


# Work Package 5: Implementation of a conservation methodology

**Final Report** | February 2021

**Project:** Conservation of Art in Public Spaces
**Acronym:** CAPuS
**Webpage:** http://capusproject.eu/
**Work package:** Work Package 5
**Work package leader:** Centro Conservazione e Restauro “La Venaria Reale”
**Estimated work package start and end date:** M16-M24
**Actual work package start and end date:** M16-M36
**Report version:** 1.0
**Project coordinator:** University of Turin, Dr. Dominique Scalarone
**Email:** dominique.scalarone@unito.it

**This project has received funding from the European Commission, Programme Erasmus+ Knowledge Alliances, Project N° 588082-EPP-A-2017-1-IT-EPPKA2-KA.**

## TABLE OF CONTENTS

# 1. Introduction

## 1. 1. Work package overview

The main aim of Work Package 5 was to define sustainable approach and protocols for the conservation of Urban Art, with a specific focus on the intervention methodologies.
With the purpose of reaching a wider and more comprehensive analysis of current practices for urban art preservation at European level, specific surveys activities were set up: the analysis of the needs and the state of the art of conservation intervention on public artworks in the different European countries engaged in the project was assessed on the basis of a collaborative work involving all the partners.

A first phase of WP5 focused on 4 activities, specifically addressed to the different issues related to:

- the technical approach (Activity 1),
- the definition of methodologies (Activity 2),
- the study of the products available on the market (Activity 3)
- the sustainability of urban art conservation treatments (Activity 4).

In parallel, were elaborated:

- a multilingual GLOSSARY for the Street Art & Graffiti and Conservation, containing terms and definitions for the description of the artistic characteristics and the assessment of the condition of the objects, build up on the basis of international technical glossaries and taking into account terms arising from street-artists' communities.
- a CONDITION REPORT form, available in PDF o EXCEL file for hand or digital compilation.
- a GUIDELINES document organised as a series of tabs/cards aimed to drive the users towards the definition of the most suitable and effective approach for the conservation, intended as enhancement of the knowledge and direct intervention on the different urban artworks.

The aim was to have reference documents tailored for the specific needs of the project itself, including the educational purposes. Moreover, the documents can be used as methodological and practical tools to refer by any professional facing an intervention on a work of art belongings to public art heritage.

These documents constitute the outputs of the WP5 work.

## 1. 2. WP5 structure and working methodology

According to the main goal of the WP, in the first phase four main activities were defined and structured as follow:

- ACTIVITY 1: investigation of the most widespread methodologies for urban art conservation;
- ACTIVITY 2: tests for conservation products efficacy assessment and for the evaluation of intervention methodologies;
- ACTIVITY 3: analysis of products on the market and technical information reported in the technical/safety data sheets;

- ACTIVITY 4: economic and environmental sustainability for conservators and producers.

Each activity consisted of tasks specifically designed by the WP leader (WPL) for either commercial or academic partners, with the purpose of including different perspective and contributions in the complex analysis of conservation approach. As described further, every task is specifically aimed to investigate one or more aspects of the main topic defined by the activity.


During the 4th meeting held in Venaria (Italy) in October 2019 a general presentation of the activities structure and of the different topics to study was proposed with the aim of discussing about the involvement of the different partners: in that occasion, some doubts arose about the possibility to work individually, mainly in reason of the need of collecting information from the widest number of local conservators, as previewed in activity 1. Therefore, “country clusters” were created for Croatia and German partners. Nevertheless, specific tasks, addressed to either commercial or academic partners were carried out by the single reference partner, as fully detailed hereafter.

The preparation for some documents was preliminary discussed during the 2nd CAPuS meeting held in Split in July 2018: the proposals for the structure of the glossary and the condition report form were presented by CCR and discussed by all partners.

A preliminary English draft of the extended glossary was developed by CCR and Montana and underwent to all partners for their feedback, suggestions and modifications were included. A steering committee was called in order to discuss some specific issues and amend the final version of the document. All partners contribute in the creation of reduced bilingual versions of the glossaries in their own mother-tongue language.

Finally, the document of the guidelines for the conservation intervention was writing by CCR, following the examination of materials collected from the surveys.

### 1. 3. A note on the work package duration

Regarding tasks and expected results, there were no significant deviations from the work plan. The only significant deviation concerns the duration of the work package: the WP5 activities started as foreseen in month 16 (April 2019) but the work extended to month 36 (December 2020) instead to end in month 24. Two main reasons caused this delay: first of all, the partners were still engaged on previous delayed WP activities and second, the emergency due to the spread at European level of SARS-COV 2 pandemic limited the progress of the on-going work of all partners, and especially of the industrial ones.

### 1. 4. Content of the report

This report is not composed by individual reports submitted by the partners, it has a structure slightly different from the previous ones, as a results of the different organisations of WP5 activities. Since not all partners of the project have direct operational skills in conservation practice but deals with conservation science, materials science and materials production, the WP5 activities were not strictly practical but focussed on the analysis and definition of needs in relation to conservation products and methodologies.
This report is written by the WP leader and contains in the first part the individual contributions that the Research groups elaborated within the surveys activities identified for the WP5 collaborative work.
Each chapter from two to five reports the results of the 4 activities focussed on methodologies, evaluation tests, products and sustainability issues, supplied with all the filled sheets received by the partners.
Moreover, the chapters five to seven report the work methodology adopted for the realization of the 3 documents that constitute the main outputs of the work package: the CAPuS glossary, the condition report template and the guidelines for the conservation intervention.
These 3 documents were enclosed apart.

### 1. 5. Added value due to the European dimension of the project

One of the main aims of the project was network building and establishing a cooperation framework within European institution involved in the heritage conservation. The collaborative work among the partners involved in the CAPuS project and the opportunity to compare the experiences and conservative strategies applied within the different European countries were essential in the development of shared guidelines. These can represent a valuable tool to select the best actions for the conservation of contemporary murals and public artworks in terms of effectiveness, not harmfulness for the original materials and sustainability. The search of common practices to face those issues is fundamental at international level to reach the goals of sustainable development (DSGs), as outlined by the UN Agenda 2030. The guidelines and activities carried out within the WP5 followed exactly this direction: on the one hand, conservation of art in public spaces is recognized as a key element for a sustainable urbanization (goal 11.4), on the other hand any intervention and product used must be safe for workers (goal 8.8) as well as environmental-friendly. Thus, attention was paid by all partners in wondering which aspects should guide the production/selection of product and the design of a proper conservation strategy: as stated by the goal 12.4, it is crucial to “achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, and

significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment".

### 1. 6. Benefits from cooperation/sharing of competences among the partners

The heterogeneity of the partnership allowed to face some important issues from different perspective fostering mutual learning and promoting fruitful debates. For examples during the Glossary preparation, the discussions about specific but substantial terms, as graffiti and vandalism, brought out how much general approaches could differ. Starting from the very beginning the different professional backgrounds and the varied national approaches arose and the partners were committed to find a shared vision on specific matters. This process promoted the identification of the best practices commonly adopted at national and at European level and the introduction of new integrated pathways that have to be improved in time and validated in the future.

# 2. ACTIVITY 1: Methodology and state of the art.

## 2. 1. Description and structure of the activity

The “activity 1” of work package 5 aimed to define the current frame for street art conservation in Europe, through the investigation of the most common practices and approaches to the different steps of an intervention, spacing from the preliminary selection of products to the evaluation of the treatments.

The activity was subdivided in the following two tasks:

1- TASK1: Providing a list of national conservators, who experienced one or more issues related to the conservation of urban art or to the definition of a proper methodology for the intervention on street/contemporary outdoor artworks, and send them the survey prepared ad hoc by WPL;
2- TASK2: Analyse the results collected from the surveys and define a general frame for the different issues under study, namely the most important steps for the definition of the different actions and the identification of the most shared criteria within the intervention on an urban artwork.

## 2. 2. Methodology and partners’ involvement

Considering the need of reaching a significant number of conservators, a sharable digital survey was prepared by the WPL and shared with the partners, using the online app Google Form®.
The survey consisted in a series of questions (reported hereafter) related to different aspects of the intervention process, highlighting the fundamental issues at the basis of the selections of products for cleaning, consolidation and protection, and the most attested approach to each conservation treatment.

Sezione 1 di 5

## CAPuS_preliminary conservation survey

ABOUT THE CAPuS PROJECT:
CAPuS project is an European Project funded by ERASMUS+- Knowledge Alliances. The consortium is composed of 15 full partners and 2 associated partners from 5 countries, including universities, academies, companies and research centers. The project aim to effectively contribute to the dissemination of knowledge in the field of public art conservation, through the close cooperation of researchers, universities, conservators and companies.
FOR FURTHER INFORMATIONS:
http://www.capusproject.eu/

Considering that one of the aims of the project consist in the definition of protocols and guidelines for urban art conservation, the present survey represent the first step of an international recognition of current practices for public art treatments. If you are a conservator, or a professional involved in conservative interventions on public artworks, please answer the questions below considering your own experience and knowledge, in relation to your general conservation intervention practices. The survey is subdivided in several sections, each related to specific operations or preliminary approaches; for each question the suitable response mode is indicated (short paragraph, multiple choice,..), for multiple choice more than one option can be selected.

If you are interested in the conservation of artworks in public spaces, you might find some interesting materials on CAPuS website (linked above).. stay tuned for more updates!

1 - Are you a conservator?

- ○ Yes
- ○ No

2 - Are you currently enrolled in an institution ?

- ○ Yes
- ○ No, I work as a freelance conservator
- ○ Other

3 - If "yes", please name your institution.

Testo risposta breve

4 - Have you ever faced the conservation of artworks in public spaces?

- ○ Yes
- ○ No
- ○ Other

5 - Please, give a brief description of the public artworks you worked on, especially in relation to the constitutive materials.

Testo risposta lunga

Sezione 2 di 5

# Conservative intervention: cleaning

Descrizione (facoltativa)

6 - Generally, what kind of material you intended to remove by mean of a cleaning treatment?

- [ ] Dust or incoherent deposit
- [ ] Particulate or deposit with a low-medium adhesion to the painting surface
- [ ] Products associated with the presence of animals (manure, plumes,..)
- [ ] Residues of biological growth, such as moss, biofilm, bacterial colonies, fungi,..
- [ ] Salts precipitation on the surface
- [ ] Stain related with the presence of applied elements (e.g. gutters, pipes..)
- [ ] Stain related with external causes (e.g. moisture, fire,..)
- [ ] Stain related with alteration of constitutive materials (e.g. corrosion of metal elements, alteration of protec...
- [ ] Materials associated with vandalism (such unwanted graffiti, tags or any materials deliberately applied on ...

7 - Thinking to a conservative intervention on a public artwork, how do you set up the cleaning metholodogy?

| | Yes | No | Other |
|---|---|---|---|
| Premininary tests on mo... | ○ | ○ | ○ |
| Preliminary tests on site | ○ | ○ | ○ |
| Scientific researches | ○ | ○ | ○ |
| Previous experience on s... | ○ | ○ | ○ |

8 - According to your experience, what criteria have been the most important for cleaning treatment setting in public artworks?

- [ ] Sustainability (economic)
- [ ] Sustainability (impact on environment and operators)
- [ ] Selectivity
- [ ] System modulation and control
- [ ] Compatibility with constitutive materials

9 - What did you usually test for the superficial cleaning?

- [ ] Dry cleaning
- [ ] Organic solvents
- [ ] Poultice
- [ ] Gels
- [ ] Specialised commercial products for the restoration
- [ ] Commercial products for unspecialised users
- [ ] Mechanical cleaning (sandblasting, sanding)
- [ ] Laser
- [ ] Combination of several methods
- [ ] Altro...

10 - Considering either a specific intervention or your personal experience, which cleaning method did you find most appropriate? Why?

