Korogo, pp. 2-7; D003639/46744 – Summary condition report upon arrival of the collections at MNAAO, pp. 8-45, "Statement of receipt", the condition of the mask upon arrival at the museum.

fig. 4

4. 72.1993.1.94, Mask Baada. *Korogo village, East Sepik Province, Papua New Guinea.*

The actors of the collection of "La Korrigane" did not practice the purchase of objects: they exchanged all that they saw, because they had brought back objects from France for this purpose, and they carefully documented each object (fig. 3). Unlike Mr. Philippe Peltier (fig. 4), an anthropologist who was in charge of a mission at the MNAAO during his buying mission in Papua New Guinea between July 1991 and August 1992. Here I will note the most relevant information gathered during my research in the DocMuséale cataloguing system.

According to the "Report on Purchase Missions,"[11] the first piece of information indicates the rising price of Oceanian objects on the international market. Indeed, Peltier explains that the mission's objective was to renew and develop the museum's situation and management. He offered to buy Oceanian pieces on the Australian and New Guinea markets; the intention was to find objects that were not present on the market for various reasons. Peltier was going on a mission to the Sepik Valley, where he had already been several times. Thanks to the friendly relationships he had established with the locals, he had access to local dealers and artists.

Later documents I found in the DocMuséale program, still related to the Peltier mission, inform us very precisely of where, how much and what was purchased. The analysis of this data led my reflection towards a buying mission organized by a gallery rather than a museum. From the way in which here the cultural characters of the object are missing, which are, on the other hand, carefully noted by the actors of the collection "La Korrigane", my concern was showing the changes of the two research applications. In the field of humanities and social sciences, in a time span of about sixty years, the vision and the relationship with the Others has completely changed, as did objects installation in the case of museum exhibitions. The period we are currently living in requires a renewal of the way of seeing and representing the Others: this remains to be seen in the near future.

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TO RESEARCH, IT IS NECESSARY TO CONSERVE:

THE IMPORTANCE OF CONSERVATION IN CURATION AND KNOWLEDGE PRODUCTION, THE CASE STUDY OF RIO DO MEIO, BRAZIL

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INTRODUCTION

The Role of Conservation and Restoration in archaeological research is neglected in most parts of the world, including Brazil. Usually, the attention given to and the research developed to prioritize the study of easel paintings, polychrome sculptures, paper, and architectural monuments to the detriment of studies related to Archaeology and Ethnology. On the other hand, the field of Archaeology and Ethnology itself treats the fields of Museology, Curatorship, Conservation, and Documentation of Collections as auxiliary disciplines. However, considering the interdisciplinary behaviour that exists in them and that each field can contribute to preserving cultural heritage is vital.
Due to the diversity of materials and the fact that they have been buried for a long time, the complexity of archaeological artifacts requires strategic management of the collections. Consequently, the storages places, which are configured as an organized and systematized space within museums, archives, and other institutions, have the objective of adequately safeguarding the collections. In this context, the conservator-restorer has been playing a significant role, with an action that begins in the procedures of in situ intervention, characterized by the set of conservation measures taken at the time of excavation, and ends inside the storage places of laboratories and museums, in preventive conservation, curative, and restoration work.
Through reflection on the management of the collection of *Rio do Meio*, safeguarded at the *Museu de Arqueologia e Etnologia Professor Oswaldo Rodrigues Cabral, MArquE/UFSC* this article aims to highlight and emphasize the importance and contribution of conservation in Archaeology and conservator's roles in curating and producing knowledge in Archaeology.

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ARCHAEOLOGICAL SITE AND COLLECTION

The *Rio do Meio* archaeological site is located in Jurerê beach, Florianópolis, Santa Catarina, Brazil, and was excavated between 1996 and 1998 by the team from the *MArquE/UFSC*. The research and collection of material aimed to mitigate the damage caused to the site due to a real estate project that would be built on the site, this measure was in line with Brazilian law at the time since the site was excavated in a salvage character. The contract Archaeology, also known in Brazil as salvage, preventive, or enterprise Archaeology, encompasses a series of measures of protection, rescue and valuation of the archaeological heritage threatened by the current economic development[1].
Rio do Meio is classified as a shallow site, similar to the midden culture. However, these sites are not midden because there are very limited shells in the site, the archaeological layer, approximately one meter thick, rests on beach sand, and is formed by dark humus, mixed with sand, charcoal, fish, bird and mammal bones and sparse shells[2].
Excavation was conducted at the *Rio do Meio* archaeological site from natural layers, with the implementation of squares in two excavation areas, making a total of 260 squares excavated at a depth of between 60 cm and 90 cm. The collected material was taken to the Archaeology Laboratory, partially processed and then moved to the storages places of the *MArquE/UFSC*. In addition, a sediment sample was collected from each level and from each square. When it was not possible to excavate a square, its content was taken integrally to the museum in order to pass for a process of flotation and selection in laboratory[3].
The *Rio do Meio* site was excavated following a field method common to its time; nevertheless, there was no critical reflection on the collection policy, which yields an enormous number of

[1] Gondim *et al.* 2017, pp. 83-97.
[2] Lessa *et al.* 2008, p. 89.
[3] Fossari 1998, p. 15.

materials taken to the museum. The concern with collecting material was so great that even part of the modern rubbish found on the surface of the site was transported to the laboratory and stored in the museum. During the fieldwork, researchers were concerned to record as much information as possible on the archaeological site, providing a wide range of primary sources, such as sketches, photographs, and maps of the archaeological site [4]It is worth highlighting this information and details to get an idea of the amount of material sent to the institution, which generated several problems, diagnosed so far, such as storage places full of materials that should have already gone through a disposal process or should have been collected through a reflective collection instead of a quantitative collection. For sixteen years the *Rio do Meio* collection has been a problem for the institution due to the extensive amount of inadequately preserved and poorly documented collected material, and the museum staff was quite small to cope with this and other demands of the museum.

In 2014 the collection was contemplated with the culture stimulus award Elisabete Anderle in 2014, granted by *Fundação Catarinense de Cultura (FCC)*, under the project title "Revisiting the archaeological collection of the *Rio do Meio* site: study of the ceramic, faunal and lithic collections"[5]. The project was approved in first place, and took a year and a half, within the time and funding foreseen, although work is still being carried out on this collection.

THE STATE OF CONSERVATION OF THE COLLECTION BEFORE AND AFTER APPLYING THE PROJECT

At present, all the material collected during the excavation is stored at the *MArquE/UFSC*. Being stored in the museum does not necessarily means, that have been stored and documented in accordance with ideal standards. Only a quarter of the material which was floated, sorted, and analysed was well documented and in good storage conditions. Regarding the rest of the material that corresponds to most of the collection, unfortunately it was in inadequate but unavoidable conditions of storage due to lack of space and lack of staff. Museum professionals were not able to process and store such a volume of material without the effective participation of other researchers and undergraduate and postgraduate students.

Starting by most of the material that was neither sorted, analysed nor conditioned. The way the material was collected and packed

[4] Gondim *et al.* 2018, pp. 113-124.

[5] The project was written and coordinated by the current archaeologist at MArquE, Luciane Scherer and voluntarily by part of the team from the Laboratory for Interdisciplinary Studies in Archaeology (LEIA/UFSC) of which the author of this article is member.

1. Information about each square, level and date of collection.

fig. 1

in the field suggests that this collection was done considering, in fact, to be temporary. The information about each square, level and date of collection was written in marker pen directly on the plastic bags and as the years went by, this information disappeared completely or partially. Often, the noted identifications, as well as the numerous pieces of data, are difficult to understand (fig. 1).

As this is an archaeological site is similar a shell mound, the malacological material is part of the site's constitution, but what is most remarkable is the quantity collected. For each square, level and field day, there was, on average, a package of 500 grams of shells. Just inside the museum's storage, 180 kg of shells were collected, thus optimizing the space of the storage place (fig. 2). In the other space in the museum that most of the unsorted and non-analysed material was located, 683 kg were accounted for, totalling 863 kg of shells that were stored in plastic bags for sixteen years (fig. 3). This accounting was only possible because we visited the spaces where the collected and processed or not materials are found. We separated the shell packages by quickly

2. Optimizing the space of the storage place.

fig. 2

fig. 3

3. Excessive amount of malacological material (shells).

identifying the species and weighing each package for possible disposal, since the amount collected exceeds the research needs, overfilling the storage, besides the fact that most of the shells that do not present any anthropic transformation, with no explanation and documentation explaining the reason why it has been collected.

This research does not intend to blame the situation in which the *Rio do Meio* collection finds itself. The objective, through this case study, is to show that the lack of interdisciplinarity, methods and dialogue between the areas of archaeology, museology and conservation contributed to this situation. One cannot be anachronistic when thinking with the techniques, methods, and legislation currently available to us and judge what was done in the past. But we can use as an example a problem inherited by the institution that has a reduced team and needs to find a way to process all this material. The case of *Rio do Meio* possibly represents one among many other cases in the museums of archaeology in Brazil and perhaps in many other places in the world.

The award received by the museum allowed those involved to revisit this collection for further study. This grant allowed this collection to be, if not entirely, then partly processed and revisited by researchers with an interest in it. Part of the lithic, ceramic, and faunal collection was studied again, as well as part of the ceramic and zooarchaeological collection was processed, documented, and conditioned (fig. 4). With respect to the lithic material, once studied, it revealed ecofacts whose conservation in storage has no justification. From this new look to the collection

4. Adequate storage of faunal material.

fig. 4

many researches were developed, from doctoral to a master's thesis, and capstone project, as well as articles and presentations in congresses. The museum's spaces and storages were also optimized, and the creation of a new documentation and protocol of entry and conservation of archaeological collections in the museum has been discussed and debated.

THE ROLE AND IMPORTANCE OF ARCHAEOLOGICAL CONSERVATION

The excavation of the *Rio do Meio* archaeological site was done out of concern to save the archaeological site in its entirety from the impact it would suffer due to local development. However, this concern became problematic as much of the material remained for a long time stored in the same condition as it arrived in the field. The question remains: up to what point does excavating without proper conditioning, documentation and research mean carrying out an archaeological rescue? This question incites a reflection and, at the same time, creates forms of interaction between research, preservation, and adequate protection of the archaeological heritage, which when taken out of its context are conditioned and stored in technical reserves of museums. Dialogue is necessary, as well as planning involving archaeology, museology and conservation professionals to create protocols for the collection, entry, safekeeping and conservation of the different types of archaeological collections, before it loses completely its potential for research and dissemination[6].

It is necessary to have clear policies and long-term planning

[6] Arriaza *et al.* 1988.
[7] *Ibidem.*

that foresee and avoid the deterioration that collections suffer once excavated, researched, and deposited in museums, otherwise, as Arriaza & Cassman[7] point out, we will be committing an "archaeocide". The responsibility of an archaeologist does not end after the publication of his work, this concern must go far beyond the individual interest of research. Therefore, conservation plays a primordial role not only in the material conservation of the objects, but conservation is also an integral and very important part of Archaeology, without it, a wealth of archaeological information would be lost and/or not explored[8].

The goal of conservation treatment of artifacts is to enhance usability and longevity. Use and preservation are not necessarily on opposite sides, since if an object cannot be used, whether for research, exhibition or any physical or intellectual use, there is no reason to preserve it. Thinking about preservation means raising the undefined future values, uses and meanings of objects for their guardians, society and researchers[9].

Starting from the case study about *Rio do Meio*, it is highlighted that often the museum is seen only as a storage place, not only for the audience, but also for researchers. Many researches were carried out just to prove or disprove theories, resulting in the cramming of storages with the vestiges collected. The idea of excavating and removing the artefact for preservation was not always associated to the extroversion of knowledge to different audiences and also to the conditions under which these objects would be stored and exhibited.

The work of the archaeologist and the conservator are closely linked. There is no doubt that when the Archaeology researcher goes to the field, independently if it is to start new research, or if it is a rescue work, it is unquestionable that conservation actions must follow in the field, then in the laboratory and, finally, kept in museum storages. Otherwise, the best that can and should be done is to keep it buried in the "stable" environment in which it was found, instead of storing it in a precarious and inappropriate way for months, and even years, awaiting proper treatment. The action of time inevitably modifies in some way the materiality of the object, but the damage eventually produced by an incorrect intervention during the collection process can be even worse.

To take into consideration conservation when dealing with artefacts means, in the long term, to ensure the research potential of these objects collected in the field, since this action demonstrates the concern in maintaining the integrity of the material[10]. In the absence of a conservator, one of the archaeologist's main goals should be the development of conservation strategies, since by exposing the archaeological remains to different conditions, will be disturbing the balance established between the material and the environment where it was found, thus becoming an involuntary accelerator agent of the processes of deterioration and corrosion of the archaeological material, contributing to its destruction, because archaeological sites are not renewable goods.

[8] Cronyn 2003.

[9] Appelbaum 2010.independent of object type or material, and its use will enable conservators to be more confident in their treatment decisions. Conservation Treatment Methodology is illustrated with numerous examples that emphasize the equal importance of the physical and cultural aspects of objects for decision-making. The book also explains how the history of an object and the meaning that it holds for its owner or custodian contribute to determining its treatment. Conservation Treatment Methodology is an essential text for conservators, historic preservation specialists, and restorers, as well as students. Since it is not a technical manual about how to carry out treatments, the book will also be of value to art historians and museum personnel who work with conservators.\"This book is unique in its overarching, multidisciplinary approach. The writing is not only clear, but entertaining and engaging.\"Dan Kushel, Distinguished Teaching Professor, Art Conservation Department, Buffalo New York

[10] Lorêdo 1994, p. 124.

CONCLUDING REMARKS

By taking a new look at these collections, interaction between research, preservation, and adequate archaeological heritage protection was created. In addition, creating a bridge, a dialogue, and planning that involved professionals from archaeology, museology, and conservation was conducted. Taking into consideration the issue of conservation before the artifacts means, in the long run, ensuring the research potential of these objects collected in the field, since this action demonstrates the concern not only in maintaining the integrity of the material but also its potential for research, communication, and dissemination of knowledge. Thus, it demonstrates the need to apply interdisciplinary methodologies in an appropriate way to preserve these archaeological remains, these potential sources of research so that they continue being researched and, above all, outreached to the public.

The study and refitting of the *Rio do Meio* collection provides a positive example of archaeological research carried out without the need for a new excavation. The different approaches and interdisciplinary methods applied provided new archaeological knowledge and at the same time contributed and contributed to the conservation of the archaeological collection. The intention here is to call the attention of archaeologists to the potential and value of collections which are deposited in numerous museums, many of which have not yet been studied, and which deserve this treatment, as has happened and is happening with the *Rio do Meio* site's collection.

It should be stressed that, thanks to the prize, new dates have been established for the site, which had only one date until now. And thanks to the impulse of the project "Revisiting the archaeological collection of the *Rio do Meio* site: studying the ceramic, faunal and lithic collections", it has become possible to continue the research begun in the 1990s, making it possible to process a significant part of the material, producing scientific knowledge and readjusting the storage spaces, freeing these

[11] Appelbaum 2010, p.independent of object type or material, and its use will enable conservators to be more confident in their treatment decisions. Conservation Treatment Methodology is illustrated with numerous examples that emphasize the equal importance of the physical and cultural aspects of objects for decision-making. The book also explains how the history of an object and the meaning that it holds for its owner or custodian contribute to determining its treatment. Conservation Treatment Methodology is an essential text for conservators, historic preservation specialists, and restorers, as well as students. Since it is not a technical manual about how to carry out treatments, the book will also be of value to art historians and museum personnel who work with conservators.\"This book is unique in its overarching, multidisciplinary approach. The writing is not only clear, but entertaining and engaging.\"Dan Kushel, Distinguished Teaching Professor, Art Conservation Department, Buffalo New York 29.

spaces of the Institution. The intention in presenting these data is that this initiative encourages research on archaeological collections present in museums, instead of excavating new sites.
The practice of conservation is much more than the application of manual and advanced material-specific techniques to achieve long-agreed objectives. Our task, as conservators, is the material preservation and interpretation of objects that have value to its owners or to society at large. Accomplishing this task requires us to understand that our choices, based on protocols and scientific research, can impact on the meaning of these objects. Thinking and acting beyond materiality demonstrates how broad and dynamic our work as conservators is. Conservators must also be involved in protocol creation, documentation, field and scientific research. Ultimately, then, the ideal conservation practice is not only in our hands, but also in our heads[11].
This case study is as well important to understand how the museum is often seen only as a place of storage, not only for the public but also for researchers. Museums are not spaces fated to the past, or of dead icons. Above all, museums are living and dynamic spaces, which besides housing and conserving objects, also generate research and communicate through exhibitions and publications, and the curator has an essential role in this.

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CONSERVATION OF EVIDENCE:
THE SIGNIFICANCE OF OBJECTS BIOGRAPHY FROM TUTANKHAMUN TOMB

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ABSTRACT

Tutankhamun is famous throughout the world for the wealth of the objects found in his tomb. Numerous books have been written about the golden treasure, but no study writes about the materials used during the discovery. Howard Carter who discovered the tomb used in his everyday life inside the tomb some materials such as boxes, paper, cards and pieces of newspapers for packing and transportation of the objects from the tomb to Cairo Egyptian museum, the research focus on these materials which have a historical context with the objects and consist its biography.
The research focus on the packing materials used with the objects discovered in Tutankhamun tomb, not as usual on the objects itself. Howard Carter used with the objects newspaper such as the Times, Morning Post and Egyptian Gazette which date back to 1922 the time of discovery of Tutankhamun's tomb, photography and food boxes which he bring from outside Egypt and other related packing materials.
The aim of our research is to present a new ways of thinking about conservation of museum objects, thinking more about the objects biography. Despite the objects is the main concern of museum conservators but some time the packing

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fig. 1

1. Newspaper Used during restoration process. (Courtesy of the Griffith Institute, Oxford, UK).

2a-b. Food boxes and box for glass plate negatives used as packing boxes.

fig. 2

materials can add more significance value to objects. The research present a study of object's life through the materials used within, Analyze the social lives of objects (Object 'biographies'), to understand what stage in an object's life we are studying, recording, representing and conserving. Know more about everyday life in the tomb and excavator, not only this but also the evidence around the world during this time. Thinking about how, where and why things are made (materials and technique), discussing their condition and significance. The research open discussion engage community with people from different nationality about different articles and evidence related to their country in these pieces of newspaper. Thinking about how to display these pieces within the objects to engage the community with preserving not only the objects but also the evidence of the history will be very interesting to complete the story about Tutankhamun's tomb and to be attractive for visitor in our new museum GEM-CC.

INTRODUCTION

Biography is the life story: help us to understand what stage in an object's life we are studying, recording, representing and conserving. Analysis of objects is useful because they help us to think about: how things are made (materials and technique), where they were made and used, why they are in poor or good condition, how their significance varies.

MATERIALS

H. Carter used in his everyday life inside the tomb of Tutankhamun some materials such as boxes, paper, cards and pieces of newspaper for packing and transportation of the object from the tomb to the Egyptian museum at Cairo (fig. 1 e fig. 2).

All these materials have a historical context with the archaeological objects from the tomb; these materials can tell rich stories about the everyday life of the excavators. The idea from this case study is to study biographies of objects with these pieces of newspapers with the everyday life of the excavator, making link between the dates of the newspaper and what happened inside the tomb in this date with the aim to preserve them as a part of the history of the objects.