Testo risposta breve

11 - Did you faced unwanted graffiti overlapping the street artworks you were conserving?

- ( ) Yes
- ( ) No

12 - Have you decided to remove unwanted graffiti?

- ( ) Yes
- ( ) No

13 - If "yes", why?

- [ ] Aesthetic reasons
- [ ] Conservative reasons
- [ ] Other

14 - Have you ever faced problems or critical issues related to the cleaning treatments?

- ( ) Yes
- ( ) No

15 - If "yes", please give a brief description

Testo risposta lunga

Sezione 3 di 5

## Conservative intervention: consolidation

Descrizione (facoltativa)

16 - Which degradation phenomena did you find on the artworks?

- [ ] Loss of cohesion (powdering, crumbling, ..)
- [ ] Loss of adhesion (Scaling, flaking,..)
- [ ] Other

17 - Are they related to a specific painting/background layer or primer?

- ( ) Yes
- ( ) No
- ( ) N.A.

18 - In case of loss of cohesion, what methodology for consolidant treatments have you tested?

- ( ) Spray application
- ( ) Brush (directly on the surface)
- ( ) Brush (through Japanese Paper)

19 - What class of product have you tested for loss of cohesion treatment?

- [ ] Acrylic resins
- [ ] Micro-acrylic resins
- [ ] Inorganic products
- [ ] Etyl-silicate
- [ ] Alchyl-alcossi-silane
- [ ] Siloxane
- [ ] Colloidal silica
- [ ] Ammonium oxalate
- [ ] Vinylic resins
- [ ] Cellulose poultice

20 - In case of loss of adhesion, what methodology for products application have you tested?

Testo risposta lunga

21 - What class of products have you tested for loss of adhesion treatment?

- [ ] Acrylic resins
- [ ] Micro-acrylic resins
- [ ] Inorganic products
- [ ] Ethyl-silicate
- [ ] Alkyl alkoxysilane
- [ ] Siloxane
- [ ] Colloidal silica
- [ ] Ammonium oxalate
- [ ] Vinyl resins
- [ ] Cellulose poultice
- [ ] Epoxy resin
- [ ] Polyester resin

22 - What criteria did you consider most relevant in the setting of a consolidant methodology?

- [ ] Adhesion properties
- [ ] Absence of chromatic/gloss alteration
- [ ] Absence of water absorption variation
- [ ] Durability
- [ ] Compatibility with original materials
- [ ] Sustainability (economical and environmental)

## Conservative intervention: protection

Descrizione (facoltativa)

23 - Have you ever applied protective coating on public artworks?

- ○ Yes
- ○ No

24 - What class of protective coatings have you selected?

Testo risposta breve

25 - In the preliminary product selection, what properties have you considered?

- ☐ Absence of chromatic alteration of the surface
- ☐ Hydrophobicity
- ☐ Absence of gloss alteration
- ☐ Absence of residues after removal (only for temporary protective coating)
- ☐ Absence of interaction with constitutive materials
- ☐ Durability
- ☐ Resistance to atmosferical agents
- ☐ Resistance to ageing and UV light

26 - How do you evaluated these properties?

Testo risposta breve

27 - Have you monitored the protective coating after application?

- ○ Yes
- ○ No

28 - If "yes", have you set up macroscopic monitoring or analytical protocols? Give a brief description.

Testo risposta breve

Then, every partner/national cluster sent the survey to a list of conservation experts, that preferably work within national institutions or as freelances; when the number of the reachable local professionals specialised in outdoor/contemporary/urban art conservation was too little, conservator from international institutions were included. The intent of initially limit the survey to national professionals reflected the willing to highlight differences in the approaches or in the methodologies that can be somehow linked to the specific cultural and historical context of the different countries involved in the project. In fact, in the perspective of the construction of sharable protocols, the identification of similarities and differences in the study or in the intervention on this kind of artwork, undoubtedly represents one of the key factors for the construction of protocols that, at least at European level, might be agreed.
The document was firstly written in English even if, to simplify the spread at national level, it was decided to let to every partner the possibility to translate all the survey in the national language: therefore, the survey was translated in Croatian, Polish and Spanish by the respective partners.
After completed the first task, consisting in listing the wider number of local conservators and share with them the survey, every partner/national cluster was asked to report the results obtained filling a resume form (task 2).

Considering the different professional specialisations, some of the partners grouped in national clusters for this activity, as follow[1]:

- Research group 1: includes partner 1, University of Turin (Italy)_UNITO
- Research group 2: includes partner 2, Centro Conservazione e Restauro "La Venaria Reale" (Italy)_CCR
- Research group 3: includes partner 3, CESMAR 7 (Italy)
- Research group 4: includes partner 4, AN.T.A.RES (Italy)
- Research group 5: includes partner 5, Cologne Institute of Conservation Sciences (Germany)_CICS and partner 6, Schmincke (Germany)
- Research group 6: includes partner 7, Academy of Fine Arts of Warsaw (Poland)
- Research group 7: includes partner 10, University of Split (Croatia), partner 11, METRIS (Croatia), and partner 13, Sisak Municipal Museum (Croatia)
- Research group 8: includes partner 15, University of Vigo (Spain)
- Research group 9: includes partner 16, Montana Colors

[1] The following references to the partners' number are based on those reported in the CAPuS "detailed project description"

### 2. 3. Analysis of the results

The analysis of the results showed a heterogeneous scenario, possibly in reason of a lack of common vocabulary that often leads to misunderstandings in the identification of the degradation phenomena and, thus, in the explication of the related conservation approaches. The survey reached about fifty conservators, from different European countries, almost equally split between professionals enrolled in an institution and freelance, having experienced intervention on a variety of public artworks (metals, architectural surfaces, wall paintings, stone...).

Considering the cleaning treatments, almost two/third of the participants traced back the substances-to-remove to both the dust/incoherent deposit and the residues of biological growth; outpointing the presence of materials related with vandalism as the third class to whom address the cleaning treatments. Usually, the setting up of the methodology is based on tests realised directly on site, scientific research and previous experience of the professionals involved. Less than the half of the interviewed reported the systematic use of mock-ups for products and methodologies selection.

A variety of different methodologies is attested: dry cleaning is usually used as preliminary step, followed by other treatments often realised with a combination of different methods. Organic solvents and gels resulted to be as well attested, probably in reason of the prevalence of additional materials related with vandalic actions (such as unwanted graffiti, scratches, stickers...). In fact, more than a half of the participants declared to have removed, at least once, graffiti, mainly for aesthetic reasons.

The investigation of consolidation practices revealed that only in a few cases, mainly because of the lack of a multipurpose and specific analytical campaign, degradation related with loss of cohesion and adhesion can be clearly due to the presence of unproper constitutive materials. Either applied by spray or brush, the acrylic, micro-acrylic resins, together with inorganic products and ethyl-silicate are the most used consolidants for loss of cohesion, while scales, flaking and other degradation related with loss of adhesion, are usually treated with acrylic resins, and, only in few cases with micro-acrylic resins, inorganic products and epoxy resins (probably when wider scales of structural degradation are attested). For the selection of the most suitable product, the guiding requirements are usually the adhesive power, the absence of chromatic/gloss alteration and the durability (intended as the possibility to maintain the original properties in outdoor exposition for long periods).

The possibility to protect the exposed surfaces resulted not so widespread: only half of the participants declared to usually consider the application of protective coatings at the end of an intervention. The most interesting result, in this perspective, is that even if the major of the users considers the absence of interactions with the constitutive materials and the resistance to UV rays/ageing the most important criteria for the selection of the protective coating, only few participants reported the use of scientific analysis for the monitoring of the products after the application on the artworks surfaces.

### 2. 4. Problems encountered & implemented or proposed solutions.

Problems were encountered in:

1. Listing a significant number of conservators who experienced street/urban art conservation. So far, the experience within the European context in street art conservation is very limited

2. Even when a significant number of professionals was reached with the survey, only few of them took part in the survey: often the minimum number of 10 fillers for the survey couldn't be reached, leading to results that have poor statistical significance.
3. Adapting the original work plan and timing of WP5 to the criticalities related with the current pandemic worldwide situation, an extension of the deadline for WP5 was necessary.
4. Some partners didn't manage to take part in the WP, therefore the analysis and the survey didn't reach all the professionals in the European countries of the project partners.

### 2. 5. List of the hereby attached documents received from partners.

**Reports received from the research groups:**

- Research group 1 **WP5_1task2_survey results by UNITO**
- Research group 2 **WP5_1task2_survey results by CCR**
- Research group 3 **WP5_1task2_survey results by CESMAR 7.**
- Research group 4 **WP5_1task2_survey results by AN.T.A.RES**
- Research group 5 **WP5_1task2_survey results by CICS and Schmincke**
- Research group 6 **WP5_1task2_survey results by Academy of Fine Arts of Warsaw**
- Research group 8 **WP5_1task2_survey results by University of VIGO**


## *WP5_ACTIVITY 1_TASK2: REPORT OF PRELIMINARY SURVEY by UNITO*

*Please, summarize the information obtained from all your contacts through the survey*

| | |
|---|---|
| **How many professionals replied to the survey?** | [Please, detail the total number of professionals involved, how many of them are conservators, how many are freelance or are enrolled in an institution…]<br><br>10 professionals replied to the survey. 7 of them are enrolled in an institution (National Museum of Denmark; Universitat Politècnica de València; Getty Research Institute; Supsi, Lugano, and SABAP, Firenze; Department of Conservation of Antiquities and Works of Art, University of West Attica; Opificio delle Pietre Dure, Firenze; Nicola Restauri) and 3 are freelance conservators |
| **Categories of artworks** | [Please, list all types of artworks / constitutive materials reported]<br><br>Wall paintings; modern outdoors murals (mostly synthetic binding media), street art (paste ups, mixed media, acrylic and vinyl paints), graffiti and graffiti writing (sprays, spray alkyd paints) on household emulsion (not always), on plaster or concrete wall; household paint on wall (plaster/concrete); combination of spray, household paint and felt pen on wall; public artworks in stone, bronze, iron; outdoor sculptures; stone and marble monuments. |
| **Cleaning – approach and setting** | [Please, report what are the most important criteria, considered in the set-up of a cleaning methodology, referring also to preliminary and control tests).<br><br>Materials to be removed with cleaning treatments are: dust or incoherent deposit, particulate or deposit with a low-medium adhesion to the painting surface, residues of biological growth (e.g. moss, biofilm, bacterial colonies, fungi, etc.), salts precipitated on the surface, stain related with external causes (e.g. moisture, fire,..), stain related with alteration of constitutive materials (e.g. corrosion of metal elements, alteration of protective layers,..), materials associated with vandalism (e.g. unwanted graffiti, tags or any materials deliberately applied on the surface), products associated with the presence of animals (e.g. manure, plumes,…).<br><br>The most important criteria for setting the cleaning methodology are (in order from most cited to least cited): compatibility with constitutive |

| | |
|---|---|
| | materials (9/10), sustainability in terms of impact on environment and operators (7/10), selectivity (6/10), system modulation and control (6/10), economic sustainability (4/10).<br><br>To set the cleaning methodology 6 out of 10 of the survey participants do preliminary cleaning tests on mock ups. All the survey participants carry out preliminary cleaning tests on site and rely on their previous experience on similar artworks. 9 out of 10 perform scientific researches. |
| **Cleaning** | [Please, report the cleaning treatments described as the most appropriate; for each one, specify in relation to which kind of material to be removed it was applied. If any treatment was applied by more than one conservator, please make a list in order from the most to the less used. Add a row for each type of treatment]<br><br>Cleaning treatments are listed in order from the most used to the least. When available, the information on whether and when these methods are appropriate has been added. 5 out of 10 of the survey participants answered that there is not an appropriate cleaning method, it depends on the type of substrate, the type of deterioration and the type of deposit. In many cases the best is a combination of methods, such as gels with mechanical cleaning or dry cleaning and solvents.<br><br>1. Dry cleaning (9/10): it is considered appropriate by one of the survey participants, but dangerous by another because mechanical action causes damage due to abrasion on wall paintings |
| | 2. Organic solvents (8/10): appropriate to remove oxidised varnish layers (on paintings on canvas and wood) |
| | 3. Gels (7/10): superior results have been obtained with Peggy 6 hydrogels produced by CSGI loaded with water and other cleaning liquids |
| | 4. Combination of several methods (7/10) |
| | 5. Poultice (6/10): poultices are problematic due to spreading of cleaning liquids and subsequent moisture ring formation |
| | 6. Mechanical cleaning (sandblasting, sanding) (5/10) |
| | 7. Laser (3/10) |
| | 8. Specialised commercial products for the restoration (2/10) |
| | 9. Commercial products for unspecialised users (1/10) |
| | |
| **Consolidation**<br>***(> loss of cohesion)*** | [Please, report the class of products tested for cohesion treatments; for each class, specify in relation to which degradation phenomena it was applied and the application methodology. If any treatment was applied by more than one conservator, please make a list in order from the most to the less used. Add a row for each type of treatment]<br><br>Application methodologies of products for cohesion treatments are: brush through Japanese paper (3/7), brush directly on the surface (2/7), spray |

| | |
|---|---|
| | application (2/7). They have not been related to classes of products.<br>1. Acrylic resins (6/8) |
| | 2. Inorganic products, Ethyl-silicate, Alkyl–alcossi-silane, Colloidal silica (6/8) |
| | 3. Micro-acrylic resins (3/8) |
| | 4. Cellulose poultice (3/8) |
| | 5. Siloxane |
| | 6. Ammonium oxalate |
| | 3. Vinylic resins |
| **Consolidation**<br>***(> loss of adhesion)*** | [Please, report the class of products tested for adhesion treatments; for each class, specify the application methodology. If any treatment was applied by more than one conservator, please make a list in order from the most to the less used. Add a row for each type of treatment]<br>1. Acrylic resins (7/9): applied with syringes on the back of the paint flakes |
| | 2. Inorganic products (3/9) |
| | 3. Polyester resin (2/9) |
| | 4. Epoxy resin (2/9) |
| | 5. Micro-acrylic resins (2/9) |
| | 6. Vinyl resins (2/9) |
| | 7. Cellulose poultice |
| | 8. Ethyl-silicate |
| | 9. Cement grouts: applied via injection while using vacuum |
| | The application methodology depends on the level of damage and based always on previous research and experience in similar treatments previously completed. It depends on the situation, the environment, the client's and artwork's needs.<br>Adhesives are applied locally by brush. Application methodology includes tests on mock ups, in situ tests and evaluation procedure. It depends on the background of the detached surface. |
| **Criteria for consolidant methodology definition** | [Please, summarize here the most relevant criteria in the setting of a consolidant methodology]<br>Adhesion properties (5/9), absence of chromatic/gloss alteration (6/9), durability (6/9), compatibility with original materials (6/9), absence of water absorption variation (5/9), sustainability (economical and environmental) (3/9) |

| | |
|---|---|
| **Protection** | [Please, report the products tested as protective coatings; for each product, specify the properties considered in the selection and the way these properties were evaluated. If any coating was applied by more than one conservator, please make a list in order from the most to the less used. Add a row for each type of treatment]<br><br>5 out of 10 of the of the survey participants applied protective coatings on public artworks.<br><br>In general, product properties considered for their selection are: absence of chromatic alteration of the surface (2 preferences), hydrophobicity (2 preferences), absence of gloss alteration, absence of interaction with constitutive materials (4 preferences), durability (3 preferences), resistance to atmospheric agents (3 preferences), resistance to ageing and UV light (4 preferences), absence of residues after removal (only for temporary protective coating) (2 preferences).<br><br>In general, products are evaluated by several methods (not specified by the survey participants), including tests on mock ups and in situ tests, reviewing product specifications and/or doing research.<br><br>1. acrylics (2/5) + with additives, 2 to 3 layers with different composition - properties considered in the selection: absence of interaction with constitutive materials, resistance to atmospheric agents, resistance to ageing and UV light, absence of residues after removal (only for temporary protective coating), durability; evaluation is done through tests on mock ups and in situ tests, reviewing product specifications and/or doing research. |
| | 2. nanotechnology water repellent (1/5) - properties considered in the selection: absence of chromatic alteration of the surface, hydrophobicity, absence of gloss alteration, absence of interaction with constitutive materials, durability, resistance to atmospheric agents, resistance to ageing and UV light. |
| | 3. inorganic (1/5) - properties considered in the selection: hydrophobicity, absence of interaction with constitutive materials, durability |
| | 4. anti-graffiti coatings (1/5) |
| | |
| **Monitoring** | [Please, report here macroscopic of analytical protocols set up for the monitoring of the protective coating after its application]<br><br>Karsten pipette, spectrophotometer, SEM, ...<br><br>Detailed protocol that includes macroscopic, microscopic examination, imaging techniques, comparison with laboratory samples, colorimetry etc.<br><br>Analytical protocol (solubility test, reversibility, appearance evaluation, reaction to the environmental conditions)<br><br>Macroscopic monitoring comparing high resolution pictures in specific environmental conditions. Colorimetry to identify changes in the short term. |

## *WP5_ACTIVITY 1_TASK2: REPORT OF PRELIMINARY SURVEY by CCR*

*Please, summarize the information obtained from all your contacts through the survey:*

| | |
|---|---|
| **How many professionals replied to the survey?** | 8 conservators filled the form: 4 are from CCR "La Venaria Reale", 3 from ISCR and 1 works as freelance. |
| **Categories of artworks** | 1- I worked on the marble base of "the colonna Antonina" at the vaticans museum and I'm Not sure it can be considered a public artwork because though it is set in an outdoor environment, it has a sort of protection shelter and panels above and on the sides;<br>2- Monuments in bronze and stone; stone architecture;<br>3- I' ve worked on a contemporary abstract mural painting, which was designed by the Italian artist Giuseppe Capogrossi in 1954 in the Airone ex-cinema theatre in Rome. The mural, based on PVAc synthetic paint, was in a highly degraded conservative situation which can be practically compared with some outdoor conservative problems due to environmental factors. Many degradation causes like lacunae, swelling, mixing and loss of cohesion of the original colors - the latter especially connected to the high presence of efflorescence and sub florescence of soluble salts - were all due to the persistency of the water through the painting. Moreover, the decoration was completely covered by synthetic coatings, generating the same cleaning problems that are connected in street art mural paintings. Now I'm generally studying on artworks in public spaces, focusing on reintegration materials in a research project which will involve another synthetic mural painting.<br>4- Mural paintings in buildings and sites, archaeological contexts, monuments, complex multimaterial sculptures, mosaics, decorated surfaces of architecture, paintings on panels and canvas, wooden sculptures;<br>5- I worked on several Keith Haring murals and I published the results in many places with Will Shank. The most recent is about the Haring's technique in the eighties for the publication of the group associazione con l'arte about muralism conservation.<br>6- Working as freelance conservator I designed the conservation project of the surfaces of the Architecture Faculty in Valle Giulia in Rome. The surfaces had been decorated during the 1968 with engraving technique in the pozzolanic plaster, painted with silicate paints. The authors were a group of Situationists by the name of Birds. The operation carried out during the occupation of the faculty |

| | |
|---|---|
| | marks a historical event at the time also supported by Guttuso who had followed the operations closely and who was perhaps the author of an element. An inscription reported in emulsion acrylic the writing “away the police from the University”. In the 1990s another moment of student struggle with the Panthers had defined the margins of the engravings with black white and yellow stripes and added some figures. The restoration after making the analysis of the constituent materials involved the elimination of the second phase and the recovery of the decoration of '68, including the writing. |
| **Cleaning – approach and setting** | Substances to be removed:<br><br>1) Dust or incoherent deposit, (8/8)<br>2) Particulate or deposit with a low-medium adhesion to the painting surface; (6/8)<br>3) Products associated with the presence of animals (manure, plumes...), (5/8)<br>4) Residues of biological growth, such as moss, biofilm, bacterial colonies, fungi... (4/8)<br>5) Salts precipitation on the surface; (5/8)<br>6) Stain related with the presence of applied elements (e.g. gutters, pipes...), (4/8)<br>7) Stain related with external causes (e.g. moisture, fire...), (4/8)<br>8) Stain related with alteration of constitutive materials (e.g. corrosion of metal elements, alteration of protective layers...) (5/8)<br>9) Materials associated with vandalism (such unwanted graffiti, tags or any materials deliberately applied on the surface); (7/8)<br><br>CLEANING METHODOLOGY SETTING UP:<br><br>- Preliminary tests on mock-ups (7/8)<br>- Preliminary tests on site (7/8)<br>- Scientific researches (7/8)<br>- Previous experience on similar artworks (6/8)<br><br>MAIN EVALUATION CRITERIA:<br><br>1) Sustainability (economic) (5/8)<br><br>2) Sustainability (impact on environment) (4/8)<br><br>3) Selectivity (6/8)<br><br>4) System modulation and control (3/8)<br><br>5) Compatibility with constitutive materials (8/8) |
| **Cleaning** | Most common cleaning method<br><br>1. Dry-cleaning<br>2. Organic solvents<br>3. Poultice<br>4. Gels<br>5. Specialised commercial products for the restoration |

| | |
|---|---|
| | 6. Commercial products for unspecialised users<br>7. Laser<br>8. Combination of several methods<br>+ Organic solvent in gel + eventually laser cleaning<br><br>7 out of 8 faced unwanted graffiti and all of them decided to remove them both for aesthetic and conservation reasons.<br><br>5 out of 8 faced some critical issues with the cleaning method:<br><br>1- yes, I did, in many cases and for two different reasons: deontological - understanding if the effect was part of the idea by the artist or unwanted; technique - impossibility of selectivity about what you want to remove from the original, so you have to resort to retouching but as long as this also does not create future irreversibility problems linked to its future removal selectivity.<br>2- on the Pisa project the rubber erasers were not suitable due to the roughness of the surface<br>3- almost always the substrate is weaker than the graffito and in a bad state of conservation that means a lot of difficulties and compromises to reach the best result in terms of conservation and aesthetic<br>4- The original synthetic pictorial film was strictly linked with the overpainted synthetic layers. The efflorescences and sub-florescences were trapped also underneath the original painting layer, causing other degradation problems.<br>5- Poor dissolution and extraction of metal oxide from stone surfaces; hard cleaning of graffiti from stone and porous surfaces. |
| **Consolidation**<br>***(> loss of cohesion)*** | Loss of adhesion is more frequent that loss of cohesion (when loss of adhesion always loss of cohesion, not vice versa)<br><br>Spray application (6/8) of:<br><br>1. Acrylic resins (4/8)<br>2. Micro-acrylic resins (4/8)<br>3. Inorganic products (3/8)<br>4. Ethyl-silicate (2/8)<br>5. Alkyyl-alcoxy-silane (1/8)<br>6. Siloxane (1/8)<br>2 out of 8 did not answer at all. |
| **Consolidation**<br>***(> loss of adhesion)*** | General answers (4/8)<br><br>A- Organic and inorganic treatments, according to the problems.<br><br>B- injection, replacement with several adhesives, deep injection with modelled props to sustain the surfaces, placements of sustaining structures or elements in order to give coherence and stability to the artwork system<br><br>C- CTS product Fluoline HY<br><br>D- Acrylic resins on the writing made with acrylic paint<br><br>Classes of products (7/8 answers):<br><br>1- Acrylic resins (6/8) |