3. The Times Newspaper used as a packing material for Tutankhamun textiles in 1922.

fig. 3

4. Newspaper used as a packing material for Tutankhamun textiles in 1922.

fig. 4

In this case study conservation focus on preserving the materials used with the objects as packing and storing as they have social lives. Looking into newspaper which Carter used with the objects such as the Times, Morning Post and Egyptian Gazette, as packing materials for textiles from the tomb to the Egyptian museum at Cairo (fig. 3 e fig. 4). Conservation decided to preserve the biography of objects and the diaries of excavators.

Conservation in this case not an intervention but extraction of data from these materials. documenting the articles in this newspaper records that some of them talk about the discovery of the tomb, other article talk about the fleet's tour London fire visitors to Luxor and other one talk about American scientists from Metropolitan at the tomb, a lot of articles have interesting evidence . Also we will give a hint about the letter of excavator to their friend such as the letter from Mace to his wife.

fig. 5

5. Simulation of display Design for newspaper pieces.(Author design).

Documentation for the food and photographic boxes which Carter brings it from London and used it as storage boxes for objects, also numbering cards made by Carter. Packing paper which have found with objects contain different number than Carter number gives more details about the development of numbering of Tutankhamun's collection by the time.
Two popular objects were received in these materials the textiles and the hassock. Textiles were packed in both cardboard and wooden boxes inside these boxes were the pieces of the newspaper. The cardboard box with the hassock used to preserve the beads, this box was a French box of gelatin silver bromide photographic plates, marketed at the beginning of the 20th century by the Lumière company "anonymous society of photographic plates and papers Antoine Lumière and his sons", which thought to be brought by Hurry Burton the photographer of the tomb. A nice story about this box is that the arrival of gelatin silver bromide plates changed the history of photography at this time. Also give more details about why Hurry Burton chooses this type of plates which allow producing in advance large quantities that can be preserved before and after the shooting.
Thinking about how to display these pieces with the objects to engage the community with preserving not only the objects but also the evidence of the history will be very interesting to complete the story about Tutankhamun's tomb and to be attractive for visitor in our new museum GEM-CC (fig. 5).

CONCLUSION

The preservation of Tutankhamun's tomb collection is a huge challenge. Working in direct contact with the objects and studying the debates and practices of the past while reviewing our own practices revealed that present-day conservation decisions integrate decisions from the past more comprehensively than initially realized.
All conservators must accept that communicating with the public is part of their role Public engagement will be the way forward. In building a strong profession conservation has a future if the wider community feel and thinks it is important, this come out when conservators engage the community about their work to make the case that the work they do is important. Conservators need to convince the general public that conservation matters. Conservation is not only the intervention or treatment we applied to our collections, conservation can apply to preserve the materials around the objects which maybe data, storage materials and registration cards which we can call it objects biography.

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CONTRIBUTION TO THE INTERDISCIPLINARITY OF THE MUSEUM PROFESSIONALS:
CASE STUDY OF CULTHER PROJECT

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The built cultural heritage is part of the history and identity of each nation. Cultural heritage is our past, present, and future. It is precious and it deserves protection. Cultural heritage buildings have historical values resulting from their architecture and their correlation with important social, religiuos and political events. Preservation and conservation of buildings, which are cultural heritage, is very important because it provides a sense of identity and continuity in a fast-changing world for future generations. Nowadays preservation of cultural heritage has to be considered not only as a means for preserving physical fabric and sustaining cultural values, but as an incentive for enchanting cultural diversity, sense of place and sustainable economic development[1]. Cultural heritage conservation is important for identifying, recording and protecting cultural heritage and cultural resources. Preservation and conservation of buildings of cultural heritage is an important tool in the sustainability of the regions. This process is very important for defining the landmark of the regions through the cultural heritage. In the sphere of cultural heritage, the preservation values are critical deciding what to preserve and how. Even making a typical preservation decision reveals many different and sometimes divergent values: artistic, aesthetic and historic values, plus economic values tied with the use of building or other structure under consideration[2].
Heritage buildings are subjected to processes of degradation with time, which leads to a situation in which they became not able to fulfil the purpose for which they were built. For example, in the region in North Macedonia there are many heritage buildings that have been lost[3]. Therefore, the conservation and preservation can be an important tool to protect the heritage buildings.
Facing climate changes issues, the challenge of heritage conservation is to provide sustainable services, (sustainable tourism), sustainable contribution to urban development (urban revitalisation) and sustainable production models (local arts, crafts and skills)[4].
In the world where climate is changing, the heritage will be faced with a range of new pressures that are quite different to those experienced in the past. Management practices will have to evolve to reduce the impact of novel threats and to recognise the need for a shift from damage mechanisms like air pollution, towards a different biological and physical process that will give rise to damage forms that are expected to be different from those of the last century[5].
Climate change will unquestionably affect cultural heritage with direct, indirect and cumulative impacts. This, in turn, reveals not only the importance of understanding of causes and dynamics of climate change, but also the necessity to access the impacts and to understand risks and vulnerability. The awareness of the climate change toward the build cultural heritage is on very low level in North Macedonia and the region[6]. Climate change is especially relevant in preserving the cultural heritage because these monuments were developed at times when different weather conditions prevailed[7]. Slowly deterioration of cultural heritage buildings can result with the degradation of the construction materials or from the damage of the building elements. Heritage buildings are subject to process of degradation with time. In other words, the degradation of the construction materials is a process that develops naturally with time, and can be accelerated by chemical, physical or biological processes. The best way to protect the cultural heritage is to make sustainable conservation and preservation of the building materials, that are part of the heritage buildings. Sometimes the cultural heritage has many damages and it is very difficult to conserve it. A very important part of the process is good diagnostics and application of different technologies. There is a growing demand for accurate approaches towards conservation and restoration.

[1] Grazuleviciute 2006, p. 78.

[2] See more in Avrami, Mason 2000.
[3] Blinkova, Kasovska Georgieva 2019, p. 89.
[4] Ost, Carpentier 2018, p. 147.
[5] Sabbioni *et al.* 2008, p. 4.
[6] In order to receive an answer on the awareness of the climate change toward the built cultural heritage in North Macedonia, questionnaire was made in 2019. 90 % of the respondents, answered that the awareness of the climate change is on low level.
[7] Kasovska Georgieva, Blinkova 2016, pp. 281-288.

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1. *Case study of St. Panteleimon church.*

fig. 1

The built heritage sector differentiates from other sectors, as the sector is dependent on different professions and qualifications. For good and sustainable conservation, sometimes we need the implementation of innovative techniques and knowledge in different interdisciplinary fields. That is why the museum professionals and cultural heritage institutions professionals need interdisciplinary skills, as well. (fig. 1) (fig. 2) (fig. 3) (fig. 4)
The present conservator has need of different skills and knowledge regarding the preservation of the cultural heritage. "The transfer of knowledge must be increased because practitioners need to be able to convert research into practice, with support of protocols and directives. Cultural heritage is neither prepared nor adapted to our future climate. Information is necessary on how to make it more resilient to future disasters and how to survive them"[8].
Being a professional conservator requires specific techniques, innovative solutions, creative ideas, new skills, open mind. Addressing this key issue, the CULTHER project set up a new international professional development program in the field of conservation and prevention of built cultural heritage from climate change influences.
The international project "Development of professional courses for preservation and preventive conservation of the built cultural heritage from the climate change influences" was implemented under Erasmus + program, in 2017-2019 in four countries: North Macedonia, Belgium, Germany and Lithuania. The project develops and introduce interdisciplinary skills to the museum professionals, such as management, sustainability, innovation, climate changes, on one side and conservation and preservation,

[8] Sabbioni, *et al.* 2008, p. 23.

2. *Training in the classroom.*

fig. 2

on the other side. The project also raised awareness about the importance of sustainable conservation and preservation and sustainable built cultural heritage[9].
The wider objective of the project was to develop sustainable cultural heritage that will improve Macedonian conservation performance in that way create sustainable cultural heritage through the improvement of their conservation skills. The aim of the project "CULTHER" was development of professional courses for preservation and conservation from climate change influences of the built cultural heritage build on rigorous research evidence and principles of VET education. The consortium developed teaching materials, curriculum and learning platform, which was implemented as a pilot course in North Macedonia.
It is important that this project was delivered transnationally and developed models for best practice and facilitate action for sustainability of the cultural heritage, taking into account experiences from already existing frameworks and paying particular attention to the needs of developing countries, including for capacity building.
The most important priorities were enhancing the quality and relevance of VET museum learners knowledge and skills by jointly developing and implementing professional courses for sustainable cultural heritage (preservation and preventive conservation of the built cultural heritage from the climate changes influences and maintaining cultural heritage) for conservators, architects and engineers currently working or planning to work on positions in the museums and in this field through enhancing access to training and qualifications. The goal of the courses is to bring new qualities and advantages for professional museum learners, where their relevant knowledge

[9] Kasovska Georgieva 2018, see more on http://www.vipheart.mk/.

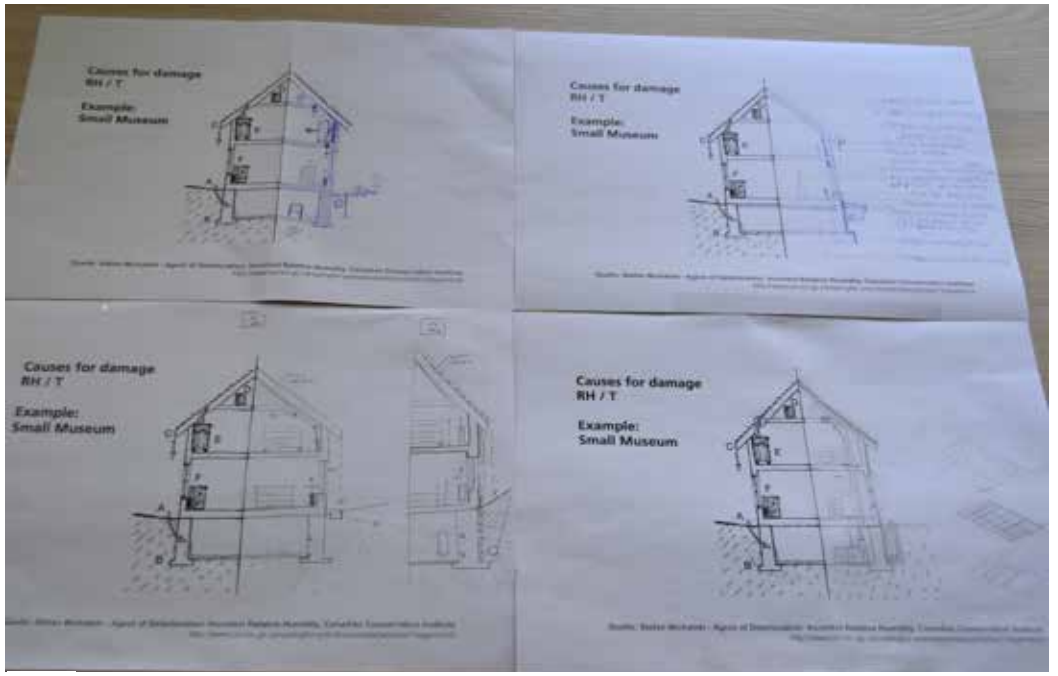

fig. 3

3. Training in the classroom.

and skills will empower them to easily find their place in the society and enhance their employability, as well.
The courses were result of joint initiative, mutual cooperation, peer learning and exchange of experiences at European level among the project partner organizations. Therefore, they were jointly developed by: Institute for Research in Environment, Civil Engineering and Energy (IECE) from North Macedonia, Katholieke Universiteit Leuven (KU Leuven), from Belgium, Vytauto Didziojo Universitetas (VDU) from Lithuania, Fraunhofer Gesellschaft Zur Foerderung Der Angewandten Forschung (FHG) from Germany and Civil Engineering Institute Macedonia (CEIM) from North Macedonia.
The program was developed and based on the needs of conservators, architects and engineers research evidence, principles and standards of conservation. Throughout the Courses for developing sustainable cultural heritage participants from museums and cultural institutions in North Macedonia developed interdisciplinary and advanced skills and practices, ground practical and theoretical approaches facilitated by distinguished affiliates, received a professional orientation, which can be implemented later in their organizations , received interdisciplinary knowledge from trainers from other countries and worked together on conservation and preservation case studies.

fig. 4

4. Practical training on the interior of the church.

Thirty Museum professionals and professionals from cultural institutions in North Macedonia took part in the project courses. The main aim of the courses was education, training, knowledge transfer and quality labels. The courses were innovative, with six interdisciplinary modules referring the conservation, preservation, sustainability, management, climate changes, energy efficiency, building materials. The education was theory and practice, as well. The professionals worked on chosen case study: the unique Byzantine church from the XIIth century (fig. 1). The museum professionals gain knowledge in different interdisciplinary skills, (sustainability, management, EU policy and EU funding, climate change, energy efficiency) which can be used and transfer further in their professional careers. These actors were educated in the strong international network in interdisciplinary and knowledgeable professionals

with a deep commitment to developing and improving their interdisciplinary skills. In order to be more flexible, in tune with the needs of the target groups, and regarding their professional and private time and activities, through our project, the project promote access and learning through open and innovative practices in digital era, Open Educational Resources (OER) and will support e-based trainings, as well as ICT-based assessment practices in VET education, by creating e-learning platform (figg. 2-4).

All courses from the "CULTHER" program were taught using contemporary training methods, such as problem-based learning, game-based learning, case study method, etc. The program used a blended learning concept – a combination of traditional and e-learning concepts. The excellent quality of the training, learning and examining methods, utilizing the possibility of building simulation methods, significantly contributed to high quality learning opportunities. The professional courses for preservation and preventive conservation were tailored to individual museum learners, using innovative ways of outreach and delivery (praxis, on-line courses, in classroom training and peer learning opportunities between participants and trainers from different countries).

Development and implementation of this project is sustainable investment for the future, because it was highly effective program developed according to the needs and trends. On the other hand, conservation courses are missing in North Macedonia[10]. Practical skills and useful knowledge relevant to the trends in the conservation and environment, transferable skills and abilities to restore problems, have professional ethics are much needed nowadays[11].

Within the project, different results were achieved. Analyses on the needs and challenges of conservators were made, where over 200 professionals in the field of conservation took part in the survey. A Review of the courses and training programmes in the field of conservation and prevention of the built cultural heritage was made, where more than 1000 different courses and trainings in the field in Europe were analysed. Also, report on trends in Europe in conservation standards and technology was made. For the aim of the courses, a unique curriculum, learning materials and ICT learning environment in Sustainable preservation and preventive conservation, was created. At the end the results were evaluated and monitored by the four partner organizations[12].

Analyses of the needs and challenges of conservators, architects and engineers. This activity served for further development of the curriculum for the courses. Therefore, we assess the current situation regarding the needs and challenges and competences. The activities were producing of assessment questionnaire, creating inter- active resource for online survey, analysing of results and creating report on the survey analyses. Underlying the propose of the distributed questionnaire is the question of how can conservators, architects and engineers be trained to satisfy tomorrow's requirements. The aim of these analyses is to answer the questions about the needs of conservators, architects and engineers and propose a list of skills that can be put forward as those skills required by the employers[13].

Review of the courses and training programs in conservation and prevention of built cultural heritage in Europe was developed. Therefore, was made comparative analyses and state of art on current 229 European courses. The courses were analysed regarding the content and structure, duration, module description, teaching methods and quality standards; programs in conservation and prevention of built cultural heritage in Europe was developed. Therefore, desk research on good conservation and preservation practices as well as on sustainability courses was made. At the end comparative analyses were made and benchmarking report was created[14].

Also Report on trends in conservation industry (standards, technology, and innovation) was developed. Trends and standards for the conservation and preservation were reviewed. The conservation standards were analysed and compared, and they served as providing guidelines and framework for the curriculum. At the end comparative analyses were made and benchmarking report was created[15].

The curriculum was developed, by defying of learning outcomes, development of content and structure of the courses. Specific courses in the program were developed, by creating syllabus for each course and implementing the courses. The courses were certificated on national level. Learning materials were developed for each course. Creating content (lectures, case studies, tools, learning methods) of the courses for conservation was the main activity[16].

Developing ICT learning environment for the courses was composed of defining learning materials for the learning environment, creating e-learning platform, testing the platform, creating learning environment for each subject. Defining e-course, developing e-courses, creating guide book for using the e-learning platform (instructions, guidelines) and monitoring the ICT environment was also part of this activity[17].

Practicum with best practice examples, case studies, tools which

[10] In order to receive an answer whether conservation courses are missing in North Macedonia, questionnaire was made in 2019. 97 % of the respondents, answered that there is need of courses for conservation and sustainable cultural heritage.

[11] In order to receive an answer whether practical skills and useful knowledge relevant to the trends in the conservation and environment is needed, questionnaire was made in 2019. The five most important topics of the training courses that the conservators would like to participate to are: conservation materials, technology and decay; survey, preliminary studies and investigations in built cultural heritage; risk analysis, sustainable development and cultural heritage and preservation principles, theories and standards.

[12] See more in *Booklet* 2020.

[13] *Handbook* 2020, pp. 12-28.

[14] *Ivi*, pp. 29-32.

[15] *Ivi*, pp. 33-35.

[16] *Ivi*, pp. 36-47.

[17] See more on http://mls4en.iege.edu.mk/moodle/.

were used from VET learners was created. Also, Handbook used to promote the Professional courses for preservation and conservation from climate change influences of the built cultural heritage to perspective participants and to other relevant stakeholders was made[18]. The Quality Assurance Manual was developed in order to ensure the quality process and project activities. Within the QA Plan several materials were created: quality plan, guide for quality assurance plan. First the content of the QA Plan was defined, then the Manual was created, and the same was published on the web portal of IECE[19].

The Booklet was promoted on the Final event, that was used for future promotion and recruitment of new participants within the courses[20]. Exploitation plan for ensuring sustainability of the professional courses was also developed. The Exploitation Plan give vision on how the courses will continue to function after the end of the project. In the Plan the options for sustainable use of the project results were discussed, also how the professional courses will continue to function[21].

The project CULTHER ensure high quality learning opportunities to VET education and provide effective strategies for enhancing transferable skills of museum learners and cultural professionals[22]. The final effects from the project were to develop new innovative educational program for preservation and conservation from climate change influences of the built cultural heritage, tailored and implemented to the needs and expectations of conservators, architects and engineers. The project created quality of higher advanced education with interdisciplinary skills, combining high level of excellence and attractiveness and expanded conservation knowledge and performance through improvement of competencies in the field of sustainable cultural heritage. The final result was to develop innovative techniques for preservation and conservation of built cultural heritage and to develop innovative solutions for competitive sustainable cultural heritage.

At the end the project raised awareness for the conservation and the state of built cultural heritage in all four EU countries, included in the project. The project served as a baseline for further activities within the field of sustainable conservation of built cultural heritage. Also, the project served as a best-practice project and was designated as unique in its field and activities in the region from the EU.

[18] See more in *Booklet* 2020.
[19] See more on http://www. iege.edu.mk/international/projects.
[20] See more in *Booklet* 2020.
[21] See more on https://www. iece.edu.mk/international/projects.
[22] *Handbook* 2020, pp. 3-4.

The project "Development of professional courses for preservation and preventive conservation of the built cultural heritage from the climate change influences" claims the increasing relevance of interdisciplinary skills in a conservation profession and that the future of the museum profession is bright, if they include interdisciplinary skills, as well.