| | |
|---|---|
| | 2- Microacrylic resins (3/8)<br>3- Inorganic products (2/8)<br>4- Epoxy resins (2/8)<br>5- Ethyl-silicate (1/8)<br>6- Colloidal silica (1/8)<br>7- Vinyl resins (1/8) |
| | |
| **Criteria for consolidant methodology definition** | Most relevant criteria (7/8 answers):<br><br>1- Adhesion properties (6/8)<br>2- Absence of chromatic/gloss alteration (6/8)<br>3- Compatibility with original materials (6/8)<br>4- Durability (4/8)<br>5- Absence of water absorption variation (2/8)<br>6- Sustainability (economical and environmental) (2/8) |
| **Protection** | 3 out of 8 have applied a protective treatment on outdoor (urban context) artworks.<br><br>Classes of products:<br><br>1. Polysiloxane for stone – acrylic resins and wax for bronze<br>2. Acrylic and silicon-based materials, fluor elastomers, in some rare cases mineral coatings<br>3. Phase product water based Hydrophase, sprayed<br>4. I never applied protective coating on *murales*, I normally use polysiloxanes for the stones and the bricks<br><br>Criteria for evaluation:<br><br>1- Absence of chromatic alteration of the surface (8/8)<br>2- Hydrophobicity (4/8)<br>3- Absence of gloss alteration (7/8)<br>4- Absence of residues after removal (only for temporary protective coating) (2/8)<br>5- Absence of interaction with constitutive materials<br>6- Durability<br>7- Resistance to atmospheric agents<br>8- Resistance to ageing and UV light<br>Evaluating systems (3 answers out of 8):<br><br>1-Preliminary studies (1/8)<br><br>2- Technical sheets, tests and scientific analysis. Bibliography. Previous documentation and experience. (1/8)<br><br>3- From Study Sector (1/8) |

| | |
|---|---|
| **Monitoring** | 7 out of 8 answers. 3 out of 7 monitored the artwork after the application of protective coating:<br><br>1- Optical observation and photographic documentation<br>2- When possible in terms of time, money and possibility to reach the surface: periodic survey with condition reporting, photos likely, colorimeter with background measurements<br>3- Perla Colombini of Pisa University made accelerated aging tests (for Keith Haring murals) |


## *WP5_ACTIVITY 1_TASK2: REPORT OF PRELIMINARY SURVEY by CESMAR7*

*Please, summarize the information obtained from all your contacts through the survey*

| | |
|---|---|
| **How many professionals replied to the survey?** | We received 3 answers back from conservators, all enrolled in institutions (Academy of Fine art of Bologna and Como and Mibact) |
| **Categories of artworks** | All the artworks considered are contemporary murals (acrylic, alkyd and vinyl paints on plaster and concrete); only one mural on canvas is included |
| **Cleaning – approach and setting** | [Please, report what are the most important criteria, considered in the set-up of a cleaning methodology, referring also to preliminary and control tests).<br><br>Materials to be removed from the surface are: (most common)<br><br>- dust and incoherent deposit<br>- Low- medium adherent particulate<br>- Vandalisation<br>Only in one case biological growth, salt precipitations and stains related with constituent materials have been treated.<br><br>The most important criteria to select the cleaning treatments are selectivity (3/3), compatibility with constitutive materials (3/3), system modulation and control (2/3) and sustainability economic, environmental and for the operator) (1/3)<br><br>In order to set up the cleaning methodology, the most common approach is to perform preliminary tests on both mock-ups (2/3) and on site (2/3), together with scientific research (2/3) and the previous experience on similar artworks (2/3). |
| **Cleaning** | [Please, report the cleaning treatments described as the most appropriate; for each one, specify in relation to which kind of material to be removed it was applied. If any treatment was applied by more than one conservator, please make a list in order from the most to the less used. Add a row for each type of treatment]<br><br>Dry cleaning is the most common method performed, but only for deposit (incoherent or low- medium adhesion); for vandalisation or overpainting removal, a gradual and selective approach combining different methods is |

| | |
|---|---|
| | desirable, but it is not possible to indicate a unique method, because there is a strong influence by type of paint, substrate and difference in solubility between constituent materials and applied materials. One of the main issues in order to select the cleaning method is deriving also by the large size of the artwork, together with the non-homogeneity of conservation<br><br>1. Dry cleaning (3/3) (on dust incoherent deposit and low-medium adherence deposit, residues of biological growth) |
| | 2.Gels (3/3) (Low- medium adherent materials, vandalisation) |
| | 3. Combination of several methods (3/3) (for all types of materials to be removed, no further specification are supplied) |
| | 4. Organic solvent (1/3)<br><br>5. Laser (1/3) for the removal of vandalisation/tags in case there was no possibility of selectivity with the original (same materials e.g. acrylic spray on acrylic paint) |
| **Consolidation**<br>***(> loss of cohesion)*** | [Please, report the class of products tested for cohesion treatments; for each class, specify in relation to which degradation phenomena it was applied and the application methodology. If any treatment was applied by more than one conservator, please make a list in order from the most to the less used. Add a row for each type of treatment]<br><br>1.(1/3) Method: brush<br><br>Micro-acrylic resins<br><br>Inorganic products<br><br>Ethyl-silicate, vinyl resins |
| | |
| | |
| | |
| **Consolidation**<br>***(> loss of adhesion)*** | [Please, report the class of products tested for adhesion treatments; for each class, specify the application methodology. If any treatment was applied by more than one conservator, please make a list in order from the most to the less used. Add a row for each type of treatment]<br><br>Adhesive are applied by brush or with injection under flake (local treatment)<br><br>1. Acrylic resin (3/3) |
| | 2. Vinyl resin (3/3) |
| | 3. Micro acrylic resins (1/3)<br>4. Inorganic products (1/3)<br>5. Ethyl silicate (1/3) |
| **Criteria for consolidant methodology definition** | [Please, summarize here the most relevant criteria in the setting of a consolidant methodology]<br><br>The general criteria for consolidation treatment definition are:<br><br>1. Adhesion properties (3/3)<br>2. absence of chromatic/gloss alteration (3/3) |

| | |
|---|---|
| | 3. compatibility with original materials (3/3)<br>4. absence of water absorption (2/3)<br>5. Durability (1/3)<br>6. Sustainability (economical and environmental) 1/3) |
| **Protection** | [Please, report the products tested as protective coatings; for each product, specify the properties considered in the selection and the way these properties were evaluated. If any coating was applied by more than one conservator, please make a list in order from the most to the less used. Add a row for each type of treatment]<br><br>Only one conservator applied products for protection, choosing **siloxanes** |
| | The main criteria for the choice are:<br><br>1. Absence of chromatic alteration<br>2. Hydrophobicity<br>3. absence of gloss alteration<br>4. absence of interaction with constituent materials |
| **Monitoring** | [Please, report here macroscopic of analytical protocols set up for the monitoring of the protective coating after its application]<br><br>5. The conservator that applied the coating monitored it for one year in various weather conditions; the area was observed in visible light and with colour measurement taking note of all variations |


## *WP5_ACTIVITY 1_TASK2: REPORT OF PRELIMINARY SURVEY by ANTARES*

*Please, summarize the information obtained from all your contacts through the survey:*

| | |
|---|---|
| **How many professionals replied to the survey?** | We sent the survey to 10 professionals; 2 of them never replied because not really specialized in public art; other 2 refused to fill it in because they found difficulties on answering: in their opinion the questions are too generic and reductive, attached you can find the answers we received from them.<br><br>6 conservators replied to the survey: 4 freelance and 2 enrolled in institutions |
| **Categories of artworks** | Metal sculpture (bronze; mixed materials: outside iron, inside: cement on fiberglass, metal, wood, iron);<br><br>Mural paintings (mixed materials: spray paints, acrylics, tempera, both on bricks, plaster and cement);<br><br>Stuccos, pozzolan;<br><br>Mosaics;<br><br>Ceramic sculptures (semi-refractory enamelled and terracotta) |
| **Cleaning – approach and setting** | The most important criterion is:<br><br>**Compatibility with constitutive materials**;<br><br>Followed by:<br><br>Sustainability (impact on environment and operators);<br><br>Selectivity, System modulation and control.<br><br>The cleaning methods used were mostly selected after:<br><br>preliminary tests on-site;<br><br>scientific researches;<br><br>previous experience on similar artworks |
| **Cleaning*** | **1.Combination of several methods depending on the conservation needs** |
| | 2. Gels → surface cleaning and removal of substances |

| | |
|---|---|
| | 3. Dry cleaning → surface cleaning |
| | 4. Mechanical (with specific and precise tools) → removal of substances and polishing metal surfaces |
| | 5. Aqueous solutions (with surfactants) → superficial cleaning on ceramic surfaces supports |
| | 6. Poultice→ removal of substances |
| **Consolidation** ***(> loss of cohesion)*** | 1. **Micro-acrylic resins** applied by brush (through Japanese paper or directly on the surface) or by spray → Loss of cohesion (powdering, crumbling, ..) * |
| | 2. **Colloidal silica** applied by brush (through Japanese paper or directly on the surface) or by spray → Loss of cohesion (powdering, crumbling, ..) * |
| | 3. **Ethyl-silicate** applied by brush (through Japanese paper) → Loss of cohesion (powdering, crumbling) |
| | 4. **Inorganic products** applied by brush (through Japanese paper) or by spray → Loss of cohesion (powdering, crumbling) * |
| | 5. **Acrylic resins** applied by brush (directly on the surface) → Loss of cohesion (powdering, crumbling) |
| | 6.**Vinylic resins** applied by brush (through Japanese paper) → Loss of cohesion (powdering, crumbling) |
| | 7. **Ammonium oxalate** applied by brush (through Japanese paper) → Loss of cohesion (powdering, crumbling). Please note that this product is out of the market |
| **Consolidation** ***(> loss of adhesion)*** | 1. **Acrylic resins** applied by brush, injections or spray * |
| | 2. **Vinyl resins** applied by brush, injections or spray * |
| | 3. **Epoxy resins** likely applied by brush, injections * |
| | 4. **Inorganic products** applied by brush, injections or spray * |
| | 5**. Micro-acrylic** resins likely applied by brush |
| | 6. **Colloidal silica** applied by brush, injections or spray * |
| | 7. **Polyester resin** likely applied by injections |
| | 8. **PVA resin** |
| **Criteria for consolidant methodology definition** | The most relevant criteria in the setting of a consolidant methodology are, equally:<br><br>Adhesion properties;<br><br>Compatibility with original materials;<br><br>Absence of chromatic/gloss alteration. |

| | |
|---|---|
| | These are followed by:<br><br>Durability;<br><br>and in a less relevant way, by:<br><br>Sustainability (economical and environmental);<br><br>Absence of water absorption variation |
| **Protection** | **1. transparent Nitro protective** product chosen for its absence of chromatic alteration of the surface, hydrophobicity, absence of interaction with constitutive materials, durability, resistance to atmospheric agents and resistance to ageing and UV light. Evaluation: not reported |
| | **2. fluoropolymers water based** (**anti-graffito**) chosen for their absence of chromatic alteration of the surface, absence of gloss alteration and durability. Evaluation: Tests in-situ |
| | **3. Inorganic or silicon based protective products** chosen for its absence of chromatic alteration of the surface, absence of gloss alteration, absence of interaction with constitutive materials, resistance to atmospheric agents and resistance to ageing and UV light. Evaluation: Chromatic and contact angle measurements, chemical properties (e.g. $T_g$) |
| | **4. sol-gel based protective products (nano-silica)** chosen for its absence of chromatic alteration of the surface, absence of gloss alteration, absence of interaction with constitutive materials, durability, resistance to atmospheric agents and resistance to ageing and UV light. Evaluation: Tests in-situ and technical suggestion by manufacturer. |
| | **5. Anti-graffiti coatings not specified** chosen for its absence of chromatic alteration of the surface, hydrophobicity, absence of residues after removal (only for temporary protective coating), absence of interaction with constitutive materials, Resistance to ageing and UV light. Evaluation: not reported |
| **Monitoring** | 3/6 conservators replied that a monitoring after the intervention is necessary and they assert that a visual monitoring under different light radiations (and different conditions) is enough. |