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COMMUNICATING CONSERVATION AND RESTORATION PRACTICE:
TOWARDS A HOLISTIC APPROACH

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INTRODUCTION

«To help a painting deal with the passing of time without losing its expressive and documentary capacity, there is a specific professional, the restorer.
The restorer cannot restore a work to its "ancient splendor" but must help it to maintain a good state of health, so as to deliver its message to the future as well».
[Information panel at the Pinacoteca di Brera]

«The conservator has a particular responsibility in that care is given to irreplaceable originals, which are often unique and of great artistic, religious, historic, scientific, cultural, social or economic value».
[Information panel at the V&A Museum]

The ones cited above are two definitions of restorer that appeared on information panels within the exhibition itineraries of the Pinacoteca di Brera and the Victoria and Albert Museum. These definitions are certainly fascinating and able to highlight, in a few lines and with simple language, the great cultural and social significance of the restorer profession. But why, in two of the most important art museums in Europe, has there been a need to explain to visitors what are the prerogatives and skills of this professional figure?
In fact, within the museum environments it seems that the problems relating to the conservation and restoration of the works of the collections are taken into little account, and this is probably due to some restorers' tendency to share very little of their profession and expertise[1].
Starting from these points, but also considering an increasingly digitized social context, this contribution intends to highlight how the professional figure of the restorer now needs to open up to other professional areas and skills, to implement communication strategies to the public of conservative and restorative processes, online and onsite.
The following paragraphs will therefore analyse the current scenario in which museums and cultural institutions operate to develop communication strategies concerning the theme of heritage conservation and restoration; later, the proposal for a transmedial and holistic communication strategy is examined together with the proposal of a standardized and scalable workflow.

HOW CONSERVATION AND RESTORATION IN MUSEUMS ARE COMMUNICATED: THE STATE OF THE ART

Why is it necessary for the communication of cultural heritage also to include the phases of conservation and restoration of the works?
To answer, we have to cite some documents, including the Faro Convention (signed in 2005 but ratified by Italy only in 2013) and the related Action Plan of the Council of Europe, which recognizes the right to the cultural heritage of every citizen, understood as «the right to participate in cultural life, as defined in the Universal Declaration of Human Rights» and with the aim of «human development and quality of life»[2]. Other international documents that ratify the Faro Convention and that take into account the recent digital developments of our society are the ICOMOS Charter for the Interpretation and Presentation of Cultural Heritage Sites[3] and the London Charter for the digital visualization of Cultural Heritage[4].
We can deduce two main considerations from these documents:

[1] Jones 2002.
[2] *Convention on the Value of Cultural Heritage for Society*, Faro, 2005.
[3] ICOMOS Charter for the interpretation and presentation of cultural heritage sites, Quebec, 2008.
[4] London Charter for the digital visualization of cultural heritage, 2008.

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firstly, the communication of the conservation processes of cultural heritage should always be understood as a moral imperative, to implement in any case, albeit with different methods, purposes, audiences and results. A Cultural Property is an expression and synthesis of the material and immaterial knowledge of a community, and therefore any conservative or restorative intervention that is carried out there must be public. Secondly, the digital technologies we have at our disposal can be a highly effective tool for increasing public involvement and participatory processes to recognize the cultural value of objects and implement conservation processes.

Turning the focus to the current situation, the pandemic context has highlighted even more how important the online presence of cultural institutions is. In this context, it is clear that even a conservation project or a restoration intervention should be communicated to the public, and in fact, in recent years many museums and cultural institutions have moved in this direction, sometimes creating illustrious examples of communication for restoration: two emblematic cases are analysed below[5].

Starting in 2019, the Rijksmuseum in Amsterdam has embarked on a colossal research and restoration project of Rembrandt's "Night Watch", named "Operation Night Watch". Since the painting represents a flagship work of the collection it was necessary to avoid its prolonged absence from the museum: it was therefore decided to carry out the intervention "on sight" in the room where the painting is exhibited. This way, visitors can continue to admire the work and are informed of the progress of the work with constantly updated information material.

In addition, a digital communication project was created concerning both the preliminary research and diagnostic phase of the painting and the actual restoration phase, through the "Experience the Nightwatch" content access portal and the institution's social channels that offer narrative and immersive experiences. In the words of Director General Taco Dibs, in fact, «Everyone in the world, no matter where you are, can watch the research and restoration because the Night Watch belongs to all of us»[6].

In the Italian context, however, we consider it relevant to mention the work of the Pinacoteca di Brera, which since 2001 has had a transparent restoration laboratory included in the exhibition itinerary, equipped from 2018 with large monitors and information panels to illustrate the restoration work to the visitors. In this case, this onsite communication activity is accompanied by an intense, although less immersive, online activity: the site of the Pinacoteca and the Instagram page are equipped with a special section that illustrates with high-quality images the completed and ongoing restorations, highlighting the diagnostic phases, techniques and purposes, sometimes also using podcasts and videos for interviews with the restorers. Furthermore, in 2017 the restorer of the Pinacoteca Sara Scatragli, in collaboration with the educational services inside the museum, wrote and illustrated a children's book entitled "Restorers. The doctors of paintings", inspired by the restoration of Umberto Boccioni's "Self-portrait": this is a first and fruitful attempt to make a conservative and restorative process usable for children and families[7].

What emerges from this partial examination is that it is not the mere staging of the restoration intervention inside the museum halls that is effective – the so-called "Restoration on sight" format, on which various experiences and opinions coexist – but the creation of an organic and structured communication project, which can include an on-site restoration, but which does not end with it, and indeed finds fruitful communication methods for different audiences in the use of other channels.

TOWARDS A TRANSMEDIAL AND EXTENDED APPROACH: PROPOSAL OF A WORKFLOW

Therefore, in addition to the "restoration on sight" format, it would be necessary to achieve real transmedia and extended communication strategies for conservation and restoration. These strategies can include the implementation of online communication campaigns, on dedicated websites but also using the main social networks; in addition to this, it would also be desirable that the Restoration Schools on the Italian territory and the other cultural institutions that have internal laboratories begin to open these places to the public to develop guided tours and onsite (but dialoguing with those online!) communication strategies[8].

It seems obvious that at the base of such an imposing communication machine there must be a well-organized (and digitized!) system of documentation of all the work phases: it is precisely for this reason that the figure of the restorer must be personally involved in all the processes listed above, but at the same time he needs to open up to new expertise and collaboration with various professionals related to the world of communication, but also of information architecture and

[5] Osservatori Innovazione Digitale, 2020.
[6] www.rijksmuseum.nl/en/nightwatch
[7] pinacotecabrera.org
[8] Chiapparini, Pracchi 2013; Williams 2013.
[9] Mandelli 2011.

fig. 1

1. An infographic describing the four main steps to design a holistic communication strategy for conservation and restoration.

data design[9]. In addition, an extended communication strategy should be developed on different channels (official website of the institution, social channels, ...) and always be configured as an open, adaptable and scalable project.

It seems useful to propose here a standardized workflow that can give an idea of the essential work phases to communicate conservation and restoration in the most holistic way possible (fig. 1):

- The first step consists of the documentation of all the research and intervention phases of restoration work. It is desirable that the documentation phase be digital and organized according to an open logic, functional to the subsequent phases of creating the communicative output[10];
- The second step concerns the translation phase of the scientific language produced in the first phase in a simple and understandable language for the public, using storytelling strategies;
- The third step consists of the design and creation of one or more outputs for the dissemination content created in the previous phase, always mixing digital and physical. Possible examples are public events, dedicated websites, pages on social networks, contests to stimulate actions from the public, interviews with professionals, documentaries, ...;
- Finally, step four consists of the design of self-assessment methods to evaluate the impact that the communication project has had in terms of awareness and social sensitivity concerning conservation and restoration of cultural heritage.

[10] Gasparetto, Devecchi 2020.

[11] Gustafsson 2019.

CONCLUSIONS

This contribution, albeit partial, wanted to demonstrate how, in the "digital era" in which we find ourselves today, the online presence of cultural institutions is increasingly essential, to communicate heritage remotely and fulfil the functions of service for society expressed in the Faro Convention. In addition to museums, the time is ripe for the organizations that deal with Restoration and Conservation to communicate to the public. In addition, as already stated, it will also be necessary to develop standardized evaluation methods to measure the impact that the conservation and restoration campaigns of our heritage have on the cultural identity of a society. Only in this way, by communicating what we do and demonstrating the enormous social value that our beautiful profession possesses, will we be able to make the work of the restorer truly recognized at all levels of the community and a driving force for the development of the territory[11] (fig. 1).

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SESSION 4

HISTORY OF CONSERVATION

Stefania De Blasi
Maria Beatrice Failla

FROM PAST TO NEW

It is very important have a session dedicated to the history of restoration because, increasingly, the history of restoration is positioned as the common basis for planning the future of conservation. The true challenge is building a world-wide network dealing with shared knowledge and methodologies and create a new platform to study the actions of restorers who came before us but also to build our legacy for the restorers of the future. This is precisely what we are doing today.
During the orientation weeks of this new edition of YPF we have an intense work of our community that has grown over the course of this year.
On those occasions we gave some tips and hints and we were glad to know that all participants treasured them as the ambassadors suggested.
It makes us very happy and proud to see such a great number of participants for fourth session coming from many countries from all around Europe, Asia and Africa. So, it is a great honour to us to be able to witness about more than 20 cases of studies submitted by young talented professionals during the call for papers.
We have very interesting case studies and each one has a unique point of view with critical thoughts about the discipline.
For example, we're lucky enough to have a paper coming from India.
This paper deals with the critical reception, the critical fortune of the western studies about the *Theory of conservation*, originally written by Cesare Brandi in Rome in 1963, translated into English a long time ago, and nowadays read under a new awareness into the Indian cultural heritage context.
Straight from Austria we have another interesting case study, dealing with scagliola interiors decorations. Normally, scagliola studies are mostly about decorations dealing with Italian religious buildings and so, of course, the majority of them are Italian and they focus above all on technical and material aspects. This case study is very interesting especially because it leads to a new

conception that allows us to have a wider view for what concerns the branches of studies in maintenance and restoration in residence-museums.

One more abstract that we selected is about the history of protection of heritage in Spain during the 19th century and the role of the S. Fernando Royal Academy of fine arts as an institute of guardianship. This is crucial as it highlights the origin of the rising global awareness about the safeguard of cultural heritage in Europe.
Another interesting paper we selected dealing with the history of conservation of drawings through the analysis of historical passpartout of the collection of the castle in Kroměříž. Analyzing the passpartout gives us the chance to assess a lot of information about history, origin, conservation and movements during the history of the drawings and, in this case, in a historic residence.
We would like to let all of you know how difficult this year it was for us to choose among all of the interesting case studies we have received.
We've chosen two different papers coming from Italy among a lot of abstracts because they present two different critical lines of thought.
On one side we have a deep analysis of a specific case study involving a current restoration presented by a young restorer.
And on the other hand, we have a young art historian who traced back the history of cultural conservation in Turin to the period between the two world wars and she analyzed and put together several different aspects from the 20s and the 30s.
We think the talks in this session gave us so many insights into different methodologies, different materials, different approaches to documenting the past. We think we got a glimpse of where the restoration of the future will go and we are really grateful for that and proud to introduce now this part of proceedings.

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MAKING FUTURE FOR THE PAST:
CONVERSATION OF HISTORY OF CONSERVATION, AN INDIAN PERSPECTIVE

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INDIA BEFORE THE BRITISH

Conservation of Heritage in India before the British
Conservation of heritage before British was never an approach to protect. India has a tradition for caring and maintaining historic buildings, and many ancient techniques and details are documented in '*Mansara*'[1].
The issues or risks faced by heritage then also were similar to the risks faced by heritage even today. These include the risks due to natural calamities and conflicts. Earlier the monuments or structures were owned by the Maharajas, or the rulers of that region used to take care of them. But these were maintained and not conserved.
Whenever any structure of any ruler's kingdom was attacked, or destroyed due to wars or natural calamities, they have been built again, not keeping in mind the theories of conservation, but with vision of the kingdom's ruler.

Conservation of Qutub Minar in Mehruli, New Delhi post disaster
The Qutub *Minar* was built by the first ruler of the Delhi

[1] Menon, Piplani 2004, p. 1.

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WINNER OF THE YPF 2021 EDITION

Sultannate in 1192 by Qutb-ud-din Aibak. The mosque present in the Qutub *Minar* complex is one of the earliest mosques that survive in the Indian subcontinent. It was constructed as a sign of victory and establishment of Muslim rule in Delhi Sultanate. It is also one of the first works of Indo-Islamic architecture and design.

In 1368, first recorded lightning had struck the Qutub *Minar* damaging the top storey of the *Minar*. Sultan Firoz Shah Tughluq, the ruler then, had replaced the fallen storey and added two storeys and crowned it with a cupola. The Sultan also introduced white marble to the red and buff sandstone. In 1503, Sikandar Lodi the ruler of the Delhi Sultanate then, also had carried out few repairs, but nature and extent of damage is not known. In the 1803, the next damage happened due an earthquake and it caused significant damages along with destroying of the Firoz Shah's cupola permanently. This time it was British to conduct the repair works. The British Governor-General of India, Lord Wellesley gave the authority to Major Robert Smith to carry out the necessary repairs. Major Smith was also the builder to the St. James Church in Delhi, hence with very little knowledge about conservation. Major Smith, according to the brief given to him had to re-create the Indo-Islamic cupola, which he replaced with the Bengali style *chatthri*. This had to be latter in 1848 removed and was placed in the Complex. This is known as Smith's Folly even today[2]. Due the lack of understanding on the philosophy of conservation or awareness and knowledge, the restoration efforts done on the Qutub *Minar* were as per the ruler's vision and many times an attempt to leave their mark in history. The Qutub *Minar* complex was added to list of UNESCO's World Heritage Site in 1993, and the conservation efforts are more focussed to protect the Outstanding Universal Values of the site (fig. 1).

Building and Rebuilding the Somnath Temple, Saurashtra, Gujarat: heritage in conflict

The sea shore – Somnath Temple at Gujrat, India, is one of the most important temples in the Hindu religion. This temple was destroyed for more than seven times, and every time it was the destroyed, it was rebuilt. The temple was original built in the seventh century. The temple being a Hindu Temple, it was destructed and looted by the rulers of other religion especially Muslim rulers, who invaded this territory. Every time the temple was rebuilt there was use of different materials likes red sandstone (and embedded with jewels and gold) when it

[2] Datta 2015, pp. 1, 3.

1. Kishnadwala, Sneha, 2017. The Qutub Minar Complex, New Delhi [Unpublished].

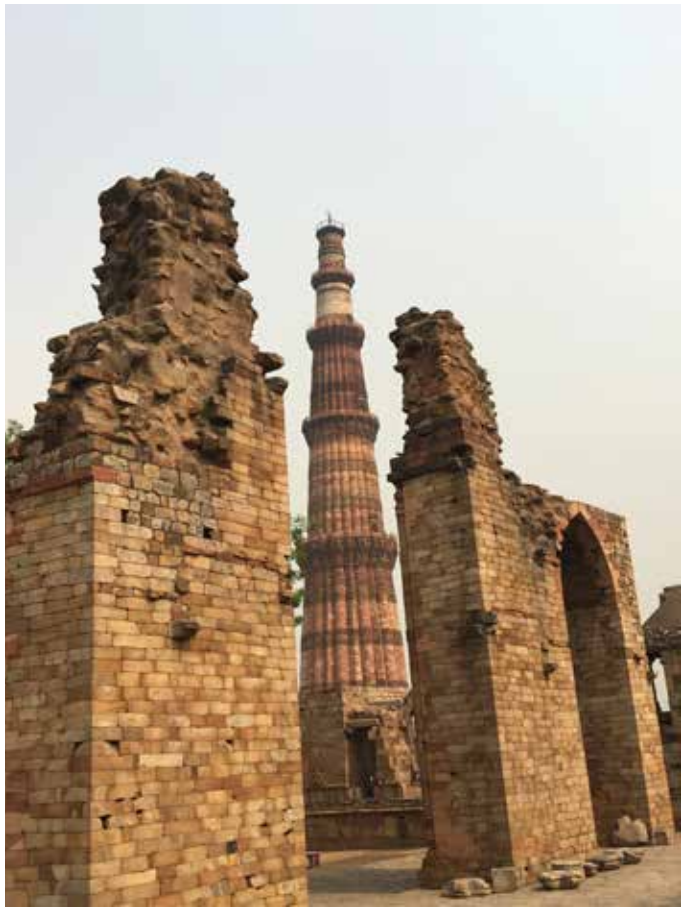

fig. 1

was reconstructed third time, after destruction, the sandstone was replaced with a wooden structure. The last destruction happened was in 1706. After which the temple stands today as it is.

The philosophy behind the rebuilding of this temple (trans. Jīva nō dhāraṇa) was the local community's faith in the shrine and the temple. The masons of this temple are called *Sompuras*, who have inherited the ancestral knowledge, and hence the style of architecture resembled the previous ones. They were able to rebuild the temple as it was with additions which the local rulers asked them. Also, the temple followed a typical style of (i.e. Chalukyan Style of Architecture), therefore the interventions got limited.

Such kind building and rebuilding can be compared with the '*spoilas*' in Rome. In '*spoilas*' there was making of new from the old, but here it is the making of old every time it was destroyed.

2. Kishnadwala, Sneha, 2016. Interior of Cruz dos Milagres Church, Goa [Unpublished].

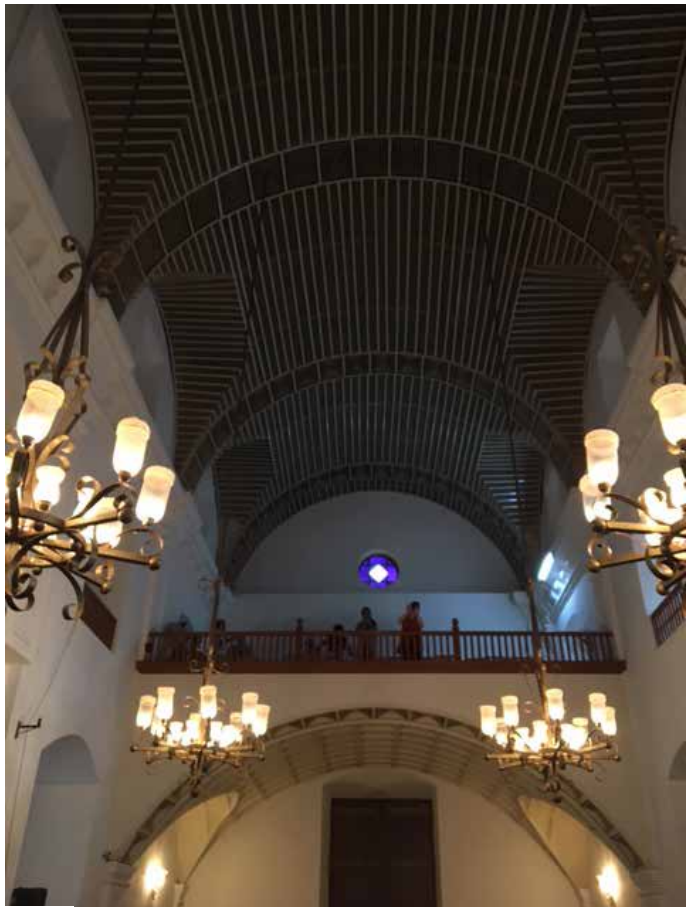

fig. 2

FORMATION OF ARCHAEOLOGICAL SURVEY OF INDIA

The concept of conservation and preservation was introduced to India by the West, beginning with the formation of the Archaeological Survey of India (ASI) in 1861. Alexander Cunningham was a British who excavated and discovered the Harappa Civilization. He being a visionary saw the need for documenting and protecting the vast number of archaeological sites in the subcontinent.
In 1904, the Ancient Monuments Preservation Act was passed to empower the ASI to protect monuments and sites which were of national importance. With this Sir John Marshall became the first Director General and was a part of the organisation for 24 years. During this time Marshall encouraged a professional culture to preserve the monuments of India as found.
Along with this he also compiled the Manual for Conservation

3. Kishnadwala, Sneha, 2015. Lodhi Gardens, New Delhi [Unpublished].

fig. 3

to guide the archaeologists to preserve the monuments in the subcontinent[3].

Heritage Legislations and Regulations in India under ASI
After Independence, the Ancient Monuments Preservation Act of 1904 was replaced with in 1958, with The Ancient Monuments and Archaeological Sites and Remains Act. Under this Act, the protection of monuments and sites of national importance was extended. Along with this similar Acts were adopted by different States to protect monuments of State importance[4].
There were others Acts passed, the Antiquities and Art Treasures Act in 1972 and the Public Records Act in 1993. With time and need for the change in approach to have heritage led development, the Acts of 1958 was amended in 2010. This came to be known as The Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010. Under this Act, development was not seen as rigid to protect a structure, for the same heritage byelaws for every protected site was needed to be formed. Along, with this for any development or infrastructural project to take place within 300 metres radius needed to conduct a heritage impact assessment.
Post-independence the regulations formed were to protect sites of national and state importance mainly to protect them from encroachment, smuggling and fraudulent dealings. But, by 2010 there was a need to find a balance between development and protect monuments and sites. However, there are still many gaps yet to be addressed in the heritage laws and regulations of the sub-continent.

[3] Menon, Piplani 2004, p. 3.
[4] *Ibidem.*

fig. 4

4. Vaidya, Amruta, 2020, Sunder Nursery, New Delhi [Unpublished].

CONTRASTING SCENARIOS OF PROTECTED AND "UNPROTECTED"

The heritage regulations and Acts protect the architectural heritage and consist only of exemplary buildings, which were of national and state importance. Only these were under the protection and responsibility of the Indian government. However, considering the history of the sub-continent only 3,678 monuments and sites are protected under ASI and rest all sites was unprotected. There was also no mention of protecting or safeguarding the intangible cultural heritage, traditional knowledges systems and so on.
This contrasting scenario where on one side there are regulations formed to protect the sites and monuments, but on the other hand there are uncountable sites of importance which were left unprotected.

FORMATION OF INDIAN NATIONAL TRUST FOR ARTS AND CULTURAL HERITAGE (INTACH)

Between ASI and State Departments of Archaeology (SDA) there were less than 10,000 monuments protected. Also, there was a very limited number of experts outside the Government who could conserve the unprotected heritage, resulting in leaving out thousands of monuments, indigenous building traditions and conservation practises unidentified and unprotected. The Indian National Trust for the Arts and Cultural Heritage (INTACH) was founded with the aim of protecting the unprotected heritage in India, i.e. the sites which were not protected by ASI and SDA.
INTACH established Chapters in various cities of the country to spread awareness about the need to conserve the unprotected heritage, which focussed on the significant structures of their local culture and heritage.
They undertook many activities to achieve their mission and commitment to conservation. They began documenting the unprotected architectural heritage, resulting in the articulation of an ideology of conservation different from that was being followed by ASI and SDA[5].

INTACH UK Trust

Under one of their initiative, the INTACH UK Trust was established in 1987, a registered charity in the United Kingdom funded by the Charles Wallace bequest. Soon they realized the need of professionals who needed to have good knowledge of protecting heritage. They initiated a programme to train conservation professionals through scholarships offered by the Charles Wallace Trust[6].
These professionals came back to India to contribute to the field of conservation in India and the application of the West principals began in India. On one hand the Theories of Conservation from the West emphasised on minimum interventions and irreversibility, it was realised that India had an advantage of craftsmanship that were able to replicate each wall to a minor engraving.

APPLICATION OF THEORIES OF CONSERVATION FROM THE WEST IN INDIAN CONTEXT

The application of Caesar Brandi's Theory of Restoration (1963) and the Venice Charter, 1964 were adopted and maybe applied unknowingly in India. These case studies are from across the sub-continent showcasing how professionals helped in evolving the history of conservation in India by protecting the past for the future.

Brandi's Theory of Restoration (1963), examples for and against.
Brandi in his theory mentioned that "Restoration is the methodological moment in which the work of art is appreciated

[5] Menon, Piplani 2004, p. 4.
[6] *Ibidem.*

in its material form and in its historical and authentic duality, with a view to transmitting it to the future." For Brandi only the material was important, which was to be replaced to restore the structure. He aimed at "re-establishing the potential unity of the work of art, as long as this is possible without producing an artistic or historical forgery and without erasing every trace if the passage of time left on the work of art"[7].

There are many examples which he applied in his paintings, where he restored the paintings with a minimum intervention. He termed this intervention as Lacunae's. 'Lacunae' word means an unfilled empty space. Its application means the use of lines following in similar direction or angle as the paintings. This helps to read the painting as one at the same time allows differentiating between the new intervention and the old.

All theories may not be applicable in all situations, like for example the Ajanta Caves. The Ajanta caves in India, a World Heritage Site have a collection of Buddhist frescos drawn on the walls and ceilings of the caves. Due to weather change and water leakages from the mountains these frescos are being damaged in the course of time. The frescos being 'dry frescos', i.e. they are painted on the plaster that was dried, and therefore they are very delicate which peel off even when touched by hand. In such case, the Brandi's lacunae would not be wise decision to restore these paintings. At present these frescos are been in preserved, to protect the existing. Brandi's concept of Lacunae is also applied in many architectural projects, mentioned below.

Chanwar Palkhiwalon ki Haveli and Anokhi Museum

This was project executed by Ahmedabad (India) based firm Abhikram, had won an award of UNESCO Asia-Pacific Heritage Conservation Award in the year 2000 for setting new standards of conservation in India. When architects Nimish Patel and Parul Zaveri started this project in 1990, the Haveli was almost in ruins. The haveli was a stone structure with lime plaster in a mix of Rajput and Mughal architectural styles, which had ornate balconies and intricate ornate balconies. The Jaipur Chapter of INTACH planned to restore and convert this Haveli as School. But, the clients, the owner of the Anokhi Textiles decided to use the Haveli as a Museum for the display of their textiles[8].

The load bearing walls of this building were weak enough to take the load of the roof, therefore instead of reconstructing or adding extra supports to the wall the architects decided to intervene with a modern intervention, by using a tensile stencil roof maintaining the original structure of the building. The building was originally lime plastered; hence the same technique was used in the conservation process done by the local craftsmen of that region. The architects were very clear that the building shall be not only be conserved by using traditional methods but also by the local artisans and craftsmen, who knew these methods through generations. The refined lime plaster used for wall finish, locally known as '*araish*' was re-introduced. The project dint only brings the Haveli back to its original grandeur but also, encouraged the use of traditional skills and provided employment[9].

Award Citation for the project: "the rehabilitation of the *Chanwar Palkhiwalon-ki-Haveli* ruins demonstrates that even severely detreated historic structures can be saved, restored to near their original condition and given a prolonged life in an eventually practical way. Utilizing local artisans and materials resulted in economic revitalization among participants, with several eventually establishing their own construction firms specializing in historic rehabilitation. The high visibility project became a catalyst for master plan conservation of the 800-year-old historic town of Amber"[10].

In this project, the architects unknowingly adopted the Brandi's Theory of Restoration. They were conscience about not damaging the significance of the haveli. It can be argued that they intervened by reconstructing and making it as new, but this was possible because of the availability of knowledge and craftsmanship.

Conserving the Cruz dos Milagres Church, Goa

A similar approach can be seen in the *Cruz dos Milagres* Church in Goa. The architect Tulio De Souza wanted to preserve and enhance the historical fabric of this church. There was a need of an additional block, which he strategically located not disturbing the old layout but designed it as continuity[11].

In the restoration work, De Souza (2012) primarily used laterite stones which were available as part of the ruins and procured few additional stones. These were laid in mud mortar and plastering was done in a lime as the original structure was built. The ceiling for nave of the church was where Brandi's theory of conservation was applied. Here, instead replicating the entire vaulted false ceiling, De Souza took the decision to change the material. He used timber frames to design the vaulted false ceiling.

De Souza (2012), was the principal architect for this project but Archbishop Filipe Neri Ferrao was leading the project. The Archbishop seems to be have taken inspiration from the Church

[7] Brandi 1963, p. 12.
[8] Abhikram 2000, p. 1.
[9] Abhikram 2000, p. 3.
[10] Abhikram 2000, p. 4.
[11] De Souza 2012, p. 1.

of Oratorio di S. Filippo a Neri at Bologna, where Brandi's theory of restoration was also applied (fig. 2).

The Venice Charter, 1964

The Venice Charter's basic aim is to safeguard the past for the future generations to recognise and to hand the past with its full richness for their authenticity. The Charter is stated in sixteen Articles, with sections on definitions of a monument, conservation methods, and restoration methods, how to handle historic sites, excavations and the publication of these[12].
The Venice Charter is also applied in many architectural projects; two of them are mentioned here.

Conservation of Chota Batashewala Tomb, New Delhi

Chota Batashewala Tomb is situated within the *Batashewala* Tomb Complex, which is near the Hamuyun's Tomb Complex. The conservation of this tomb was addressed during the Conservation of Hamuyun's Tomb, where this tomb was nothing but ruins.
The tender report prepared for conservation of these buildings, included just cleaning of the *Chota Batashewala* Tomb. But, the Aga Kahn Trust for Culture, decided to explore the archival data for the tomb. From the archival data, they were able to find an image of the tomb, which was in ruins as seen in figure 13, but this helped them to understand the proportions of the tomb and to complete one portion of the façade, this would help to understand the original scale and profile of the tomb. With the help of architectural 3D models, they tried to understand the structural detail of the tomb[13].
The interesting part of this project is that the architects decided to restore the tomb to a stage where the evidences were found, believing that in case in future they were able to find more evidences for the tomb, they would be able to complete it.

Khan-i-Khanna tomb, New Delhi

The conservation of the Khan-i-Khanna tomb was under the *Nizamuddin* Urban Renewal initiative by Aga Khan Trust for Culture. The initiative was to be a pioneer to return the craft-based approach to conservation in India. In the documentation and archival research, it was found that the marble and red sandstone was stripped off from this tomb and was used in the construction of the *Safdarjung's* Tomb[14].
In order, to show the continuity and give a vision of what the Tomb would have looked before the marble and red sandstone was stripped AKTC re-cladded part of the tomb.

[12] Venice Charter 1964, pp. 1-4.
[13] Nizamuddinrenewal.org. 2015, pp. 4-6.
[14] Nizamuddinrenewal.org., 2018, p. 14.

Application of the Venice Charter 1964

Both projects mentioned has justified the Articles 3, 6 and 9 in the Venice Charter, 1964, which says:
Article 3: "The intention in conserving and restoring monuments is to safeguard them no less as works of art than as historical evidence"[15].
Article 6: "The conservation of a monument implies preserving a setting which is not out of scale. Wherever the traditional setting exists, it must be kept. No new construction, demolition or modification which would alter the relations of mass and colour must be allowed"[16].
Article 9: "Its aim is to preserve and reveal the aesthetic and historic value of the monument and is based on respect for original material and authentic documents"[17].

NEED FOR A CHARTER FOR INDIA

With the growing need of development, especially in a developing country such as India, professionals also felt the need to have a Charter particularly for India which can look into several of aspects, such as, traditional knowledge systems, cultural landscapes, intangible heritage, and craftsmanship along with their management. And therefore, a Charter was formed in 2004, known as the 'INTACH's Charter for Conservation of Unprotected Architectural Heritage and Sites in India'.
By 2004 INTACH had accomplished a lot, but more was yet to be achieved. Now, the problem was not only lack of resources, but a lack of knowledge of ground realities, cultural and material, to better utilise what was available. There was a need for a document which could coordinate both heritage conservation in India and the knowledge of traditional techniques and craftsmanship. It was realised that INTACH needed to collate and structure its experience and expertise to effective knowledge to guide future activities in heritage conservation[18].
In 2002, INTACH had conducted a workshop to formulate a National Policy for Heritage Conservation and Management, where the need for India Charter was identified. The structure for a Charter was examined by a steering group of exerts and in-house staff. After, several meetings, seminars and workshops, the recommendation were made the focus of a workshop, INTACH Aus- Heritage workshop, during March 24 – 27 at New Delhi. In the concluding session, a draft structure of the proposed Indian Charter was outlined, and it was to

[15] Venice Charter 1964, pp. 1-4.
[16] *Ibidem.*
[17] *Ibidem.*
[18] Menon, Piplani 2004, p. 4.

be developed for a presentation at the INTACH National Convention in November 2004[19].
The initial Charter was drafted by Professor A.G.K. Menon and assisted by Navin Piplani. They evaluated projects from last two decades that were undertaken by INTACH and all significant international charters to define characteristic elements for Indian Charter and to establish a specific focus. The draft was prepared, shared and posted on the Web for views from cross-section of experts. Based on the comments received, the revised draft of the Charter was presented at the INTACH National Convention on 2 November 2004. At the convention, experts from Sri Lanka, Malaysia, and Thailand responded to the Charter. Based on the inputs from the experts, the final draft was prepared and presented at the Plenary Session on November 4, 2004 where it was duly adopted[20].
The INTACH Charter was prepared and attempted to broaden the legal definitions heritage and to include the diverse strands of conservation ideology that was existing in India. It also has taken into consideration the complex ground realities of socio-cultural and economics that could be included in conservation practices. The primary aim of the Charter is to guide those working with INTACH, hence relates to only to unprotected monuments, historic sites, and other aspects of the tangible and intangible heritage. It can also be adopted by individuals and entities, who share similar concerns and are seeking a coordinated action to conserve the architectural heritage of India[21].

HERITAGE CONSERVATION TODAY IN INDIA

Revitalization

Revitalization is bringing the site back to life, by making the heritage site more suitable for the end users. This not only increases the value of the heritage but also improvises neighbourhoods and provides a socio-economic stimulus. For example, the Lodhi Gardens and Sunder Nursery in New Delhi.

Lodhi Gardens

These are group of tombs constructed in the period of Lodhi dynasty, which are in the middle of the city Delhi. These tombs today are situated within a landscaped garden in the city. In this manner a garden is introduced within the City Center, at the same time the monuments are protected and feeds into the well-being of the visitor's life (fig. 3).

[19] *Ivi*, p. 6.
[20] *Ivi*, p. 5.
[21] *Ibidem.*

Sunder Nursery

Similar, is the case with Sunder Nursery. Here, to the monuments are conserved and space s are revived to merge with the landscape. Today, the sunder nursey has become one of the most visited picnic spots in the city, surrounded by World Heritage Site: Humayun's Tomb (fig. 4).

Leveraging heritage with economic development

Craftsmanship

We are aware about the importance of knowledge of the local materials and the methods used for construction during that time. There is no better way by allowing the local craftsman to be a part of the project. This not only provides employment to locals but also encourages them to use the traditional methods of construction and the artisans to pass their legacy to the next generation.
This was seen in the example mentioned above, the *Chanwar Palkhiwalon-ki-Haveli*, where the local method of lime plastering '*aarish*' by local craftsmen was used.

Adaptive Reuse

Adaptive reuse is a common method, where the structure is conserved to make it functional for other use. There are many debates done for the same. It's generally concluded in such cases that if a structure is used, it is maintained more than not using it.
For example, in India most of the forts and palaces are put into adaptive reuse for making Heritage Hotels. These Hotels provide ambience of the living in a palace (which also has the modern facilities) at a cost, which the end users are ready to pay.

Heritage led development

Heritage led development is a new concept that is developing in India amongst few conservationists. The aim of this concept is to see development and heritage conservation together, and not be rigid to only develop or to only conserve. There are many projects such as Conservation of Flora Fountain as Urban Landscape in Mumbai and the *Muzaris* Heritage Conservation Project in Kerela. There is also an attempts to meet the Sustainable Development Goals and schemes such as Heritage City Development and Augmentation *Yojana* (HRIDAY) where there are efforts taken not to freeze heritage cities in an era but to develop them with changing times.

CONCLUSION

History of conservation in India though began by adopting the principals from the West, but there is enormous amount of case studies which will showcase that India has always conserved by using their traditional methods, techniques, and craftsmanship. The simple philosophy adopted by most of the conservationists in the country is, 'Who owns the past?', and only after answering this question, conservation practises are undertaken for any project. This also becomes his responsibility to draw a line between what should be conserved and how much he should to intervene, making sure that those interventions are not damage the heritage sites.

This paper is a conversion of history of Conservation in the Indian subcontinent. But the knowledge and case studies discussed in this paper is just the tip of the iceberg. There are many cases and knowledge systems which will require multiple papers and researches to be conducted.

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SOME RESTORATIONS IN TURIN BETWEEN THE TWO WORLD WARS
CRITICAL OBSERVATIONS

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INTRODUCTION

In order to correctly appreciate and understand the historical restorations framework in Italy, it is crucial to focus on the connection between different disciplines, as well as on the history of conservation and restoration, and on the art criticism and the museological system of the Country.
Given the above, it is very important and interesting to carry out a technical and methodological research with the intention to describe, and analyze, the different types of restoration, carried out in Turin in the years between the two World Wars. Such a period represents a fundamental benchmark to evaluate the different methods of intervention and the methodological choices, that represent not only salient aspects of the history of conservation but, above all, case-studies that become the basis for future reflections on the issue.
In this context, the particular focus of the research concerns a critical and reconstructive classification for the culture of restoration in Turin, as it developed from the early 20th Century to the 1930s.
The exam is very important given that, as affirmed by Marisa Dalai Emiliani affirmed that Turin is the "*capital of museographic experimentation*", as reported by Maria Beatrice Failla[1], but this "*primacy*" would appear not to be confirmed with reference to the restoration profile.

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THE RESEARCH

Coming to the content, as pointed out by different scholars, during the period mentioned above, in Italy there was a gradual shift away from the idea that restoration was just only a tool to bring the work back to its "*original beauty*". The new idea was, in fact, that restoration had to be studied, applied and undertaken only when an advanced state of deterioration could permanently compromise the work, not taking into account the theoretical concept of beauty.
On the base of such a statement, I completed a detailed research that took place in the Archive of the Civic Museums. There, I have examined all the preserved documents concerning the restorations carried out in Turin in the period early 20th Century to the 1930s.