*we are not able to reply in such specific way as requested


## *WP5_ACTIVITY 1_TASK2: REPORT OF PRELIMINARY SURVEY by CICS*

*Please, summarize the information obtained from all your contacts through the survey*

| | |
|---|---|
| **How many professionals replied to the survey?** | 2 freelance<br><br>1 other |
| **Categories of artworks** | Metal sculptures made of bronze, steel, corten steel or painted surfaces. Stone, plastic sculptures. |
| **Cleaning – approach and setting** | Compatibility with constitutive material [Please, report what are the most important criteria, considered in the set-up of a cleaning methodology, referring also to preliminary and control tests). |
| **Cleaning** | [Please, report the cleaning treatments described as the most appropriate; for each one, specify in relation to which kind of material to be removed it was applied. If any treatment was applied by more than one conservator, please make a list in order from the most to the less used. Add a row for each type of treatment]<br><br>1. Cleaning with specialised commercial products for the restoration |
| | 2. |
| | 3. |
| **Consolidation** ***(> loss of cohesion)*** | [Please, report the class of products tested for cohesion treatments; for each class, specify in relation to which degradation phenomena it was applied and the application methodology. If any treatment was applied by more than one conservator, please make a list in order from the most to the less used. Add a row for each type of treatment]<br><br>1. Acrylic resins |
| | 2. Micro-acrylic resins, Inorganic products |
| | 3. |
| **Consolidation** ***(> loss of adhesion)*** | [Please, report the class of products tested for adhesion treatments; for each class, specify the application methodology. If any treatment was applied by more than one conservator, please make a list in order from the |

| | |
|---|---|
| | most to the less used. Add a row for each type of treatment]<br>1. Acrylic resins, Polyester resin |
| | 2. Epoxy resin |
| | 3. |
| **Criteria for consolidant methodology definition** | [Please, summarize here the most relevant criteria in the setting of a consolidant methodology]<br>Adhesion properties, Absence of chromatic/gloss alteration<br>Compatibility with original materials, Sustainability (economical and environmental… |
| **Protection** | [Please, report the products tested as protective coatings; for each product, specify the properties considered in the selection and the way these properties were evaluated. If any coating was applied by more than one conservator, please make a list in order from the most to the less used. Add a row for each type of treatment]<br>1. microcrystalline wax |
| | 2. epoxy |
| | 3. |
| **Monitoring** | [Please, report here macroscopic of analytical protocols set up for the monitoring of the protective coating after its application]<br>monitoring by eyes |


## *WP5_ACTIVITY 1_TASK2: REPORT OF PRELIMINARY SURVEY by Academy of Fine Arts of Warsaw*

*Please, summarize the information obtained from all your contacts through the survey*

| | |
|---|---|
| **How many professionals replied to the survey?** | 10 qualified art conservators with completed university studies (master's degree) - 5 people are employed at universities (with the title of Ph.D. and Professor), 1 person runs a company dealing in conservation of monuments, 4 people work as a free-lance conservator |
| **Categories of artworks** | Architectural works constructed of various materials, i.e. wood, brick wall, stone wall, concrete; decorated with architectural and sculptural detail made of stucco masses and plaster, natural and artificial stone and ceramics.<br>Sculptures and monuments made of stone (sandstone, marble, limestone, granite), bronze and brass.<br><br>Wall paintings (various techniques) on lime-sand and cement plasters, sgrafitto, polychrome plaster, mosaic. |
| **Cleaning – approach and setting** | Depending on the type of dirt and type of object, there are different approaches to the problem of developing cleaning methods. Most often they are done preliminary tests on site. In addition, conservators use their previous experience on similar artworks. In more difficult cases they are performed preliminary tests on mocks-up and scientific researches. The most important principle of cleaning is that it does not harm the object - it is better to leave a layer of patina than damage the surface of the object. In many cases it is necessary to carry out pre-consolidation before cleaning, e.g. in the case of a powdered or peeling paint layer. In the case of difficult-to-remove dirt, several cleaning methods are necessary. |

| | |
|---|---|
| **Cleaning** | 1. **dry cleaning** –this method has proved to be very useful for removing many types of layers: dust or incoherent deposit, particulate or deposit with a low-medium adhesion to the painting surface; products associated with the presence of animals (manure, plumes,..), residues of biological growth, such as moss, biofilm, bacterial colonies, fungi,; salts precipitation on the surface, stain related with the presence of applied elements (e.g. gutters, pipes..); stain related with external causes (e.g. moisture, fire,..); stain related with alteration of constitutive materials (e.g. corrosion of metal elements, alteration of protective layers,..); materials associated with vandalism (such unwanted graffiti, tags or any materials deliberately applied on the surface).<br>2. **water methods** - for removing various layers (similar to point 1)<br>3. **organic solvents** – for removing various types of later layers, mainly repainting and traces of vandalism.<br>4. **poultice** – for removing dirt that cannot be removed with dry cleaning, products associated with the presence of animals, residues of biological growth, salts, repaint, materials associated with vandalism.<br>5. **gels –** for removing similar layers as in item 4.<br>6. **specialised commercial products for the restoration** – for removing different types of layers.<br>7. **combination of several methods** – for removing hard to remove layers – for example products associated with the presence of animals, residues of biological growth etc.<br>8. **laser** – most commonly used for cleaning objects from stone. |
| **Consolidation**<br>***(> loss of cohesion)*** | 1. **acrylic resin** – used in the case of loss of cohesion of paint layer (powdering); application methods - spray application, brush directly on the surface, brush through Japanese paper.<br>2. **micro-acrylic resins** - as in item 1.; in some cases also for fixing powdered plaster - then it can be applied in the form of injections. |

| | |
|---|---|
| **Consolidation**<br>***(> loss of adhesion)*** | 1. **acrylic resin** – used in the case of loss of adhesion of paint layer (scaling, flaking); application methods - brush directly on the surface, brush through Japanese paper.<br>2. **micro-acrylic resins** - as in item 1.<br>3. **mineral preparations** (preparations with lime and hydraulic lime)- introduced by means of injections under the layers of plaster in order to stick them together.<br>4. **nano lime** – introduced by means of injections under the layers of plaster in order to stick them together.<br>5. **alkyl alkoxysilane**- for the conservation of stone objects; it is introduced into the object with injections, drips, brush directly on the surface, cellulose poultice.<br>6. **siloxane** - for the conservation of stone objects; it is introduced into the object with injections, drips, brush directly on the surface, cellulose poultice.<br>7. **ethyl silicate** - for the conservation of stone objects; it is introduced into the object with injections, drips, brush directly on the surface, cellulose poultice.<br>8. **vinylic resins** (most often as an additive to acrylic water emulsion) - loss of adhesion of paint layer (scaling, flaking); application methods - brush directly on the surface, brush through Japanese paper; It is also used as an addition to injection fluids used for gluing delaminated plasters |
| **Criteria for consolidant methodology definition** | Most often, the following criteria are taken into account when choosing the appropriate consolidation method: adhesion properties, absence of chromatic/gloss alteration, absence of water absorption variation, durability, compatibility with original materials, sustainability (economical and environmental). |

| | |
|---|---|
| **Protection** | When selecting the appropriate protective coating, the following criteria are taken into account: absence of chromatic alteration of the surface, hydrophobicity, absence of residues after removal (only for temporary protective coating), absence of interaction with constitutive materials, durability, resistance to atmospheric agents, resistance to ageing UV light. The issue of choosing the right protective preparation (protective coating) is very complex. It is very difficult to find a product that will meet all the requirements for a given case. The best would be products that can be easily removed from the surface of the object without damaging it; and then repeat the procedure. When it comes to wall paintings, it is difficult to find a product that would meet all the criteria of a protective coating that is safe for objects.<br><br>Respondents mentioned the following types of protective coatings, which are mainly used to protect the surface of facades and stone sculptures (not suitable for wall painting):<br><br>1. **hydrophobic silica materials** (siloxane, alkyl alkoxysilane, ethyl silicate) on external facades (without painting decorations) and on stone sculptures; in one case the wall mural was protected with such a coating - but without conducting appropriate tests or it will not damage the painting layer; application methods - spray application, brush directly on the surface.<br>2. **acrylic resins in a solvent** - it is rarely used to protect the surface of wall paintings; application methods - spray application, brush directly on the surface.<br>3. **polyurethane resins application methods** - spray application, brush directly on the surface. |
| **Monitoring** | None of the respondents did macroscopic of analytical protocols set up for the monitoring of the protective coating after its application. |


## *WP5_ACTIVITY 1_TASK2: REPORT OF PRELIMINARY SURVEY*

## *University of VIGO*

| | |
|---|---|
| **How many professionals replied to the survey?** | The survey has been sent to 62 people related professionally to the conservation and cultural heritage field. However, only 17 conservators answered the survey. Among them, 4 freelance conservators.<br><br>Among the 6 people who detailed the workplace information, 3 work in a museums (Fundación Museo de Bellas Artes de Bilbao, Museo y Biblioteca Casa Natal de Sarmiento San Juan-Argentina, Museo Valenciá d´etnologia), 2 work in conservation and restoration centres (Centro de Conservación y Restauración de Documentos Gráficos de la Palma en Canarias y Servicio de Restauración de la Diputación Floral de Álava) and 1 in a public regional institution (Diputación de Ciudad Real). |
| **Categories of artworks** | Richard Serra's sculptures: Corten steel.<br><br>Eduardo Chillida: concrete.<br><br>Miquel Navarro: painted steel.<br><br>Public statuary<br><br>Conservation of the Muelle´s signature in Madrid. Spray paint on plaster and cement.<br><br>Signature of Muelle´s signature in Barrio de las Letras (Madrid). Marker on granite, appeared under cement.<br><br>Cataloguing and following the creative process of Borondo's mural in Vitoria (Basque country). Ephemeral layer. Kleim sol-silicate paints, following the manufacturer´s recommendation and the previous plaster.<br><br>Cataloguing and following the creative process of various festivals since 2010: Asalto de Zaragoza (3 editions), Poliniza, Pow! Wow! Hawaii (2 editions). All of them with interviews with the artists (around 60). Most of them with acrylic outdoor paints applied with different techniques (more or less diluted) and Montana spray.<br><br>Oil paintings; two of them framed and with glass<br><br>Archaeological collections, including diverse materials, mainly bone material, ceramics, and metals.<br><br>Sculptures and outdoor installations. Various materials (steel, bronze, stone, |

| | |
|---|---|
| | concrete, ...)<br><br>Coffered altarpieces and wall paintings.<br><br>Wood, board, polychromy, wall<br><br>Outdoor large-format sculptures, mainly from the IVAM collection. Materials: corten steel, steel and polychrome iron, bronze<br><br>Contemporary acrylic wall painting<br><br>Mural painting, architecture and sculptural elements.<br><br>Fountains, stone.<br><br>Extraction and transfer of Labra's wall paintings.<br><br>Oil, temperas and anilines, on lime and gypsum plasters. Brick and cement support.<br><br>Granite and sometimes polychrome. Religious structures, bibs of souls, facades of temples, etc ... |
| **Cleaning – approach and setting** | MATERIAL REMOVED:<br><br>Residues of biological growth, such as moss, biofilm, bacterial colonies, fungi... (10 answers)<br><br>Products associated with the presence of animals (manure, plumes...) (8 answers)<br><br>Dust or incoherent deposit (7 answers)<br><br>Stain related with alteration of constitutive materials (e.g. corrosion of metal elements, alteration of protective layers...) (7 answers)<br><br>Materials associated with vandalism (such unwanted graffiti, tags or any materials deliberately applied on the surface) (7 answers)<br><br>Particulate or deposit with a low-medium adhesion to the painting surface (5 answers)<br><br>Salts precipitation on the surface (5 answers)<br><br>Stain related with the presence of applied elements (e.g. gutters, pipes...) (2 answers)<br><br>Stain related with external causes (e.g. moisture, fire...) (2 answers)<br><br>CRITERIA TO PERFORM THE CLEANING:<br><br>Compatibility with constitutive materials (14 answers)<br><br>Sustainability (impact on environment and operators) (10 answers) |