MASTERS AND FELLOWS: "*AUTORITRATTO*"

The first documents analyzed are the ones concerning the intervention made by Giacomo Grosso on the "Autoritratto" of Andrea Gastaldi. The main source on this subject – found out at the Archive and dated March 1904 – could be identified in the discussion between Vittorio Avondo (painter, scholar and collector, as well as director of the Civic Museum since 1890), on one side, and the Mayor Secondo Frola[2], and the lawyer of the Gastaldi's family, Mr. Callisto Emprin[3], on the other side.
The reasons for choosing Grosso are certainly attributable to the fact that Grosso offered to work for free, in honor of his master Gastaldi. Nevertheless, the serious conditions that affected the "*Autoritratto*" following a trip to Paris[4] and, therefore, the urgency of an intervention, required Avondo to act with no delay.
It is clear that the restoration performed by Grosso was carried out with strong attention, given the prominent position within the Turin cultural elite of his master Gastaldi. However, the restoration presumably referred only to a work of consolidation of the pictorial surface, evidently not conclusive as it is possible to understand by the photograph and arguments published on the article of Calderini (see "*Bollettino d'Arte del Ministero della Pubblica Istruzione*" dated 1923, where it is described the "*Autoritratto*" before

[1] Failla 2018, pp. 9-13.
[2] Archivio dei Musei Civici di Torino (henceforth AMCTo), *Inventory* 1863-1965, 149 CAA 31, 4 segnatura, Pratica n. 2, March 12*th* 1904.
[3] AMCTo, *Inventory* 1863-1965, 149 CAA 31, 4 segnatura, Pratica n. 2, March 7*th* 1904.
[4] The trip mentioned in the letter is probably the one for the Paris exhibition of the 1889.
[5] Calderini 1923, pp.107-127.

fig. 1

fig. 2

1. Andrea Gastaldi, Autoritratto *Before Cussetti's 1930 restoration.*

2. Andrea Gastaldi, Autoritratto *After Cussetti's 1930 restoration.*

the restoration made later on by Cussetti.)[5], where the different fractures of the pictorial film are clearly visible with a serious lifting at the hairline.

Overall, there is evidence of some increased lesions and damages in the upper part of the picture, especially in the vicinity of the face of the subject. The peculiarity of the technique has led to an unusual decay of the pictorial film. Such a decay does not appear as "*crettatura*", but with clearer and longer fracture lines, probably given by the different consistency of the pictorial film compared to the oil or fresh technique (fig. 1) (fig. 2).

"*APRILE*"

In 1904, Avondo was engaged into another case – for some reason analogous – when Marco Calderini offered to restore the masterpiece "*Aprile*" of his master Antonio Fontanesi.
Calderini was obviously aware of the importance of the intervention, as well as of the technical difficulties of the work in question, but offered to conduct the restoration, also given his expertise regarding the peculiarities of the technique of Fontanesi.
The difficulties in this regard were due to the *modus operandi* and to the methods that leads the "*Aprile*" to be considered as one of the masterpiece and most complex works of Fontanesi.
In fact, the latter used for such an opera, the Morning canvas as a support, starting from a base already painted, and proceeding through repainting "*tempera su tempera*"[6] but also using oil based colours.
As evidenced by the words of Mr. Enrico Thovez, the "*Aprile*" was «*Painted and repainted at least eight times, in layers of tempera and oil thickened on each other in the subsequent remakes (as can be seen in the cut of the fallen fragments)*»[7].Mr. Thovez, who became director of the Civic Museums in 1913, wrote this letter to the Mayor of Turin, Riccardo Cattaneo, in 1920, to inform him about an episode that had caused a serious damage to the April. In the letter, he also underlined that the condition of the "*Aprile*" was already serious before the above mentioned accident, and due to «*defects in conduct of the technique used*»[8].
What, however, is more useful to underline for the aim of the Research is that Thovez affirmed that «*years ago the restoration of a piece of collapsing sky, a piece that had been secured and repainted by Prof. Calderini*»[9]. Thanks to this precious witness, it is therefore possible to affirm that the intervention of Calderini on the masterpiece of Fontanesi was not only in a work of reconsolidation of the pictorial film of the opera, but also in a repainting intervention in the critical part of the sky of the same.
Both works – "*Autoritratto*" and "*Aprile*" – perfectly represent the 19th Century practice to allow fellow students to work on the pieces of their masters; the fact that such scholars knew the modus operandi of their mentors well served as a guarantee that their intervention would be unrecognizable even to the most expert eye. This trend also characterizes, albeit in a more nuanced way, all the interventions of Carlo Cussetti, undisputed protagonist among Piedmontese restorers of the first half of the 20th century.

VIALE AND CUSSETTI: A CLOSE AND STRONG COLLABORATION

On February 18, 1930, Vittorio Viale, a key figure of the Turin cultural scene, took over the direction of the Civic Museums, a position he would hold for 35 years. The appointment of Viale marked a new phase for the life of the Civic Museums; in fact. its appointment coincides with important decisions related to the Museums' new accommodations and buildings. More specifically, reference has to be made to (I) the transfer of the Museum of Ancient Art to Palazzo Madama and to (II) the construction

[6] Calderini 1901, pp. 234-235.

[7] AMCTo, SMO1, "*Pratica Fontanesi*", *Letter from Thovez to the Mayor, November 27th 1920.*
[8] AMCTo, SMO1, "*Pratica Fontanesi*", *Letter from Thovez to the Mayor, November 27th 1920.*
[9] AMCTo, SMO1, "*Pratica Fontanesi*", *Letter from Thovez to the Mayor, November 27th 1920.*

of a new headquarter for the Gallery of Modern Art. With Viale in charge, the cultural activity and framework of the city becomes more and more intense. He did his utmost to ensure that the old conception of a museum as a static place and of mere conservation gave way to a new vision of a living and evolving environment, open to temporary exhibitions. With one eye always aimed at conservation, and the other one at the growth of the collections.
The close collaboration between the Carlo Cusetti and Vittorio Viale is very interesting to be studied, and reaches its best moment in connection to the restoration campaigns for the setting up of the Museum of Ancient Art at Palazzo Madama, and of two great exhibitions of Piedmontese Baroque, and of Gothic and Renaissance periods. In these exhibitions it clearly emerges the close connection between the museographic choices adopted by Viale and the restoration method used by Cussetti.

THE THE GREAT EXHIBITION ON THE PIEDMONTESE BAROQUE OF 1937

With regard to the great exhibition on the Piedmontese Baroque of 1937, the amount of documents kept in the Archive of the Civic Museums is very large. Among these documents, I have found in a folder of Resolutions the "n*ote of the expenses incurred for the restoration of the paintings exhibited at the Piedmontese Baroque Exhibition at Palazzo Carignano*"[10] drafted in a complete and rather exhaustive by Cussetti, who was in charge of the campaign.
For the first time the actual duration of the works was announced: it was from 15 February to 18 June, 1937. Also the names of the artists involved are discoled: Nicoli Giulio, Dall'Aglio, Mastromatteo Ezio, Verdoia Pietro, Ferraris Ferdinando, Ruba, Cortassa Giovanni, Giacchino P., Miradio Pasquale, Lunghetto Egidio, Cambursano Stefano, Righetti Enzio, Bacchetta Franco, Emanuel and Pignatta Francesco.
The role of Cussetti was becoming increasingly decisive, in the now established collaboration with Vittorio Viale: in relation to and ambitious exhibition project, he was appointed coordinator of an entire team of restorers composed of fifteen artists, to whom he allowed routine surgeries to be performed. As for the document mentioned above, it is presented as a pointed list of the 162 restored paintings divided by city of origin, indicating from time to time the ownership of the works, whether public or private. Despite this, there are no indications on the type of intervention carried out, therefore reference has to be made to the exhibition of '38 to better understand the procedures followed by Cussetti considering that the two exhibitions were organized in a short distance one from each other, and it is hard to believe that Cussetti has changed practices in the meantime. From this moment the "*story*" seems to stop, firstly because of the war period (1940 to 1945).

CONTE BALBO DI BREME: A CASE STUDY

An important case study is the one of the "Conte Balbo Bertone Marchese di Breme". In fact, this in an example of critiques against Cussetti's works.In one of his letter, the Count complained about the restoration carried out by Cussetti, assuming that the such a intervention on Cignaroli's paintings was too invasive, so much to have distorted the perception of the collector.
In the letter dated July 1937[11] – first time that this document is mentioned in this type of Research – the Count wrote to the director Viale: "*I hope to be able to talk with you about what follows, but, since I see no opportunity for my trips next to Turin, I use this that I send through my secretary. I was a bit surprised by how I saw repainted my Cignaroli, that took on a new aspect, oleographic (...) the day that the paintings will return to my salons I will find myself with some type oleography others with their beautiful old tone and then it seems that I have along with the old copy*".
This statement is really interesting both for what it concerns an analysis of the work of the restorer, and more generally in order to better understand the position of Viale towards Cussetti way of cleaning the painting. In fact, the Director's response to the Cuont defended Cussetti. The same Viale declared himself not impressed by the supposed charm of the ancient patina, considered nothing more than nineteenth-century legacy.
It should be underlined, in the end, that the patina in the new Century lost its charme, leaving the ground to the need to find out the original color. Viale identified the patina even "ugly" and "grotesque" and, to better corroborate his thesis, emphasized that in the "Foreign Museums" – please pay attention to the comparative point of view – the issue (of the patina) was already discussed and solved in the sense of affirming the need to define new methods of restorations.
We can understand the position of Viale, especially as director of the Museum. However, it should be underlined that the cleaning method carried out with very aggressive solvents during the end of the 19th century and the beginning of the 20th, had

[10] AMCTo, Inv. 1863-1965, SMO 12 1937-MB-cart. 1-3 Deliberazioni MB, "*Nota delle spese incontrate per i restauri eseguiti ai dipinti esposti alla Mostra del Barocco Piemontese a Palazzo Carignano*".

[11] AMCTo, Inv. 1863-1965, SMO 130. 5, "cartella Conte Balbo Bertone", Letter from Conte Balbo Bertone Marchese di Berme to Vittorio Viale, July 15th 1937.

become one of the worst enemies of works of art, being a totally irreversible operation. An enemy, it should be underlined, much more difficult to be defeated than the simple use of patina.
The cult of patina of the romantic era, therefore, relied on a specific a scientific ground. Also on the base of the above – as well as on the base of the Count's critiques – it should probably by affirmed that the restoration of art works should pay more attention to more simple and soft-performed reconstructive work, rather than a more impressive job of full reintegration and repainting of the opera.

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CONSERVATION OF VIENNESE SCAGLIOLA INTERIORS – PAST METHODS AND NEW APPROACHES

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INTRODUCTION

Scagliola as wall surface was never seen as work of art itself, but rather as part of the immovable interior design. Consequently, it is seen more as a handcraft than as unique art. For this reason, in addition to its former representative purpose, the immovable interior was primarily an object of daily use that was subject to fads. Due to the changes (political and connected to fashion) after the First World War, highly decorative and representative interiors were not up to date anymore. New materials and technologies came up in the 20th century and knowledge of production and maintenance of scagliola declined. This also applies to the conservation methods, which have not changed at least since the first written reports at our disposal dating back to the 19th century. Until the beginning of the 2000s, these methods were not subjected to any critical evaluation on the basis of scientific investigations or conservational science, as they were mainly carried out by craftsmen.

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HISTORY OF SCAGLIOLA IN AUSTRIA

Scagliola, commonly also known as stucco marble, has a long tradition in Austria. The technique involves several sanding and polishing cycles to obtain a shiny surface that imitates marble or other natural stones. The main ingredients are gypsum, animal glue, and pigments as well as different organic-based coatings. In its beginning, the technique was mostly applied as inlays on pieces of furniture giving an impression similar to the pietra dura technique. Especially table tops with scagliola inlays in German-speaking regions around Munich and Salzburg were very fashionable around 1600. At the same time, in Italian-speaking regions, scagliola was applied mainly for antependia, using different stylistic language. Due to the few occurrences of colored natural stone in Austria and southern Germany, stucco marble became very fashionable after 1700 for wall surfaces, imitating reddish stones. During the 19th century almost every building, public or private, around the grand avenue in Vienna, the so-called *Ringstraße*, has stucco marble surfaces to imitate expensive stones from Mediterranean origin used since ancient times. Not only in Austria but also throughout Europe, scagliola was highly popular during the revivalism style.

CONSERVATION HISTORY

The first documented preservation efforts can be found in advertisements by craftsmen praising new treatments and applications in newspapers in Vienna in the second half of the 19th century. In short written reports on the preservation of baroque churches in the Austro-Hungarian monarchy, found in the *Mittheilungen der kaiserl. königl. Central-Commission zur Erforschung und Erhaltung der Baudenkma*le from 1856, also treatments of scagliola are mentioned. The reports mainly contain short remarks on methods used, such as re-sanding, re-polishing, overpainting and the final application of wax. There is hardly any detailed information on the companies carrying out the work or the materials used for conservation. Further research shows that documents are scarce even during the second half of the 20th century. The information is mainly focused on conservation reports from the 1950s, during which post-war reconstruction was carried out. If the surface did not seem worth preserving (due to water infiltration, salinization, etc.), the historical scagliola was completely removed and missing parts were remanufactured. All sources indicated that wet re-sanding of stucco marble surfaces and the complete removal of

1. *Visible mechanical removal of surface (re-sanding/polishing) with secondarily applied stucco marble (so called stopping); thin section, SEM/BSE, ©Fuchs/ Pintér 2021.*

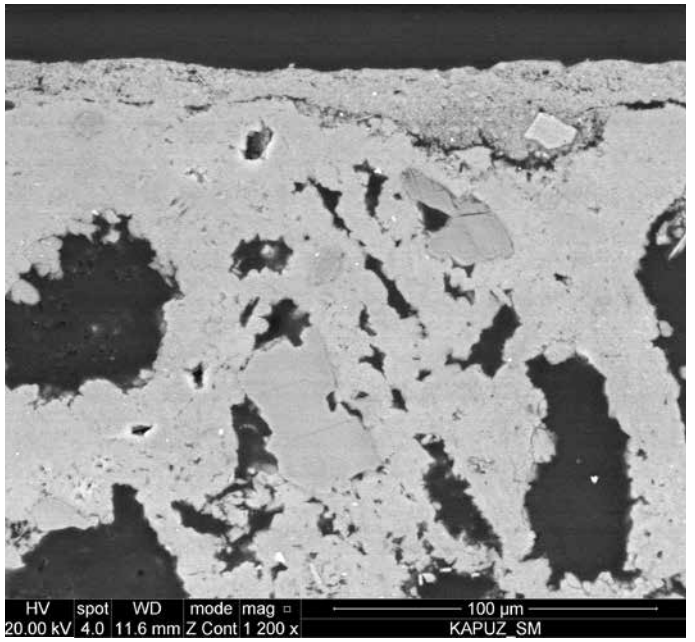

fig. 1

salted parts was (and is) a common practice. Re-sanding leads to abrasion of the original material and changes the historical appearance (fig. 1). Onsight, re-polished surfaces were discovered alongside various materials for completions or as fillers. In order to avoid expensive restoration campaigns, some surfaces were painted over. For the most part, conservation and completion materials were not adapted to the properties of stucco marble and are in some cases partly irreversible.

According to the sources found, the methods of preserving scagliola in Austria can generally be divided into three main phases:

– The first phase was before 1918 and the end of the Austro-Hungarian monarchy after the defeat of the First World War. Scagliola interiors were still very much *en vogue* and can be found in representative rooms that were actively used. There are few written sources on conservation treatments and these measures were necessary to ensure conservation for use and representative purposes.

– The second phase started in 1918 and lasted until the end of the 20th century. The measures were carried out according to the fad and to preserve the material heritage due to massive damages in the Second World War. Archival sources include photographs, citations, invoices, and some inaccurate conservation reports.

– The last phase began around the year 2000 and continues to this day. In the late 1990s, the first scientific research was carried out

[1] Wittenburg 1999, p. 85; Elert, Benavides-Reyes, Cardell 2019, p. 282.

2. *Structure after the mechanical impact on surface and few still existing original polish highlighted in red, SEM/SE, ©Tupy/Weber 2017.*

fig. 2

3. *Detail of dense surface layer rich in glue (highlighted in red); broken cross-section, SEM/SE, ©Weber/Gaggl 1999.*

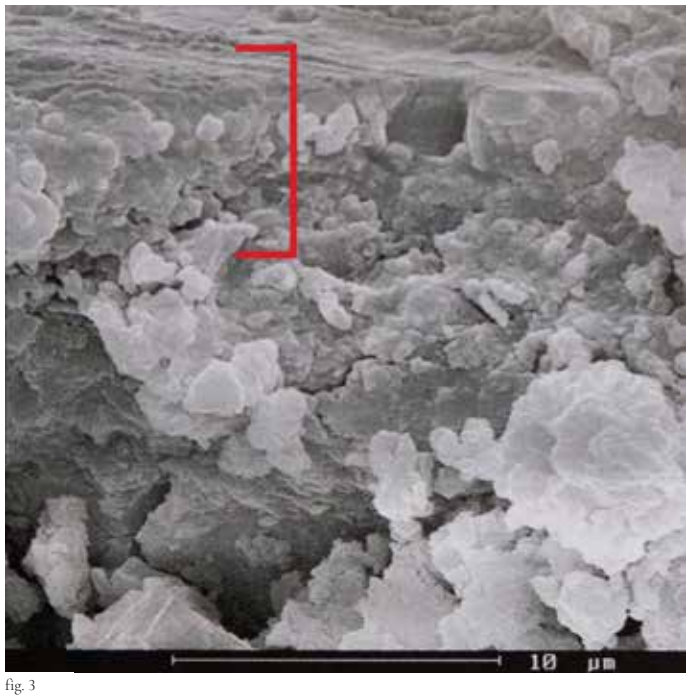

fig. 3

[2] Scientific investigations concerning conservation problems were done within diploma thesis at the Cologne University of Applied Sciences (Wollschläger 1998), University of Applied Sciences Potsdam (Axt, Czysch 2005 and Wittmann 2011), Bern University of the Arts HKB (Pagel 2008), and University of Applied Arts Vienna (Tupy 2017). Further research has been done by the University of Lisbon (Freire 2016) and the University of Applied Sciences and Arts of Southern Switzerland (still ongoing).

to better understand the material and its conservation. Most of the conservation work is still carried out by craftsmen, but more detailed reports are available. The broadly applied measures are similar to the two previous phases.

PROBLEMS CONCERNING PRIOR CONSERVATION METHODS

Processes mentioned so far – such as (wet) re-sanding (fig. 2) – are still used today due to a lack of alternatives. Another problem is the rare exchange between craftsmen and conservation scientists. Therefore, no general standard or guideline has been introduced for a suitable preservation method for this highly sensitive surface. But why is it a problem to (wet) re-sand and re-polish scagliola surfaces?
First, the original surface is removed and changes in appearance occur. According to scientific research, animal glue acts as a colloidal cover around the gypsum within the structure and is responsible for the gloss and hardness of the surface[1] (fig. 3).
Even slight infiltration of water can lead to a loss of gloss, further dissolving of gypsum, and finally to crumbling and general loss of the matrix. Different types of vegetable oils are sometimes used to treat the fading that occurs. These preservation treatments, as well as former original coatings, can attract dust and other particles, leading to discoloration and contamination. In such cases aqueous methods (water with or without surfactant) are used for cleaning, even if the underlying surface is very sensitive to it.

NEW APPROACHES

Based on the gained know-how of the material itself, test series were done at different institutions in order to find appropriate possibilities for consolidation and cleaning[2].
The consolidation of damaged surfaces (water infiltration with/without salts) is possible using chemical transformation of the calcium sulfate itself or by the application of different consolidants. The total removal or significant reduction of the salt load present within a scagliola matrix is almost impossible. "De-salinization" measures are mostly connected with enormous amounts of water in order to mobilize the salt within the structure[3]. The chemical transformation for example by using barium hydroxide is a common measure in the conservation of salinated mural paintings and can also be applied on scagliola. The many different consolidants used mostly come from the stone and plaster conservation praxis. Therefore, mainly common products based on tetraethoxysilane (TEOS), nano-lime, ethyl methacrylate (Paraloid B72), hydroxypropyl cellulose and/or pure acrylic dispersion, were tested and due to the material itself, also animal glue dissolved in distilled water. In all cases, it is necessary

[3] Axt, Czysch 2011, pp. 59-61.
[4] Wollschläger 2000, pp. 67-72; Wittmann 2011, pp. 97-102; Acquistapace, Felici 2017, pp. 5-6.

4. Detail of soiled surface on the left side and cleaned surface with diatomaceous earth and petroleum spirit at the right side, SEM/SE, ©Tupy/Weber 2017.

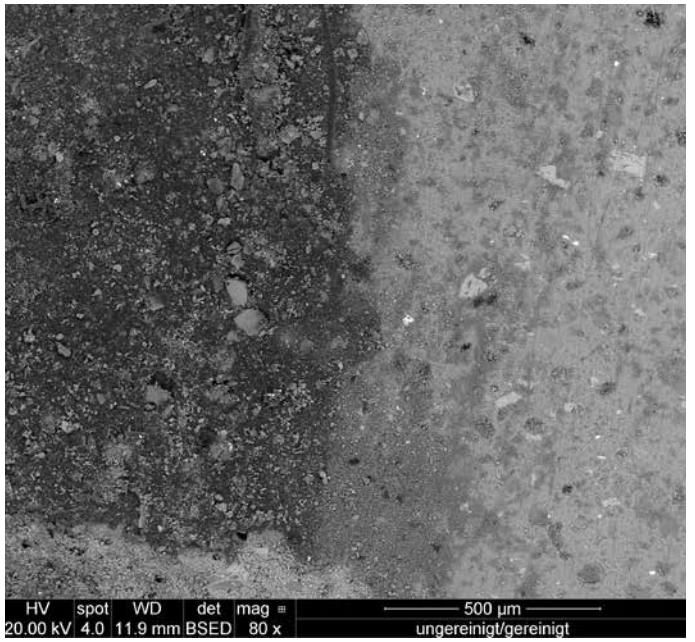

fig. 4

to check the penetration and possible changes in gloss of the scagliola surface before every application[4]. In case of salinization, some of the consolidants cannot be applied. Instead of abrasive cleaning methods, more dry cleaning (different sponges) and less abrasive measures were introduced and investigated. While using sponges, residues can be found on the surface. In most cases, combinations of slightly abrasive and slightly damp cleaning show the best results. Above all, diatomaceous earth with petroleum spirit 30-50°C and a subsequent cleaning with sponges based on (natural) latex, or ethanol and benzene mixtures (1:1) in combination with diatomaceous earth or microfiber cloths can be highlighted[5] (fig. 4). Generally, covalent systems, isooctane, or different benzenes, as well as ethanol and acetone do not affect the gloss level (there is even a slight improvement) and can be used for cleaning. Various trials with poultices were also conducted[6], but most of them are based on water, and they do affect the depth effect of the gloss[7]. Before and after the cleaning trials, the change in gloss should be assessed using a gloss meter. In case of completions and fills "new" approaches have been focusing on the useby of the very traditional historical technology. In order to make those interventions reversible and to reduce the water infiltration during manufacturing, interlayers can be introduced. First trials were done with lead-tin foils or silicone[8]. Further trials could be done by using cyclododecane as a temporary interlayer.

[5] Tupy 2017, pp. 116-121; Acquistapace, Felici 2017, p. 6.
[6] Acquistapace, Felici 2017, p. 6.
[7] Tupy 2017, pp. 114-128.
[8] Pagel 2008, pp. 88-89.

In addition to these remedial measures, more care should also be given to possible preventive conservation as well as maintenance of these surfaces. The building surrounding must be checked regularly in order to detect and repair any occurring structural defects. A stable climate in the rooms decorated with scagliola with regulated humidity should be considered[9].

CONCLUSION

Since the beginning of the 2000s, there are new approaches for the conservation of scagliola wall surfaces. But still, craftsmen are predominantly dealing with the conservation-restoration of these sensitive surfaces until today. The interest of the conservation community for scagliola is at its very beginning. Unfortunately, the importance of the complex manufacturing process and the difficulties involved in preservation and conservation are not taken into account while planning major restoration and/or renovation projects. Therefore, an increase of collaborations and educational work within professions working in the field of cultural heritage is needed as well as the elaboration of a conservation guideline to deal with scagliola surfaces.

[9] Axt, Czysch 2011, p. 62.

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MOUNTING PAPERS – A VALUABLE WITNESS TO THE HISTORY OF RENAISSANCE DRAWINGS

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The article examines the changing approach to the conservation of mounting papers for Renaissance drawings in the château in Kroměříž, Czechia. Until the 1980s, mounting papers were regarded as material of secondary importance, which was more of a hindrance to the study of the drawings or merely served as reinforcement. The current approach, however, places the emphasis on the conservation and preservation of all the extant components of the mounting process. Even small pieces of mounts or mounting paper can be of great importance in the context of a collection of drawings that has been preserved and can reveal the hitherto unknown history of the drawings. Our current research on mounting papers uncovered new possibilities for interpreting the provenance of the individual drawings, to which no attention had so far been devoted.

In the collections of the Archbishopric of Olomouc can be found a total of 67 Renaissance drawings, kept in the residential château of the Archbishops of Olomouc in Kroměříž, which testify to the activities of church representatives as collectors in the 17th century. The drawings were kept in six collectors' albums purchased by Bishop Karl II of Lichtenstein-Castelcorn from two dealers, the

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brothers Franz and Bernard von Imstenraed, in 1673. These albums of Lichtenstein can probably be identified with the albums purchased by the painter Daniel Mytens for Count Thomas Howard of Arundel in Amsterdam in 1637. Some of them can even be directly linked with the collection of the musician and painter Nicolas Lanier, who worked both for the Count of Arundel and for the English King Charles I.

This set of drawings were pasted in four albums until after the World War II. The records of the albums with drawings in the Olomouc Archbishopric, or earlier Bishopric, documentation date back to the 17th century, but the earliest preserved description of the drawings contained therein unfortunately comes only from the 1930s[1]. Nevertheless, thanks to the collectors' marks and accompanying inscriptions directly on the drawings or on the old backing sheets, it can be assumed with a certain degree of probability that the drawings were included in the Olomouc collections as early as in the 17th century. Thus, this collection of drawings is today one of the oldest sets preserved in the lands of the former Bohemian Crown. The drawings were of large formats in frames, which were later mostly hung along with other paintings on the walls of the residence of the Bishops of Olomouc. In some cases, the artist and subject were stated in the list together with a note that the drawing was framed. None of these drawings have been preserved to the present day and they were probably sold at auction in 1830 as excessive artworks. It can be only assumed that some of the drawings were removed from the frames and pasted into albums. The *Purchase List* from 1673[2] records six books with various drawings; furthermore, the albums with drawings are also mentioned in other documents, inventories or collection catalogues that were compiled for various purposes from the late 17th century until the early 20th century. Nevertheless, it has not been stated anywhere what they contain, nor is the number of sheets specified, let alone the number of drawings in a book/album.

In the past, the arrangement of the Kroměříž drawings in the albums was changed in various ways[3]. Some drawings were glued onto a different page several times or reduced in size by cutting off the edges, as can be seen from various remnants of glue, torn-off corners of drawings, or captions that have been cut off. The present mounting of the drawings can therefore be considered to be original only in a few cases. However, we do not know what was done with the albums before 1935; in that year only four albums were recorded in the château, containing 70 drawings. From 1949 to 1959, the nationalised Archbishops' collections in Kroměříž were managed by the National Gallery in Prague. In

[1] The albums were bound in a manner characteristic of the albums in the Kroměříž library in the late 18th and early 19th century. Togner 1971, p. 514.
[2] Purchase list 1673, Opava Provincial Archives, Olomouc Branch, Olomouc Archbishopic collection, inv. no. 590, sign. 118, card 174; published in Breitenbacher 1927, pp. 167-173.
[3] Togner 1996, pp. 9-11.

1. Damages of a mounting paper. Photo: Archdiocesan Museum Kroměříž.

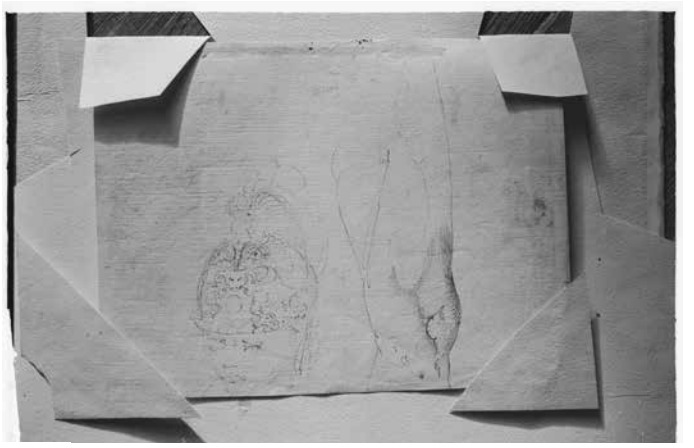

fig. 1

1951, the four albums with drawings were moved to its restoration studios where some of the drawings were removed in order to be exhibited. The handover report from 1951 was accompanied by a detailed handwritten list. It gives us important information on the form of the four albums. It specifies the dimensions of the works, the type of binding and the number of sheets in each album, provides a description of the watermarks on the sheets in the album, a description of each page specifying whether it is empty, or whether there are any traces of removed drawings, and also records the inscriptions on the backing sheets, or on the sheets in the albums[4]. In the 1960s, the contents of the albums were removed from the binding, and the individual sheets with the drawings were stored separately, in an inappropriate way, between poster papers.

Until the 1980s the drawings were largely neglected (with only a few original drawings being restored), therefore, the most major changes that took place were in the mounting. Some of them were inexpertly separated from the original mounting paper in an attempt to discover what was hidden on the reverse side (fig. 1). Others were glued onto a new sheet of paper, in some cases together with the previous mounting paper glued to the whole surface and in some cases without it. The mounting paper was removed from a number of drawings and was no longer considered to be of any value. In some cases, it was even removed without any record of this, as the approach at that time consisted in paying attention only to the drawing itself. Unfortunately, this means that an important source of information about the provenance of the drawings was lost. Fortunately, even today we are still able to determine or at least partly assume the origin of those drawings that have retained their original mounting paper. But, unfortunately, in most cases this mounting paper is

[4] Zlatohlávek 2016, pp. 12-19.

2. *St John the Baptist Preaching by Il Fiammenghino, Photo: Archdiocesan Museum Kroměříž.*

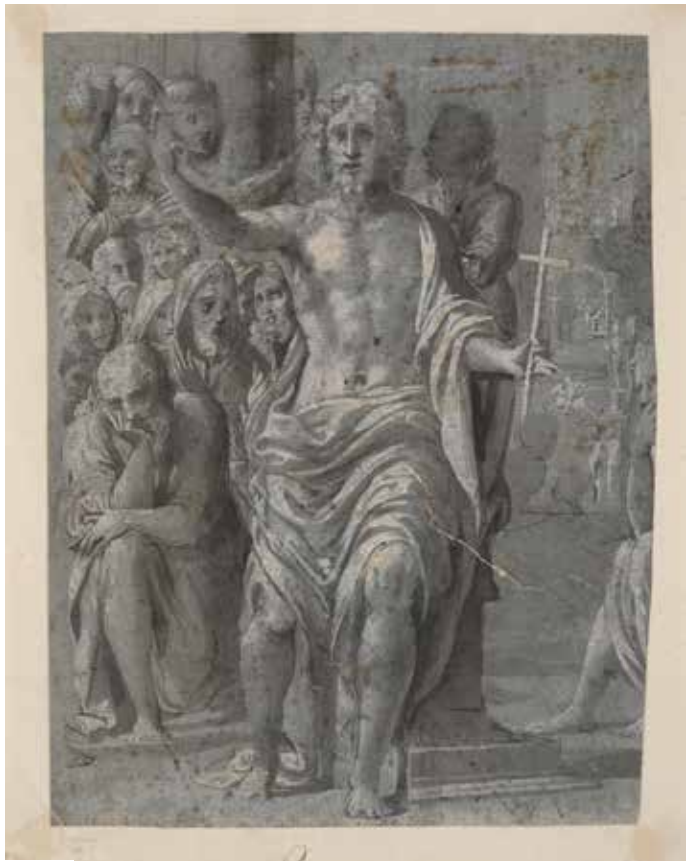

fig. 2

now missing. This means that a hypothetical arrangement of the drawings into groups on the basis of the same type of mounting paper can now be applied only partially to the collection as a whole.

At present, restorers take a holistic approach towards working with drawings and the methodology of their conservation. It is taken for granted that the mounting materials should be preserved, together with their photo-documentation. Similarly, drawings are now evaluated not as isolated works, but as works whose supporting materials tell us something about their history: whether they were exhibited, in what way and in which kind of environment they were stored, and who may have investigated them. Unfortunately, these practices were not applied in the past, with the result that much information about the history of these drawings has been irretrievably lost.

The present investigation is based on regarding drawings as part of a collection as a whole. By analysing the mounting papers also, it aims to shed fresh light on the so far unclear history and origin

3. *Fragment of a Female Figure by Amico Aspertini, Photo: Archdiocesan Museum Kroměříž.*

fig. 3

of the albums of drawings in Kroměříž within the framework of the collecting activities of the Archbishops of Olomouc. This is also contributed by research into the watermarks, which can be divided into three groups. The first group comprises watermarks which are directly on the paper of the drawing. The second group contains watermarks on the paper on which the drawings were pasted, while the third group represents watermarks on the sheets of paper that were part of four albums. While, naturally, none of the watermarks in the first group is repeated, all the 15 watermarks in the third group are identical (individual sheets from the albums). It is most likely that future restoration work will reveal more sheets with a watermark belonging to one of these three groups.

Some interesting information is provided by our recent examination of the three drawings *St John the Baptist Preaching*

4. Allegory of a River by Il Cerano, Photo: Archdiocesan Museum Kroměříž.

fig. 4

by Il Fiammenghino (KE 4536, fig. 2), *Fragment of a Female Figure* by Amico Aspertini (KE 4533, fig. 3), and *Allegory of a River* by Il Cerano (KE 4506, fig. 4), in which we noticed several common features. Their whole area is glued onto paper containing the very same watermark[5]. Furthermore, on each paper there can be found the remains of an attribution in a fine pen identifying the artist who made the drawing, which has subsequently been partly cut off or partially erased. The similar mounting of these three drawings thus indicates that they come from the same collection, and the watermark points towards a probable English provenance. In other words, they were first owned by English collectors, then made their way onto the auction list of the brothers Imstenraed, and from there to Kroměříž. At the same time, it is highly probable that in the course of the ongoing investigation further drawings may still be found whose mounting paper is the same as the three drawings identified so far, thus expanding the presumed collection of drawings coming from English collections. Drawings from Lanier's collection form a second group of drawings, which bear his collector's mark of a small star. Nicholas Lanier was one of the first collectors of drawings in England[6]. A Frenchman by origin, he left his native country due to his Protestant faith and as a musician acquired the position of the band master of English kings. His love and passion was art, in particular drawings. He focused mainly on the Italian masters of the 16th century, but his collection also included drawings by his contemporaries. Lanier negotiated sales of drawings also for other collectors at the royal court, especially for the Earl of Arundel[7]. Lanier was also one of the first to stamp marks on the paper of drawings or on the backing. This practice was reflected on several decades after his death.

Only two drawings currently bear collectors' marks used by Nicholas Lanier. One mark is represented by a five-pointed and the other one by an eight-pointed star stamped in Lugt's encyclopaedia[8].

The gradual restoration of this collection of drawings has been bringing novel pieces of knowledge about the origin of the Archbishopric collection album as well as about painting history in general. Only by using the identical methodology and the identical approach to the drawings, it is possible to achieve the unified results, which may indicate what the unpreserved mounting papers looked like and where the particular sheet of paper was located in the album. Depending on the method of adjusting the drawings, it is possible to discover repeated procedures for pasting the drawings into the albums. Although great emphasis has been placed on the use of the same procedures in the restoration of drawings, the restorers were required to use an individual approach to each drawing, trying to preserve the authenticity of the drawing as much as possible; either directly without any additions or with clearly marked ones. All secondary parts of the adjustment were stored as attachments to the drawings in a folder containing suitably alkaline environment. Additionally, a light biography of every work was established to clearly show when the drawing would be able to appear at the exhibition. Folders of the preserved albums, which should be located in the rich book collections of the Kroměříž chateau library, are still being sought, since they would complete an overall impression of such an important collection of drawings.

The survey of mounting papers of the Kroměříž drawings will be further extended to selected drawings from the Moravian Gallery in Brno and the National Gallery in Prague, which could be expected to have originally come from the collections of archbishops of Olomouc. Using the complex approach, i.e. by documenting the drawings and their mounting papers (and not only the drawings themselves), our research will contribute to further knowledge and documentation of the collection of drawings in the Czech lands.

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[5] K. Wanková, 2016, p. 127.
[6] Wood 2003, pp. 85-121.
[7] Roberts 1989, pp. 120-125.
[8] Lugt 1921.

THE COMPLEX CONSERVATION EVENTS OF THE ANDATA AL CALVARIO OF THE CORREALE MUSEUM IN SORRENTO

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The awareness that restoration is always a critical act should be the point of convergence between art historians, restorers, scientific experts and those involved in the protection of heritage. The restoration work on the *Andata al Calvario* (fig. 1) is an example of how a multidisciplinary approach has allowed historical-artistic insights that represent new stages in the knowledge of the work, allowing us to retrace the conservative history of the canvas in question and better understand the problems related to the painting.
The artwork is kept in the Correale Museum of Sorrento, a pretty eighteenth-century palace once inhabited by the noble Correale family. At the behest of the last descendants, the brothers Alfredo and Pompeo Correale, Counts of Terranova, the house was converted into a Civic Museum in 1924, exhibiting inside numerous art objects collected by the family. The canvas depicting the scene of Christ's ascent to Mount Calvary is now in Room X of the Museum: its tag reads "Andata al Calvario – Giuseppe Bonito". In the spring of 2019, the canvas underwent a conservative treatment because of the polychromy and the

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1. Andata al Calvario (165x250cm), attribuited to Giuseppe Bonito.

fig. 1

support, which had long been in a bad state of conservation. This was, therefore, the opportunity to investigate the documents related to the painting that has come down to us and to re-discuss the current attribution of the painting to Giuseppe Bonito. The restoration work carried out inside the Correale Museum has allowed at the same time to access the documents kept in the museum library. This research was based, through the recovery of inventories, archives and historical guides, on retracing the history of the painting. The oldest mention of the artwork is obtained from the museum inventory of 1917, which, at the number "981" reports: "Oil painting on canvas without frame – Christ falls under the cross, with many figures – The canvas is broken. 1,64 x 2,50[m]"[1]. The inventory in question also provides a significant indication from the conservative point of view, as that the canvas, in the second decade of the twentieth century, was "broken". This aspect is reflected on the canvas, in fact, the impressions of long tears mended are still visible.
To confirm that, there is a deed of payment emerged in favour of Mr. Alfonso Palumbo, dated July 1922 (fig. 2). The receipt specifies that Palumbo lined seven paintings, including a "Jesus under the Cross by Luca Giordano"[2], with all clarity the work in question. The note represents the first mention of the painting in which it is associated with the name of the famous Neapolitan master, as well as a useful indication to date the lining.
The lining was made by using a singular methodology that involved tensioning the lining canvas directly on the final strainer. This technique is a variant of the classic Neapolitan lining and is thought to date back to the eighteenth century[3].