| | |
|---|---|
| | Selectivity (5 answers)<br><br>Sustainability (economic) (2 answers) |
| **Cleaning** | 1. Dry cleaning (13 answers) |
| | 2. Specialized commercial products for the restoration (9 answers) |
| | 3. Combination of several methods (8 answers) |
| | 4. Mechanical cleaning (sandblasting, sanding) (6 answers) |
| | 5. Gels (6 answers) |
| | 6. Organic solvents (4 answers) |
| | 7. Poultice (4 answers) |
| | 8. Commercial products for unspecialized users (1 answer) |
| **Consolidation**<br>***(> loss of cohesion)*** | 1. Etyl-silicate (7 answers) |
| | 2. Acrylic resins (4 answers) |
| | 3. Inorganic products (4 answers) |
| | 4. Vinylic resins (4 answers) |
| | 5. Micro-acrylic resins, (2 answers) |
| | 6. Cellulose poultice (1 answer) |
| | 7. Ammonium oxalate (1 answer) |
| **Consolidation**<br>***(> loss of adhesion)*** | 1. Acrylic resins (7 answers) |
| | 2. Inorganic products (6 answers) |
| | 3. Ethyl-silicate (5 answers) |
| | 4. Epoxy resin (4 answers) |
| | 5. Vinyl resins ( 1 answer) |
| | 6. Ammonium oxalate (1 answer) |
| **Criteria for consolidant methodology definition** | 1. Compatibility with original materials (13 answers) |
| | 2. Adhesion properties, (10 answers) |
| | 3. Durability, (8 answers) |
| | 4. Sustainability (economical and environmental) (6 answers) |
| | 5. Absence of water absorption variation, (6 answers) |

| | |
|---|---|
| | 6. Absence of chromatic/gloss alteration, (6 answers) |
| **Protection** | Waterproofing nanoproducts |
| | Waxes, siloxanes |
| | Acrylic resin at very low concentration |
| | Paraloid B48 / microcrystalline wax, nanoprotections, .... |
| | A very thin layer of pigmented lime water to temporarily reduce the impact of inclement weather. |
| **Monitoring** | This is the critical point of the responses obtained because only two of respondents monitor the protection effectiveness. Only one show the evaluation of the water-repellent properties. |

# 3. ACTIVITY 2: Tests for the assessment of conservation products properties and for the evaluation of intervention methodologies.

## 3. 1. Description and structure of the activity

The “activity 2” of work package 5 aimed at investigating the current practices relating preliminary tests, on mock-ups and on site, for the assessment of the best methodology of intervention. At the same time, thanks to the participation of commercial partners in CAPuS Project, a reflection was made on the main properties that producers are searching for materials addressed to the conservation market and how they test them for specific needs of the heritage conservation sector.

Activity 2 was split in two tasks, addressed to academic and commercial partners respectively:

- Activity 2_task 1: (for academic partners only) assessment of protocols and preliminary tests on mock-ups and on site currently used to study the properties of a products and its behaviour, once applied.
- Activity 2_task 2: (for commercial partners only) assessment of the characteristics and the properties to evaluate in a new product before its commercialisation.

## 3. 2. Methodology and partners’ involvement

A different involvement was planned for the academic and the commercial partners:

- For Academic partners: the analysis of the analytical protocols used by the different partners for the assessment of the intervention methodology in WP4 was made by WPL, with the aim of define the different approaches of the partners. Secondly, the field of analysis was enlarged including the results collected from the survey carried out in the activity 1: in particular, the answers about the setting up of intervention methodology both for cleaning and consolidation treatments. The results included interesting elements that were considered in the Guidelines framework definition.
- For Commercial partners: a specific questionnaire was made up to indagate the process of analysis and study realise by the producers for the assessment of the products properties, before their entry on the market.

Therefore, the following working groups of commercial partners were set for activity 2:

- Research group 1: SCHMINCKE
- Research group 2: AN.T.A.RES.
- Research group 3: MONTANA

### 3. 3. Analysis of the results

For academic partners

All information about the issues under study can be extrapolated from the WP4 final report, on the basis of the specific protocols for the evaluation of cleaning and protection tests on mock-ups and on site already performed and reported by partners.

For commercial partners.

In the survey, products used for cleaning, consolidation and protection of the painted surfaces were taken into account. For the cleaning products, Schmincke highlights three main issue to consider: the interaction with the substrate (I), the interaction with the environment (II) and the operators (III), and the cleaning power (IV). These properties were evaluated through cleaning tests on mock-ups (I and IV), analysis of the labels (II) and tests with operators (III). Referring to products for protection, Schmincke usually performs tests as: visual observations on glass plate to indagate optics properties, pendulum hardness according to König for the elasticity, surface free energy for the adhesion, Q-Sun and UV-C tests to assess the resistance to UV exposure and long period storage at high temperature (50°C) to evaluate the storage of the product.

For AN.T.A.RES., the study usually starts with the identification of guiding selection criteria, according to the specific purposes of the single operation, including measurements of the chemical, physical and mechanical properties of the products itself and of its possible interaction with the substrates, through different steps of tests on mock-ups and related detailed analytical protocols.

For cleaning products, a list of chemico-physical properties to be evaluated by means of specific analytical tests was provided. Considering the wider range of products, from sponges to solvents solutions, varied properties and tests were described for each class, including (for cleaning tests on mock-ups): colorimetric data, optical microscopy and SEM-EDS observations of surface and cross-section samples, conductivity measurements, spot tests, FTIR and GC/MS analysis on extracts from cleaning swabs/treated samples.

For consolidation products, AN.T.A.RES. indicated two classes of products in relation to their behaviour once applied on the artworks surface: those reacting with the substrate/constitutive materials and those creating a film/layer into/above the substrate/constitutive materials. For each, specific chemico-physical characteristics have to be indagated on the basis of some common criteria: effectiveness and efficiency, compatibility, absence of dangerous by-products, durability, reversibility/removability, product usage and handling, cost.

Similarly, products for protection are usually evaluated in terms of composition, solid content, active matter, density, solubility, boiling point/range temperature, flash point (if applicable), CLP classification, pH (if applicable), $T_g$ (if applicable), softening point, drop point (i.e. for waxes), refractive index (i.e. for varnish), MFFT (minimum film forming temperature), with the aim of responding to the following selecting criteria: effectiveness and efficiency, compatibility, absence of dangerous by-products, durability, reversibility/removability (specially for sacrificial coating), product usage and handling, costs.

### 3. 4. Problems encountered & implemented or proposed solutions.

Problems were encountered in:

1. Collecting materials from industrial partner, that was not able to participate in the activity, even if the attention was stressed on the importance of feedback from the artists' materials producer.

### 3. 5. List of the hereby attached documents received from partners

- **Research group 1: WP5_TASK2_ACTIVITY2 survey by AN.T.A.RES**
- **Research group 2: WP5_TASK2_ACTIVITY2 survey by Schmincke**
-

## *WP5_ACTIVITY 2_TASK2: REPORT OF EVALUATION TESTS*

## *By AN.T.A.RES*

*Evaluation tests for conservation products (commercial partners only).*

*Please, answer to the following questions on the base of the experience of your company on preliminary tests on new conservation products*

| | |
|---|---|
| **What chemico-physical properties do you evaluate in a product for cleaning?** | [Please, list and describe in detail the criteria considered in the setting of preliminary evaluation tests for new products]<br><br>Products for cleaning<br><br>- could belong to different product classes such as:<br>**1. Sponge, tissue, supporting agent**<br>**2. Thickener and gel**<br>**3. Organic solvent/blend**<br>**4. Surfactant**<br>**5. Salt (chelating agents, base, etc)**<br>**6. Ready to use cleaning agent (i.e. paint stripper, emulsion)**<br>**7. ...etc**<br>- and developed for:<br>o Surface cleaning<br>and/or<br>o Removal (certain types) of substances<br>- and designed for<br>o certain types of supports<br>o certain types of materials to be removed<br><br>Thus, the main chemical-physical properties to be evaluated can be different:<br><br>**1. Sponge, tissue, supporting agent:** composition, structure, solubility<br>**2. Thickener:** composition, assay, viscosity, pH, conductivity, solubility, CLP classification, gelling features like temperature etc...<br>**3. Organic solvent/blend:** composition, assay, density, boiling point/range temperature, melting point, flash point, CLP classification, solubility, solubility parameters (i.e. fd, fh, fp), VOC content, biodegradability<br>**4. Surfactant:** composition, assay, density, HLB, CMC, solubility, |

| | |
|---|---|
| | CLP classification<br>5. **Salt:** composition, assay, pH, solubility, CLP classification, pKf<br>6. **Ready to use cleaner:** composition, pH, density, solubility, CLP classification, VOC content, biodegradability<br><br>Main criteria considered in the setting of preliminary evaluation tests for new cleaning products are:<br><br>- **Effectiveness and efficiency:** cleaning agent should easily and homogeneously remove substances with a good balance between applicative aspects (time and type of application, number of cycles required, rinsing and yield) and harmless to the surface to be preserved; all the above said **selectivity is very important:** the knowledge of composition, structure (i.e. porosity, morphology), pH, conductivity, solubility (i.e. polarity) of:<br>o the surface to be preserved<br>o the material to be removed<br>o the cleaning agent<br>is of paramount importance<br><br>- **Absence of residues**: residues can be dangerous for artworks: can react with constituent materials and subsequent restoration products and can produce alterations and/or degradation products; for this aim it is important to know composition, viscosity, molecular weight, evaporation rate (related to boiling point/range temperature of solvent), rinsing required.<br>- **Product usage and handling:** an important feature must be the easiness of use and its handling in terms of on site preparation, pack weight, disposal of waste etc<br>- **Product cost:** evaluation<br>For more info please refer to Wp4 report on cleaning.<br><br>https://drive.google.com/drive/folders/1_laQFbuCwovxHuyjneGiWhmDJjxJRQvA<br><br>https://drive.google.com/drive/folders/1_laQFbuCwovxHuyjneGiWhmDJjxJRQvA |
| **What related Tests do you perform for properties evaluation of cleaning products.** | [Please describe the tests set up for the evaluation of the selected properties for new cleaning products]<br><br>1. **Define and measure the most relevant chemical-physical properties**<br>2. **Design applicative tests relevant to each product to be tested**<br>list products, products families to be tested against most relevant parameters such as concentration, type and number of ingredients, viscosity, pH etc.<br><br>Products should be tested against traditional products too<br><br>3. **Apply products on mock ups and samples**<br>4. **Test evaluation against well-defined criteria and score**<br>e.g. 6 criteria: T=preservation of the topography integrity; Cr= presence and clearance of the residues; G= preservation of the surface gloss; Cp=cleaning efficiency and evenness; Am=method feasibility; Pp= pigment pick up) by the observation of the treated surfaces (abrasion, gloss, residue etc), pigment pick up, with naked eye and |

| | |
|---|---|
| | stereomicroscope. E.g. score from 0 -unacceptable result- to 10 -optimal result. Yield should be also evaluated.<br><br>5. **Identification of most suitable product lines/families**<br>6. **Fine tuning of most suitable products**<br>7. **Perform tests with fine-tuned products on mock ups/on-site artworks**<br>8. **Final evaluation against defined criteria and score**.<br>Collect optic1-al-chemical-physical data (colorimetric data; optical microscopy and SEM-EDS on surface and cross-section samples; conductivity measure, spot tests, FTIR and GC-MS on extracts from cleaning swabs/treated samples) before/after treatment or on treated/untreated samples in order to understand chromatic alteration, surface abrasion and depth of action (also evaluable with dyes in the cleaner agent), amount of residues, etc. due to the treatment.<br><br>The analysis depends on the type of the cleaning agent-substrate.<br><br>9. **Send the product to different professionals/influencers/public entities** to seek advice and feedback |
| **What chemico-physical properties do you evaluate in a product for <u>consolidation</u>?** | [Please, list and describe in detail the criteria considered in the setting of preliminary evaluation tests for new products]<br><br>Products for consolidation<br><br>- could belong to different product classes:<br>1. **react with the support/constituent material** (i.e. hybrid products, some inorganic salts etc)<br>2. **produce a film/layer into support/constituent material** (organic products etc)<br>- and developed for:<br>o Superficial treatment<br>and/or<br>o Deep treatment<br>- and designed for<br>o certain types of supports (in terms of composition and structure of the support/constituent materials i.e. porosity etc)<br><br>Thus, the main chemical-physical-mechanical properties to be evaluated can be different:<br><br>1. **react with the support/constituent material:** composition, assay, active matter content, molecular weight and viscosity, density, pH, solubility, parameters/additives required for reaction (temperature, humidity, time, co-solvent, catalyst etc…), particle size<br>chemical-physical-mechanical proprieties of the product formed after treatment such as composition, solubility, compressive strength, tensile strength, etc… compared to the constitutive material/support<br><br>2. **produce a film/layer into support/constituent material:** composition, assay, molecular weight and viscosity, density, pH, |

| | |
|---|---|
| | solubility, particle size, Tg (glass temperature), MFFT (minimum film forming temperature), hardness<br>chemical-physical-mechanical proprieties of the film such as solubility, Tg (if different), compressive strength, tensile strength, water absorption etc… compared to the constituent material/support<br><br>the above mentioned lists may not be complete and at the same time not all parameters are applicable to all products<br><br>Main criteria considered in the setting of preliminary evaluation tests for new consolidation products are:<br><br>- **Effectiveness and efficiency:** the products should easily and homogeneously consolidate the support with a good balance between applicative aspects (reaction time and type of application) and results (yield, improvement of mechanical properties, suitable penetration).<br>- **Compatibility** of the consolidant in terms of chemical composition (if applicable), appearance (colour/gloss change), microstructure (porosity and pore size distribution), physical properties (water absorption, water vapor permeability) to avoid any stress and any strong modification of the artwork behaviour due to the treatment.<br>- **Absence of dangerous by-products**: the chemical reaction should not form dangerous by-products (i.e. soluble salts): they can react with constituent materials and subsequent restoration products and can produce degradation products.<br>- **Durability:** the consolidation treatments should be also effective in the mid-long time (resistance to photo-oxidation ageing) also outdoor (resistance to: dissolution in rain, to thermal deterioration, wetting-drying/freeze-thaw cycles, soluble salts, biodeterioration etc) or under other external mechanical stress (load etc) if required.<br>- **Finally, the choice of the product should consider that** future treatments on the artwork could be needed i.e. retouching, protection etc., this is a sort of "reversibility" criterion.<br>- **Product usage and handling:** an important feature must be the easiness of use and its handling in terms of on site preparation, pack weight, disposal of waste etc<br>- **Product cost:** evaluation |
| **What related Tests do you perform for properties evaluation of consolidation products.** | [Please describe the tests set up for the evaluation of the selected properties for new consolidation products]<br><br>1. **Define and measure the most relevant chemical-physical properties**<br>2. **Design applicative tests relevant to each product to be tested**<br>list products, products families to be tested against most relevant parameters such as concentration, type and number of ingredients, viscosity, pH etc.<br><br>Products should be tested against traditional products too<br><br>3. **Apply products on mock ups, samples, artwork fragments and powders**<br>4. **Test evaluation against well-defined criteria and score**<br>eg. of criteria: G= preservation of the surface colour and gloss; Cp=consolidation efficiency and evenness; Am=method feasibility. e.g. |

| | |
|---|---|
| | score from 0 -unacceptable result- to 10 -optimal result; observation of the treated (surfaces/section) samples with naked eye, stereomicroscope; test the hardness, resistance and homogeneity of treated samples compared to untreated samples by means of loads, acid attack, percussion and pointed tools. Yield should be also evaluated.<br><br>**5. Identification of most suitable product lines/families**<br>**6. Fine tuning of most suitable products**<br>**7. Perform tests with fine-tuned products on mock ups/on-site artworks**<br>**8. Final evaluation against defined criteria and score**<br>Collect chemical-physical-mechanical data (i.e. spectroscopic/ chromatographic/ diffract. analyses i.e. Raman, FTIR, HPLC, XRD; colorimetric data - UNI EN 15886:2010 or UNI 8941; water vapor permeability - UNI EN 15803:2010-; weathering tests UNI EN ISO 11507; drilling test i.e. DRMS; ultrasonic (pulse velocity) test; scotch tape test; compression and tension tests; before/after treatment or on untreated/treated samples and before/after natural/accelerated aging; in order to understand the nature of the product formed, chromatic alteration, improvement of mechanical properties, homogeneity/ hardness/ durability/deep of the treatment (also evaluable with tracking dyes in the consolidant), etc.<br><br>The analysis depends on the type of the consolidant-substrate.<br><br>**9. Send the product to different professionals/influencers/public entities** to seek advice and feedback |
| **What chemico-physical properties do you evaluate in a product for protection?** | [Please, list and describe in detail the criteria considered in the setting of preliminary evaluation tests for new products]<br><br>Products for protection<br><br>- could belong to different product classes such as:<br>**1. Varnish**<br>**2. Water-repellent**<br>**3. Water-oil-repellent**<br>**3.1 Anti-graffito coating**<br>**3.2 Anti-stain**<br>**4. Anti-fouling coating**<br>**5. ...**<br>- and developed for:<br>o “permanent” treatment<br>and/or<br>o “sacrificial” treatment<br>- and designed for<br>o certain types of supports (in terms of composition and structure of the support/constituent materials i.e. porosity etc)<br><br>The main chemical-physical-mechanical properties to be evaluated:<br><br>composition, solid content, active matter, density, solubility, boiling point/range temperature, flash point (if applicable), CLP classification, pH (if applicable), Tg (if applicable), softening point, drop point (i.e. for waxes), refractive index (i.e. |

| | |
|---|---|
| | for varnish), MFFT (minimum film forming temperature)<br><br>Main criteria to be considered in setting the preliminary evaluation tests for new protection product are:<br><br>- **Effectiveness and efficiency:** the product should easily and homogeneously protect the surface with a good balance between applicative aspects (time and type of application, quick drying) and results (yield, improvement of superficial properties). The anti-graffiti coating should easily allow to be cleaned the treated surfaces avoid damaging the surface to be preserved.<br>- **Compatibility** of the protection products in terms of appearance (colour/gloss change – not always applicable i.e. varnish), physical properties (surface morphology, water absorption, water vapor permeability) to avoid any stress and any strong modification of the artwork behaviour due to the treatment.<br>- **Absence of dangerous by-products**: the protective products should not form dangerous by-products (i.e. soluble salts): they can react with constituent materials and can produce degradation products.<br>- **Durability:** the protection treatments should be also effective in the mid-long time (resistance to photo-oxidation ageing) in indoor/outdoor if required (resistance to: scratches – varnishes -, dissolution in rain, dirt/smoke/atmospheric pollution pick up, biodeterioration, to thermal deterioration, wetting-drying/freeze-thaw cycles, soluble salts, etc).<br>- **Reversibility/removability:** not always applicable. i.e. applicable for sacrificial anti-graffito, waxes, varnishes, etc.<br>- **Product usage and handling:** an important feature must be the easiness of use and its handling in terms of on site preparation, pack weight, disposal of waste etc<br>- **Product cost:** evaluation.<br>For more info, please refer to Wp4 report on coating<br><br>https://drive.google.com/drive/folders/1_laQFbuCwovxHuyjneGiWhmDJjxJRQvA<br><br>https://drive.google.com/drive/folders/1_laQFbuCwovxHuyjneGiWhmDJjxJRQvA |
| **What related Tests do you perform for properties evaluation of protection products.** | [Please describe the tests set up for the evaluation of the selected properties for new protection products]<br><br>1. **Define and measure the most relevant chemical-physical properties**<br>2. **Design applicative tests relevant to each product to be tested**<br>list products, products families to be tested against most relevant parameters such as concentration, type and number of ingredients, viscosity, pH etc.<br><br>Products should be tested against traditional products too<br><br>3. **Apply products on mock ups and samples**<br>4. **Test evaluation against well-defined criteria and score**<br>e.g.: 1. ease of application; 2. film homogeneity; 3. morphological changes; 4. colorimetric variation; 5. wettability change; 6. cleaning efficacy (anti-graffito). E.g. score from 0 -unacceptable result- to 10 -optimal result-. Observation of the treated surfaces with naked eye, |

| | |
|---|---|
| | stereomicroscope, contact angle measurements compared to untreated samples. Yield should be also evaluated.<br><br>5. **Identification of most suitable product lines/families**<br>6. **Fine tuning of most suitable products**<br>7. **Perform tests with fine-tuned products on mock ups/on-site artworks**<br>8. **Final evaluation against defined criteria and score**<br>Collect chemical-physical-mechanical data (i.e. spectroscopic/ chromatographic i.e. Raman, FTIR, Py-GC-MS; colorimetric data - UNI EN 15886:2010 or UNI 8941; water vapor permeability - UNI EN 15803:2010 or UNI EN 1062-1; weathering tests UNI EN ISO 11507; contact angle measurements; determination of the water absorption by Karsten tube NorMal 44/93 or contact sponge UNI 11432:2011; before/after treatment or on untreated/treated samples and before/after natural/accelerated aging; in order to understand the nature and stability of the product formed, chromatic alteration, improvement of superficial properties, homogeneity/durability of the treatment.<br><br>The analysis depends on the type of the protective-substrate.<br><br>9. **Send the product to different professionals/influencers/public entities** to seek advice and feedback |
| **Data analysis and evaluation.** | [Please, give a brief description of the evaluation and the analysis made on data collected from preliminary tests]<br><br>The evaluation of the collected data is done by comparing treated / untreated and non-aged / aged samples also against traditional products.<br><br>Graphs, such as radars or histograms, are helpful in processing data because they show numerical evaluations: the best performing products have high scores. Deviation standard is also considered in the replica tests.<br><br>The evaluation is formulated critically taking into account the different parameters as a whole:<br><br>- **threshold for each parameter cannot always be referred to** cultural heritage (such as the colour change threshold commonly accepted for conservation treatments is generally lower than $\Delta E^* = 5$).<br>- **apply different weights to chosen criteria** according to the type of application (type of support, type of operation, purpose of the treatment, etc). |
| **Tests in the case of change in the product's formulation** | [Please, give a brief description of the tests required when there are changes in the formulation of products. The changes are generally notified in the technical sheets?]<br><br>• if the change involves a change in the classification / labelling of the product, the technical data sheet as well as the MSDS should be amended as necessary<br>• if the change affects the composition and some fundamental properties, the technical data sheet as well as the MSDS should be amended as necessary<br>• if the change involves one of the product component replaced by another analogue no change should be envisaged<br>• if the change is a minor one, no tests should be performed otherwise see above |


## *WP5_ACTIVITY 2_TASK2: REPORT OF EVALUATION TESTS*

### *By Schmincke*

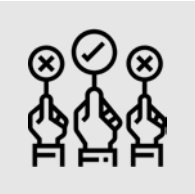
## *Evaluation tests for conservation products (commercial partners only).*