2. Deed of payment for some linings dated July 1922.

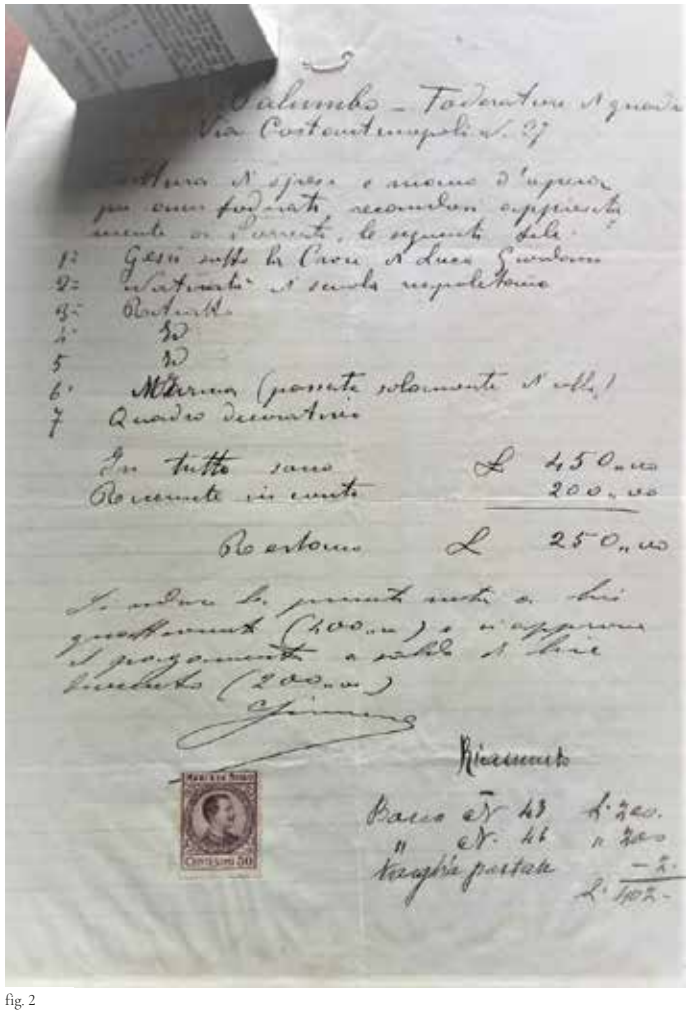

fig. 2

The *Andata al Calvario,* like all the canvases lined in this way, are united by some easily identifiable characteristics: the first is the presence of a double series of tacks on the strainer edges, where the first series ensured the new canvas to the auxiliary structure, while the second anchored the original canvas overlapping the first one (fig. 3). Often, in fact, the first tacks appear hidden by the edges of the original canvas. The second feature can be deduced from the fact that the two canvases are often glued in several places to the extreme edges of the underlying strainer, towards the nailing area. It is probable that the *Andata al Calvario* was lined in this way: the original canvas was removed from the strainer and veiled with animal glue; then, on the original strainer the canvas for lining was tensioned; the veiled painting was placed on the worktop with the color facing down and proceeded by spreading the glue on the back

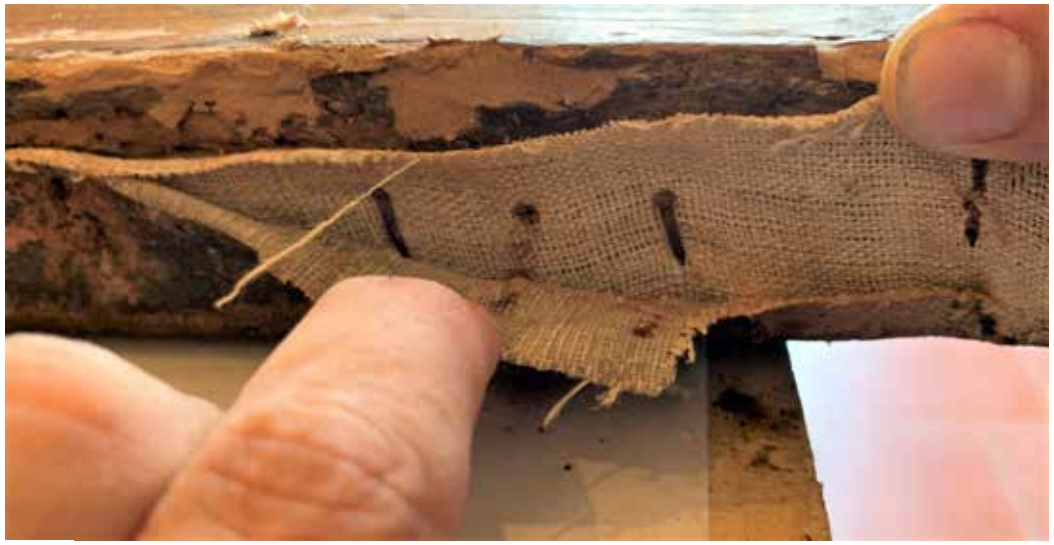

fig. 3

3. Double series of tacks visible on the strainer edges.

of the canvas; then the strainer -with the lining canvas- was laided on it making it adhere with a *pressoio*, a tool to presses the two canvases together, that also had the function of removing the excess glue; this scraping was difficult where the canvas was covered by the frame, for this reason, as anticipated, many paintings are glued in those places.

Even the *Andata al Calvario* presented the same problem, also showing accumulations of glue near the strainers bars and the central crossbar. In the end, after folding and attaching the edges of the original canvas to the strainer, was time for ironing: as per Neapolitan tradition, the ironing was carried out from the back through hot irons, but the impossibility of reaching some parts of the canvas necessarily required to operate on the areas in question from the *recto.* In this regard, it should be noted that in the portions of canvas belonging to the areas ironed from the front, the brown based areas such as the robe of the Cireneo and part of the cross, show alterations attributable to a contribution of high heat and humidity[4].

This "smart-lining", despite the drawbacks illustrated, was certainly adopted for its advantages: it allows a considerable reduction in time, processing costs and material savings. In fact, the lining canvas applied directly on the final strainer, has the same dimensions as the painting and this allows a saving of fabric compared to that necessary when using an interim frame. The painting, once lined, is already on its final strainer allowing to reduce the overall processing time. In addition, this method is well suited to *in situ* linings since it does not involve the transport of bulky temporary stretchers.

[1] Sorrento, Correale Museum Archive (henceforth CMA), Correale Inventory 1917. All the documents cited in this article have been translated from Italian to English.
[2] Sorrento CMA, Deed of payment 20 July 1922.
[3] Arciprete 2003, pp. 101-106.

fig. 4

4. UV fluorescence shows numerous retouchings over and underneath a thick layer of varnish.

The archival research continued by looking for the ancient museum guides, first of all the *Guide of the Correale Museum of Sorrento* dating back to 1924, when the Correale Museum opened to the community for the first time, precisely on May 10th of that same year. In this one, are mentioned the paintings placed on the walls with their respective authors: in particular, in room IX, there was already an "Ascent to Calvary – Young Luca Giordano"[5]. So, it is sure not only that the painting was exposed to the public, but also that it was judged to be made by Giordano.

In the following years three other mentions related to the painting shows the same attribution to Luca Giordano: we have the *Commercial and tourist guide of the city of Sorrento*[6], also available in English, a sign of the ancient international fame of Sorrento, dating back to 1932; the guide of the *Correale Museum of Sorrento,* signed by Giuseppe Morazzoni in 1938, part of the series entitled *Itineraries of the museums and monuments of Italy*[7]; then, from 1941, a topographic survey of the Museum's collection.

The World War II forced the Correale Museum of Terranova to remain closed for several years: for the safety of the artworks some of them were transported to the nearby hills of San Pietro, others were placed in an ancient empty cistern in the museum's garden that was covered with soil and flowers, while others were moved to the attic to free the rooms because were turned into barracks and soldiers' club[8].

After the war, the Superintendence of the Galleries of Naples undertook a rearrangement of the museum collection and a conservative intervention in view of the reopening. For the occasion Raffaello Causa was in charge of the revision of the catalog of the artworks: in a writing published in the magazine «Bollettino d'arte» of 1953 he tells how he personally dealt with the revision of the catalog by modifying most of the historical attributions and producing a conspicuous list in which he did not dwell in the description of each change of attribution.[9] It was, in essence, a list of names without any association with the respective paintings. Among them is the name of Giuseppe Bonito, a native painter of Castellammare di Stabia (1707-Naples, 1789) in a list of exponents of Neapolitan painting:

"And the results become even more specialized in the identifications through four centuries of 'minor' Neapolitan painting, with unpublished works by G.B. Lama, S. Buono, B. Corenzio, B. Caracciolo, S. Compagno, D. Gargiulo, P. Finoglia, S. Rosa, C. Amalfi, G. Pascaletti, M. Brandi, S. Conca, G. Bonito, G. del Po, P. De Matteis, F. De Mura, N. Viso, G. Diana, etc."[10].

As can be seen, Causa did not explain in writing which works he had decided to attribute to those artists. On the other hand, the Museum does not have an index card to refer to for the history of the attributions and we can only deduce, using a subsequent inventory of 1953, that the attribution of the *Andata al Calvario* to Giuseppe Bonito, so far considered reliable, is the result of the revision work of Raffaello Causa dated in that year. In the aforementioned document appears, in fact, at number 215, a "Andata al Calvario [by] Giuseppe Bonito" kept in room 18. Moreover, the mentions after 1953 up to the present day, report as the author of the work the name of Bonito, more than likely advanced by Causa[11][12]. From the contribution by Raffaello Causa we also get the news, without particular specification in detail, of various works that can be seen in a bad conservation conditions and, therefore, in need of restoration. Nothing remains documented in the archives of the Museum, but by the data emerged from the conservative treatment during 2019, we can hypothesize that the *Andata al Calvario* was among these (fig. 4).

The available documentation has thus made evident the uncertainties regarding the attribution: we can say that the canvas used has a dense weave very widespread in the eighteenth century and falls the hypothesis that the *Andata al Calvario* is a work of the youthful moment of Luca Giordano, who died in 1705, nor does it allow a successful comparison with the mature

[4] Mecklenburg *et al.* 2006, pp. 49-58.

[5] Giovene di Girasole 1924, pp. 5-9.
[6] Paturzo 1932, pp.142-145.
[7] Morazzoni 1938.
[8] Causa 1953, pp. 90-93.
[9] *Ibidem.*
[10] *Ibidem.*
[11] Sorrento, CMA, General Inventory 1953, Part I.
[12] The following mentions concern the inventory of 1969, an itinerary from the Seventies and a *brochure* of an exhibition held in 1980.

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ways of the Neapolitan master[13]. In addition, the canvas does not show any similarity to the typical painting of Bonito, although this attribution has never been disputed. In the *Andata al Calvario* we find heavy and loaded brushworks, a thick and luminous impasto, faded contours, grandeur of the figures and speed of execution that are all elements more akin to the ways of a master of Jordanian heritage. Professoress Viviana Farina, who guided me in the research, is in fact convinced that the painting is rather the work of another great protagonist at the transition between the seventeenth and the first part of the Neapolitan eighteenth century: the architect and sculptor Domenico Antonio Vaccaro, who was also a painter as the first artistic profession. The canvas in question, has stylistic affinities with his painting, in fact, it is traced to monumental and elongated figures, represented in unnatural poses, which betray the neo-mannerist taste typical of the young Vaccaro; heavy and angular drapery, skilful chiaroscuro effects and lights chords. The best comparisons to accommodate the Correale's canvas in the *corpus* of Domenico Antonio Vaccaro emerge fr<om two paintings dating back to 1720 approximately: the *Allegory of the Papacy of Clement XI* and *St. Dominic giving the rosary to the Queen of France* in San Martino in Naples. Two works with a heavy intonation, even academic, already in themselves more isolated in the catalog of Domenico Antonio, in the middle of that same third decade of the eighteenth century when it had now passed to its most famous effervescent and lively face. Heavy and academic can also be defined the *Andata al Calvario*, a sort of off-path of the master, who certainly for such fewer usual inclinations of style had not so far been recognized as the author of the work entered long time ago in the collection of the Correale's family.

[13] Ferrari-Scavizzi 1997, I, pp. 159-166.

THE SAN FERNANDO ROYAL ACADEMY OF FINE ARTS AND ITS ROLE IN THE PROTECTION AND SAFEGUARDING OF SPANISH HERITAGE IN THE FIRST HALF OF THE 19TH CENTURY

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THE BEGINNINGS OF THE ACADEMY IN THE REGULATION OF THE EXTRACTION OF WORKS OF ART

In 1761 there are already testimonies of the intention of the academic body to make a first attempt to regulate the exportation of art in Spain. In a petition to the Spanish monarch Charles III, the need was expressed to promote a regulation, as in other cities such as Rome and Naples, that would prohibit the departure of quality sculptures and paintings produced by renowned artists who were deceased:

The nation has suffered for many years the damage of the extraction to foreign countries of the very excellent paintings of which it abounded, and which served it as an estimable ornament; and if it does not occur with a prompt and effective remedy, this damage will grow until it leaves us entirely deprived of a wealth more difficult to recover than that which consists of gold and silver. In all cultured countries the extraction of famous paintings and sculptures of deceased authors is forbidden with the most rigorous penalties, and the magistrates take care of this

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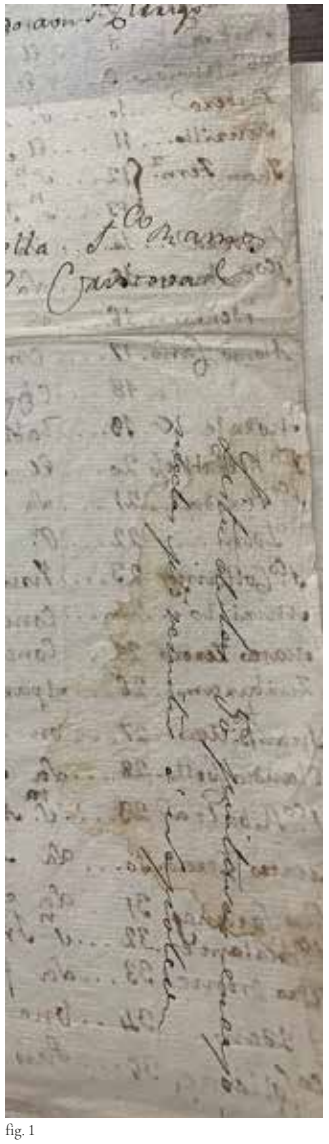


fig. 1

1. The prohibition on the exportation of pictures and paintings published in La Gaceta. *Image taken by the author.*

importance with the greatest vigilance; we know that it happens this way in Naples and Rome, but among us there is no court that prevent these exits, nor do we know that the slightest provision has been made for them. In these terms we are compelled by our obligation to your Majesty's and to the public's service to beg your Majesty to deign to prohibit under very severe penalties the removal to foreign countries of paintings and sculptures of famous deceased artists, authorizing the Academy with the powers that your Majesty deems appropriate to see that it takes effect on this just providence, or entrusting it to the court that is more to your Majesty's liking[1].

This request led to the creation of a legislation regulating this subject, authorizing the Academy to be the body in charge of this management, which was presented with a Royal Resolution, granting the institution the power to acquire those non-religious pieces for its collection that were confiscated:

By resolution to consultation of February 24, Your Majesty was pleased to agree with the providence of prohibiting under very serious penalties the extraction to foreign countries of paintings and sculptures of famous deceased artists, authorizing the Academy with the faculties that Your Majesty considers convenient to take care of the effect of this prohibition. The Academy, full of recognition and veneration, prostrates itself at the feet of your Majesty, giving the humblest thanks for the confidence that you have deigned to place in your zeal and your love for the Royal Service and the public [...]. We judge, therefore, that after the solemn publication of the prohibition, whoever is found with the aforementioned paintings or sculptures leaving the Kingdom by sea or by land, [...] if it is proved that he is carrying or sending them to a foreign country, he shall lose them and the profane ones shall be applied to the Academy to serve in its studies, and the sacred ones to the Temples that please to Your Majesty[2].

Despite this first attempt at regularization that sought, through penalties, to prevent the exit of the country's patrimony, the archives of the Royal Academy of Fine Arts of San Fernando preserve later testimonies that illustrate that this problem did not cease. Testimony of this is the example reported on October 14th of 1801 to the Secretary of the Treasury Office in which methods used by the extractors to circumvent customs are cited:

The Academy is not unaware that it is easy for foreigners to evade these orders: there have been cases of some who have extracted very precious old paintings having them overpainted by a random teacher so that they would pass for works by living authors and when painted with a certain amount of preparation, the modern part was then erased and the painting was restored to its original state: others, and the most, have at their disposal luggage which is not registered or which evades Customs surveillance[3].

As a result, in 1801 an official notice was issued and sent to all Customs offices to prevent the export of works of great value to Spain, although they were aware of the ease with which foreigners could avoid succumbing to these laws and manage to leave the country with those pieces of greater value. The Academy was therefore instructed to report and record any paintings found for sale so that the government itself could exercise its right of first refusal and thus comply with the Royal Order issued in 1799, the intention of which was to regulate this problem, as was the case with the Royal Order of 1761. Despite this, the lack of qualified personnel and the aforementioned tricks of the art merchants meant that the problem continued to be present.
Proof of the Academy's active participation in the fight against despoilment was the complaint filed in 1807 against the French restorer and artist Lebrun, who was accused of buying two paintings from the *Carmelitas Descalzas* and subsequently removing them[4]. According to the lawsuit, Juan Bautista Lebrun was trying to extract the original paintings he had bought to export them, since he considered that, in his own country (France), could give more value to the works; being a member of the Academy who gave notice that such a crime was going to be committed:

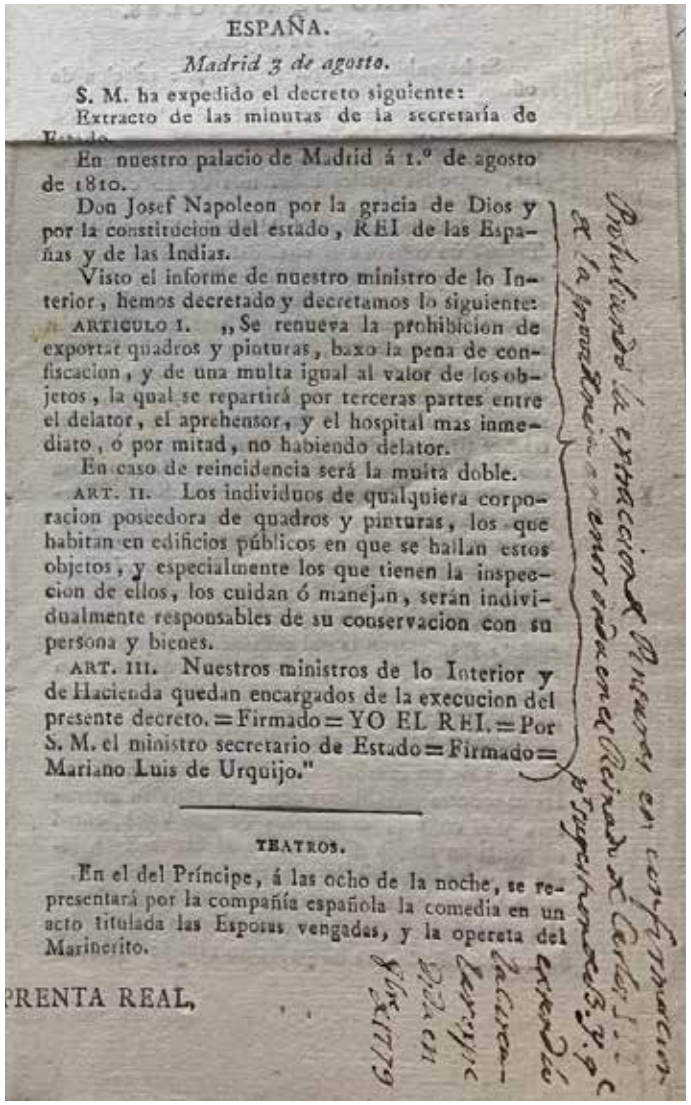
Suppose that in his acquisition he had no other objective; for a foreigner not domiciled, a traveller, painter, and restorer of antique paintings, [...] to make an outlay of some consideration to enjoy momentarily these precious things, but to give them a much greater value in his country, where the paintings of the Spanish School are much sought after as less common than those of the others[5].

THE MASSIVE PLUNDERING OF WORKS DURING THE SPANISH WAR OF INDEPENDENCE

With the arrival of the French troops in 1808, the government of Joseph Napoleon I (1808-1813) (Joseph Bonaparte) began in Spain and with it, the famous War of Independence (1808-

[1] Madrid, Archivo de la Real Academia de Bellas Artes de San Fernando (henceforth ARABASF), Comisión de Pintura y Escultura. Informes. Legislación sobre la salida de pinturas del Reino 1-34-2.
[2] *Ibidem.*
[3] *Ibidem.*
[4] *Ibidem.*
[5] *Ibidem.*

2. Annotation on the side indicating the shipment of the paintings to Napoleon Bonapare. Image taken by the author.



ESPAÑA.

Madrid 3 de agosto.

S. M. ha expedido el decreto siguiente:

Extracto de las minutas de la secretaría de Estado.

En nuestro palacio de Madrid á 1.º de agosto de 1810.

Don Josef Napoleon por la gracia de Dios y por la constitucion del estado, REI de las Españas y de las Indias.

Visto el informe de nuestro ministro de lo Interior, hemos decretado y decretamos lo siguiente:

ARTICULO 1. „Se renueva la prohibicion de exportar quadros y pinturas, baxo la pena de confiscacion, y de una multa igual al valor de los objetos, la qual se repartirá por terceras partes entre el delator, el aprehensor, y el hospital mas inmediato, ó por mitad, no habiendo delator.

En caso de reincidencia será la multa doble.

ART. II. Los individuos de qualquiera corporacion poseedora de quadros y pinturas, los que habitan en edificios públicos en que se hallan estos objetos, y especialmente los que tienen la inspeccion de ellos, los cuidan ó manejan, serán individualmente responsables de su conservacion con su persona y bienes.

ART. III. Nuestros ministros de lo Interior y de Hacienda quedan encargados de la execucion del presente decreto. = Firmado = YO EL REI. = Por S. M. el ministro secretario de Estado = Firmado = Mariano Luis de Urquijo."

TEATROS.

En el del Príncipe, á las ocho de la noche, se representará por la compañía española la comedia en un acto titulada las Esposas vengadas, y la opereta del Marinerito.

PRENTA REAL.

fig. 2

1814) which saw significant artistic despoilment. This issue has been treated by multiple authors like Mª Dolores Antigüedad del Castillo-Olivares, in her article *España en Libretad: 1808-1814 conflicto bélico y expolio*. Dangers for the artistic heritage in which she notes:

[The] misnamed War of Independence has gone down in history through a series of clichés, which, as far as heritage is concerned, are reduced to narrating the excesses committed by the Napoleonic armies in the Spanish campaign[6].

[6] Antigüedad del Castillo-Olivares 2021, p. 317.

Most of the seized works belonged to churches given the Napoleonic policy during the wars, in which it was possible to proceed to the extirpation of the ecclesiastical patrimony given that the clergy was considered to be in a permanent state of war; treated by Jorge García Sánchez and María Moraleda Gamero in an article in the magazine *MDCC 1800*[7]. To legitimize this, the famous decrees of Chamartín (1808) were issued, with which Napoleon gave way to the confiscation of works of art from a multitude of convents and churches, which had already suffered an initial looting, in which paintings were even burned. The seized objects were stored in deposits located in different parts of the country. The most outstanding were those of the Spanish capital in the convents of San Francisco and of the Rosary, enabled from the end of 1809[8].

The war together with the revolts and the chaotic panorama that had arisen in the country gave advantage to many of the foreign merchants to acquire pieces of great value and extract them from Spanish territory in an illicit way with the intention of selling or auctioning them in their own nations[9]. In turn, many of the French generals and marshals, as was the case with Marshal Soult, took advantage of the situation to enrich their own collections with works that had been plundered or acquired under duress[10].

Observing the detriment of Spain's patrimony, Joseph Napoleon I together with the Academy, tried to stop these facts enacting a new legislation with the intention of regulating it, so in 1810 the renewal of the prohibition on the exportation of pictures and paintings was published in *La Gaceta* (fig. 1). The only exception under which the artistic patrimony could leave the country was the shipment as a gift to the French emperor Napoleon I Bonaparte[11]. Despite this new regulation, the plundering and illegal export, especially of paintings, continued according to annotations found in the archive.

The Academy and the body of academics that composed it, called *afrancesados* due to their support to the new French government, played a very important role in this whole issue, since they supported this new regulation under which a legal way was generated for the exit of works destined to enrich the patrimony of the new French emperor. In addition to this, it was one of the organizations in charge of selecting, storing, and preparing the works to be sent to Paris. Proof of this is to be found in the list preserved in the Archives of the Royal Academy of Fine Arts of San Fernando (fig. 2), where there are 50 paintings distributed in 6 drawers whose destination was to enrich the collection of Napoleon Bonaparte[12]. This list was signed by several

[7] García Sánchez, Moraleda Gamero 2020, p. 95.
[8] *Ivi*, p. 96.
[9] Antigüedad del Castillo-Olivares 2021, p. 318.
[10] *Ibidem.*
[11] Madrid, ARABASF, Comisión de Pintura y Escultura. Informes. Legislación sobre la salida de pinturas del Reino 1-34-2.

academicians, among whom Mariano Maella, restorer, and chamber painter in the time of Charles III, his successor Charles IV, and the artist-restorer Manuel Napoliare worth mentioning. Both, together with the artist Francisco de Goya, oversaw generating numerous inventories of the works seized and stored in the aforementioned warehouses of the convents of Rosario and San Francisco, selecting the most outstanding works[13] (fig. 2).
Those pieces that were not sent to Paris were destined to be part of a project generated by the new Spanish monarch, which also had the backing of the Academy: The Josephine Museum. The support exercised by the Academy in this project was most probably due to the intention of creating a public cultural museum, which was to be located in the Buenavista Palace. The political instability of the time, coupled with the concept of intrusive king that resided on Joseph Napoleon I meant that this project never saw the light[14]. Even so, it should be noted that the Academy in 1813 continued to insist on the need to pursue this idea as it would encourage the conservation of paintings that were in poor condition in the depots.
Finally, it is worth mentioning the involvement of some members of the Academy in the illegal sale of artistic works, as is the case of the academician of merit and engraver Tomás López Enguídanos, who extracted from Madrid a Roman Charity, a work by Murillo, claiming to protect it from the French plundering[15]. The work, which was part of Manuel Godoy's collection, was reclaimed from the artist in 1814, as an anonymous complaint was received accusing him of having possession of the work undeclared. Lopez Enguídanos cited that the piece had been loaned by Godoy himself to make an engraving. When he took it out of Madrid, he asked a painter to restore it and given the poor restoration that the painter carried out, together with the need to leave the country and the lack of money, he decided to try to sell it to an English merchant. At first, the merchant took the painting as a deposit, indicating to the engraver that as soon as he returned the money he had lent him, he would give him the painting. However, this did not happen, as the English dealer took the painting. As compensation, at the time of the claim, he offered the Academy a panel by David Teniers[16].

END OF THE WAR OF INDEPENDENCE AND RETURN OF THE ARTISTIC HERITAGE

After the Spanish War of Independence ended in 1814, with the return of King Ferdinand VII, the Academy was commissioned to investigate and generate the appropriate inventories to locate those paintings and other artistic objects that had been extracted and that were known to have been plundered, as well as to detail the bodies to which they belonged[17]. That same year, the claims to the new French government began, requesting the return of those pieces that had been illegally extracted from the country.
The position of the institution itself and, above all, the vision it gave of its actions during the French occupation was very contrary to what it really was. Although there is material evidence that the Academy and its members actively collaborated in the work of expropriation and shipment of patrimony to France, the image it presents is one of opposition. Most of the documents that are preserved try to show how the Academy stored patrimony to conserve it, when the reality, as can be seen in the previous point, was the opposite.
Although many works were returned, those that were in private collections of marshals and officials of the government of Joseph Napoleon I, could not be recovered and are now scattered around the world as they were sold and auctioned gradually over the years. The Academy was the organization in charge of managing the return of these pieces, as well as their storage and restoration of those that needed it[18].

The paintings that arrived at the Academy, papered, and lacking their stretchers, were placed one on top of the other on joined tables, since, according to documents of the time, there was not enough space to place them. This way of storage, according to a letter sent by Pedro Cevallos[19], had a very negative effect on the conservation of the works, considering it advisable to mount them on frames as soon as possible. Although it was the most advisable thing to do, the lack of space, added to the economic amount that this intervention implied, made it impossible to manage in a short period of time. For this reason, the first solution was the publication of a list of the recovered works in *La Gaceta* so that their legitimate owners could proceed with the appropriate claims:

In such a predicament I foresee no other means to liberate these artistic treasures from the deterioration to which they are exposed, if not prompt provision is made, than to publish in *La Gaceta* the list of these paintings, providing that the communities or private individuals who have a legitimate right to them can justify that in the way the French acquired them there was no gift or other motive of interest or reward but

[12] Madrid, ARABASF, Secretario general. Informes. Reclamaciones y devoluciones de pinturas 1-34-5.
[13] García Sánchez 2007, p. 33.
[14] García Sánchez 2007, p. 35.
[15] Madrid, ARABASF, Comisión del Museo. Ingresos. Colección Godoy 1-34-4.
[16] *Ibidem.*
[17] Madrid, ARABASF, Comisión de Pintura y Escultura. Informes. Extracción de pinturas del Reino 1-34-1.
[18] *Ibidem.*
[19] Minister of State in the governments of Charles IV and Ferdinand VII.

that they were extracted without the owners having the will to return them, [...] in a peremptory term of three months under which, being just and not opposing the news we have from Paris concerning the way in which the enemies acquired these paintings, they will be delivered to the persons the owners dispute. within the peremptory term of three months under which being just the claim and not opposing the news that we have from Paris concerning the way in which the enemies acquired these paintings, they will be delivered to the persons that the owners dispute to receive them[20].

In addition to this, the need to charge the legitimate owners at the moment of delivery, the prorate of the costs assumed by the Academy for the transport from Paris, was also raised, leaving also as a clause that in case of exceeding the period of claim the pieces would become part of the royal patrimony. Another of the intentions reflected in this same document is the intention of the organization and the government of the time not to return the most notable works, alleging the possibility of deterioration and consequent loss in the transfer to their original locations, where they would not have qualified teachers to carry out the appropriate restorations. Therefore, the proposal was to return copies to these places «to avoid this serious damage to the noble arts»[21].

In 1816 the Academy ended up taking on the restoration of those works that had remained under its control, executed by the chamber painter and member of the Academy itself, José Camarón, without claiming any payment from the organization for such work[22]. At the same time, numerous stretchers were ordered from the institution's own carpenter in order to mount the works that had remained in the Academy, many of which were also placed in the Academy's rooms. Camarón himself went so far as to write a document in which he argued not only the inconvenience of removing these paintings from the Academy, but also the obligation to pay for all the interventions that he himself had made free of charge, only if these pieces were to leave the institution[23].

Both actions had as immediate consequences the intention of the organization not to return the works to their original owners, but to allocate them to their own collections[24]. An example of this is the case of the Monasterio del Escorial, which has been studied by the aforementioned Jorge García Sánchez and María Moraleda Gamero[25] and the collection of Manuel Godoy. This last example clearly illustrates the Academy's intention to claim the most notorious works from the collection, despite the existence of legitimate heirs such as the Countess of Chinchón and her daughter. The Academy, for its part, argued that most of the paintings in the collection belonged to the nation.

[20] Madrid, ARABASF, Comisión de Pintura y Escultura. Informes. Extracción de pinturas del Reino 1-34-1.
[21] *Ibidem.*
[22] *Ibidem.*
[23] *Ibidem.*
[24] *Ibidem.*
[25] García Sánchez, Moraleda Gamero 2020, pp. 95-112.

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Madrid, Archivo de la Real Academia de Bellas Artes de San Fernando (henceforth ARABASF), Comisión de Pintura y Escultura. Informes. Legislación sobre la salida de pinturas del Reino 1-34-1.
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CONCLUSIONS

The Academy played a very important role in the illegal removal of heritage from Spain. Although in its beginnings it fought against the removal of works of art considered of value, there was a clear collaboration with the French government regarding the plundering of artistic material during the reign of Joseph I Bonaparte, motivated by the *afrancesados* ideals of its members. Despite this, thanks to the inventories carried out by the Academy itself during the French occupation, many of the works could be recovered after the fall of the so-called intruder government.

The Academy was the body in charge not only of the transport, but also of the restoration of those pieces that required it, something that also illustrates the importance of the institution at the time in such matters.

One of the Academy's clearest intentions was to create a public museum, something that is reflected in its insistence on the continuation of the Josephine Museum project. This can also be reflected in the obstruction generated by the institution at the time of returning the pieces to their original owners.

The French plundering generated both physical and conceptual deterioration to all the extracted heritage, since, by removing them from their original locations, many works came to lose the spiritual meaning they possessed, something that happened especially with pieces from churches or monasteries.

YOUNG PROFESSIONALS FORUM LAB 2021 RECOMMENDATIONS ON CULTURAL HERITAGE PROFESSIONS

We, the Young Professionals Forum, organized by the Centro Conservazione e Restauro la Venaria Reale with ICCROM, ICOM, ICOMOS Italia, CNR, IIC, SIC, University of Turin, Fondazione Santagata and involving some 100 young professionals from 20 countries, identified - through participatory workshops - issues related to cultural heritage preservation and professions, in the consciousness that culture plays an essential role in sustainable development, disaster risk reduction, climate change mitigation.
The working groups focused their reflection on various themes, including strengthening the capacities of young professionals aiming to enhance the integration of heritage conservation with community involvement; the impact of new technologies on the conservation, management, use and transmission of cultural heritage; identification of complementary skills and competencies to be integrated into existing curricula to improve heritage resources management and respond to the challenges of the current historical moment; enhancement of the positive impacts of the integration of heritage management and conservation within sustainable development processes.
We call the G20 countries, with regards to:

DEMOCRATIZATION AND DIGITIZATION

- Stimulate the community in understanding the value of their cultural heritage to protect and pass it on; increase awareness and responsibility toward cultural heritage conservation.
- Adopt a participatory, consultative approach that places the community front and center, enabling them to participate in the decision-making process every step of the way.
- Through growing digitization, give space and voice to cultural needs and initiatives addressed to social and racial minorities, allowing local communities to understand the local history or uses of the heritage and identify clear objectives in conservation projects.
- In those countries where web access is still limited, promote alternative forms of communications and involvement among conservation experts, local communities and governmental institutions.
- Support the development of technological tools in cultural institutions for broader accessibility, both physically and virtually. Effort must be made in the collection and analysis of data covering the various fields;
- Sustain institutions in the implementation of low and high technology in environmental control and preventive conservation, and in the research regarding the Museums' collections.

NEW SKILLS/BUILDING NEW CAPABILITIES

- Enhance skill development through a clear definition of competencies to be attributed to each cultural heritage profession, thus ensuring that correspondence is established between education and the training offer and market demand, and, in perspective, leading to widely recognized professional qualifications. Greater homogeneity of training paths will correspond to greater consistency with the professional needs of the labor market. In addition, the above issues need to be addressed with a broader vision worldwide.
- Train and recognize the professional figures of the conservator and conservation scientist at the same level as other specialized figures to guarantee heritage preservation the importance it deserves.

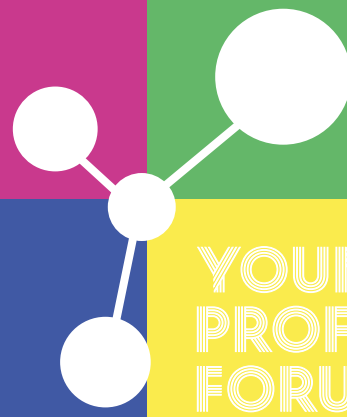
- Promote multidisciplinary education paths that combine arts and science (STEM), competencies in new digital technologies and software, communication, sustainability, management and economics, planning tools to improve performance and results, team building, leadership, problem-solving, process evaluation, awareness-raising, advocacy and cross-sector competencies ability to read and understand the society and the markets critically.
- Promote interdisciplinarity between the fields and cooperate with professionals from various backgrounds, intercultural dialogue and mediation, resulting in better cooperation.
- Facilitate the engagement in museums and heritage centers of young conservators, conservator scientists and specialists like computer scientists, chief technology officers, content creators for digital solutions to increase participation and bottom-up activities and create the opportunity for research, internships, and jobs, promoting cross-sectorial mutual interactions.
- Enhance awareness of police forces on the issue of protection of cultural heritage sites and illicit trafficking. Ensure security systems on critical historic sites.

MULTI-STAKEHOLDER APPROACH/SUSTAINABILITY/PROTECTION OF CULTURAL HERITAGE

- Enhance awareness of governmental and non-governmental institutions (civil protection, fire-fighters, museum conservator, etc.) on preventive conservation and emergency interventions in response to climate change effects.
- Facilitate private-public partnerships to enhance a heritage institution's capabilities to carry out conservation activities and ensure the sustainability of projects.
- Recognize that cultural institutions are places with enormous potential, where several interconnections can be created. Museums and cultural heritage professionals are important social players to contribute to new social habits that have to become more and more sustainable and green.
- Encourage public and private institutions to involve professionals with diverse backgrounds, not only in terms of education but also of provenance (ex. avoiding "Westernization"). Thus diversified teams are more likely to offer multiple solutions thanks to the different perspectives and expertise and show adaptation and resilience in times of crisis.
- Facilitate Inter-state cooperation in illegal trafficking and heritage protection and strengthen tracking measures for stolen objects through collaboration with auction houses, private museum owners and stakeholders.
- Promote the use of international tools and regulations (e.g. ICOM Red List, UNIDROIT Convention 1995, UNESCO The Hague Convention 1954/1995).
- Promote awareness campaigns against the destruction of heritage sites and illicit trafficking through social media, television, and schools.

Venaria Reale, 2nd July 2021

PARTICIPANTS



YOUNG PROFESSIONALS FORUM