*Please, answer to the following questions on the base of the experience of your company on preliminary tests on new conservation products*

| | |
|---|---|
| **What chemico-physical properties do you evaluate in a product for cleaning?** | We distinguish our cleaning products according to application<br>a) tools such as brushes etc.<br>b) For objects e.g. oil paintings<br><br>For case a) we evaluate:<br>1) power of solvency<br>2) thereby protecting the tools<br>3) Odour<br>4) Labelling regarding environment etc.<br><br>For case b) we evaluate:<br>1) dissolving capacity for pollution<br>2) Influence on the painting layer<br>3) Odour<br>4) Labelling regarding environment etc. |
| **What related Tests do you perform for properties evaluation of cleaning products?** | For case a):<br>Long-time dried brushes with oil/acrylic paint are tried to clean,<br>in this test the paint of the brush should not be attacked<br>Odour test with different persons<br>Checking of the raw material datasheets for classification, with the lowest possible classification<br>For case b):<br>Soiled objects are cleaned as a test and the surface of the object is then examined for contamination and/or damage. |

| | |
|---|---|
| **What chemico-physical properties do you evaluate in a product for <u>consolidation</u>?** | We don´t have |
| **What related Tests do you perform for properties evaluation of consolidation products.** | ./. [ |
| **What chemico-physical properties do you evaluate in a product for <u>protection</u>?** | For products like fixative, varnish or lacquer are always evaluated:<br>Optics<br>Elasticity<br>Adhesion<br>Resistance to UV exposure<br>Storage of the product |
| **What related Tests do you perform for properties evaluation of protection products.** | For products like fixative, varnish or lacquer are always evaluated:<br>Optics: visual on glass plate<br>Elasticity: Pendulum hardness according to könig<br>Adhesion: Surface free energy<br>Resistance to UV exposure: Q-Sun test 1600h; UV-C test 24h<br>Storage of the product : 3 months storage at 50 °C |
| **Data analysis and evaluation.** | See in the report on WP4 for example. |
| **Tests in the case of change in the product's formulation** | In the case of redevelopment, the same tests as for new development. |

# 4. ACTIVITY 3: TECHNICAL AND SAFETY DATA SHEETS



## 5. 1. Description and structure of the activity

The "activity 3" of work package 5 aimed at analysing the data sheets provided for each product, including the technical and methodological recommendations and the safety/storage related indications.
At first every partner/group of research was asked to select five products among those they are most familiar with, currently used for different activities in conservation (cleaning, consolidation, protection...). Then, a list of questions related to the completeness of the information provided by the technical and safety data sheets was the basis for a critical analysis of the content and a reflection about eventual additional information that should be included. The activity was split in two tasks:

- Activity 3_task 1: selection of five products currently used for different operations within the conservation intervention;
- Activity 3_task 2: analysis of the data provided in the technical and safety data sheets and suggestions of any additional "*desiderata*".

## 5. 2. Methodology and partners' involvement

Considering the different professional specialisations, some of the partners were grouped in national clusters for this activity, as follow[2]:

- Research group 1: includes partner 1, University of Turin (Italy)_UNITO
- Research group 2: includes partner 2, Centro Conservazione e Restauro "La Venaria Reale" (Italy)_CCR
- Research group 3: includes partner 3, CESMAR 7 (Italy)
- Research group 4: includes partner 4, AN.T.A.RES (Italy)
- Research group 5: includes partner 5, Cologne Institute of Conservation Sciences (Germany)_CICS
- Research group 6: includes partner 6, Schmincke (Germany)
- Research group 7: includes partner 7, Academy of Fine Arts of Warsaw (Poland)
- Research group 8: includes partner 10, University of Split (Croatia), partner 11, METRIS (Croatia), and partner 13, Sisak Municipal Museum (Croatia)

[2] The following references to the partners' number are based on those reported in the CAPuS "detailed project description"

- Research group 9: includes partner 15, University of Vigo (Spain)
- Research group 10: includes partner 16, Montana Colors

### 5. 3. Analysis of the results

As preliminary step, every partner outpointed a list of five products for conservation treatments: the choice included surfactants, solvents, thickener, gels, products for protection (wax, coatings...). As reported earlier, a critical evaluation of the information reported by the technical and the safety data sheets of the selected products was asked to all the partners, by means of a list of questions prepared by the WPL. The analysis focused on the eventual lack of information about the chemical composition, the chemico-physical properties, the application methodologies, the safety measures and the storage and durability. On the basis of the collected suggestion, a sort of state of the art was designed by the WPL, highlighting some interesting aspects.

Hereafter, a summary of the results was reported, focusing on positive and negative sides of the different issues considered.

Chemical composition

Generally, information about the chemical composition were considered insufficient for products composed by a mixture of solvents, or polymers because only main components are described, while no indication is given about minor substances. In the case of polymers, only general descriptions are available, any further detail on the structural units is totally missing. In at least one case, the generic description of “proprietary blend” was found, be lacking any information about the composition of the product.

For most of the products selected by CESMAR7, a detailed research of the international chemical references was made, resulting in a general lack of specific details such as the CAS and EC numbers, and the linear chemical formula.

Chemical-physical properties

Generally, for blends and ready-made cleaning products, any chemico-physical property of the single component is reported. Especially for coatings and products for protection, partners highlighted relevant lack in the description of the water-related properties (permeability, water repellence….). Specific information relating single parameters are, for instance, missing for some products (this is, for instance, the case of the vapour density and vapour pressure in the ligroin data sheet).

Application methodologies

The scenario related to the application methodologies resulted even more complex: in the technical data sheets of traditional products, commonly in use in the artworks conservation, poor information about the application are available; often, when suggestions are reported, they are not update. Commercial products, on the other side, do not show any information related to the application methodology, as showed by the analysis of the German partners. On contrary, for more recent products, greatly tested within specific scientific research programs, detailed explication for the preparation and the application are attached to the technical data sheets.

Generally, more updated references to significant case studies appears to be common *desiderata*, both for driving the selection of the most suitable product during the treatment planning and for evaluate the different methodologies for the application.

Safety and storage/durability

The analysis of the safety data sheets highlighted that the information reported are usually completed and sufficient, since they are compulsory by the European laws; rare exceptions are pointed out for products generally used for the protection of the surfaces.

### 5. 4. Problems encountered & implemented or proposed solutions.

The main difficulty in the analysis of results from the activity 3 relies on the different perception of the issue by the different partners, we noticed very different expectations towards the indications collected in the technical and safety data sheets. Most of the partners' highlight lack in the description of the chemical composition of the products, while few lacks were outpointed in relation to the methodologies of applications and the indication for storage and durability.

Problems were encountered in:

1. Collecting materials from some partners, that were not able to participate in the activity.

### 5. 5. List of the hereby attached documents received from partners.

Research group 1 WP5_ ACTIVITY3_TASK1 report by UNITO
Research group 1 WP5_ ACTIVITY3_TASK2 report by UNITO

Research group 2- WP5_ACTIVITY3_TASK1 report by CCR
Research group 2- WP5_ACTIVITY3_TASK2 report by CCR

Research group 3- WP5_ ACTIVITY3_TASK1 report by CESMAR7
Research group 3- WP5_ ACTIVITY3_TASK2 report by CESMAR7

Research group 4 WP5_ ACTIVITY3_TASK1 report by AN.T.A.RES
Research group 4- WP5_ ACTIVITY3_TASK2 report by AN.T.A.RES

Research group 5- WP5_ ACTIVITY3_TASK1 report by CICS
Research group 5WP5_ ACTIVITY3_TASK2 report by CICS

Research group 6- WP5_ ACTIVITY3_TASK1 report by Schmincke

Research group 6 WP5_ ACTIVITY3_TASK2 report by Schmincke

Research group 7- WP5_ ACTIVITY3_TASK1 report by Academy of Fine Arts of Warsaw

Research group 7- WP5_ ACTIVITY3_TASK2 report by Academy of Fine Arts of Warsaw

Research group 9- WP5_ ACTIVITY3_TASK1 report by UVIGO

Research group 9- WP5_ ACTIVITY3_TASK2 report by UVIGO


## ***WP5_ACTIVITY 3_TASK1: REPORT PRODUCTS SELECTION***

## ***by UNITO***

*Please, fill the grid with the requested information about 5 products, commonly used street art conservation, according to your professional experience, the data collected with the preliminary survey and your WP4 activities. Please, attach the datasheets of the 5 selected products when sending back to CCR.*

| N. | Product | Manufacturer/ Supplier | Field of application | Chemical composition | Application methodology | Safety (H and P-phrases) |
|---|---|---|---|---|---|---|
| 1 | **Plextol® B500** | Antares (Italy) | consolidation/adhesion | Water-based poly(ethyl acrylate-co-methyl methacrylate) dispersion –poly(EA/MMA) | Depending on the needs, the adhesive can be used as it is (even diluted) or thickened | The product is not classified as dangerous.<br><br>Dangerous substances:<br><br>Ethoxylated C10-14 alcohols 67/548/CEE: Xn, R22, Xi, R41.<br><br>1272/2008 (CLP): H318; H318.<br><br>Ammonium hydroxide<br><br>67/548/CEE: C, R34, N, |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | R50.<br><br>1272/2008 (CLP): H314; H400. |
| | | CTS (Italy) | Adhesion, binder for waterborne paints | Dispersion of an acrylic thermoplastic resin with medium viscosity | - | The product is not classified as dangerous.<br><br>Dangerous substances:<br><br>Ethoxylated C10-14 alcohols 67/548/CEE: Xn, R22, Xi, R41.<br><br>1272/2008 (CLP): H302; H318.<br><br>Ammonium hydroxide<br><br>67/548/CEE: R10; R34; R23; R50.<br><br>1272/2008 (CLP): H221; H314; H331; H400. |
| **2** | **Silo 112** | CTS (Italy) | protection | Reactive organosiloxane oligomers dissolved in demineralized water | Applied with a brush, through impregnation, or by spray | The product is not classified as dangerous |
| **3** | **Prostone** | Pelicoat (Italy) | protection | Waterborne fluorinated acrylic copolymer | Applied with a sprayer, roller or brush, until the substrate is saturated | The product is not classified as dangerous |
| **4** | **AG09W** | Keimfarben (Germany) | protection | Microcrystalline waxes and fluorinated polymers in aqueous emulsion | By brush or preferably by spraying with low pressure vaporizers, in two coats at a distance | The product is not classified as dangerous.<br><br>Dangerous substances: |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | of 30/60 min | 5-cloro-2-metil-2H-isotiazol-3-one; 2-metil-2H-isotiazol-3-one (3:1)<br><br>Acute Tox. 3, H301; Acute Tox. 3, H311; Acute Tox. 3, H331; Skin Corr. 1B, H314; Aquatic Acute 1, H400; Aquatic Chronic 1, H410; Skin Sens. 1, H317 |
| **5** | **Elephant Snot®** | Graffiti Solutions (USA) | cleaning | Potassium hydroxide (5-10% w/w) + Proprietary blend | Apply directly by brush or roller.<br><br>Allow to penetrate affected area for 15-20 minutes (30-40 minutes, cold temperatures).<br><br>Use power washer with 15 tip with 1000 - 3000 PSI maximum pressure. For optimum performance and speed of removal use hot water (190ºF).<br><br>Alternative Method: Allow to penetrate for 30-35 minutes, agitate with stiff brush, and remove with water hose at maximum nozzle pressure. | H302 - Harmful if swallowed<br><br>H312 - Harmful in contact with skin<br><br>H314 - Causes severe skin burns and eye damage<br><br>H317 - May cause an allergic skin reaction<br><br>H318 - Causes serious eye damage<br><br>H332 - Harmful if inhaled |

1 – F. Fenzi, I *writing* di Peeta, Deban e Ment a Verona, Kermes 109, 2018, 71 – 80.

2 – A. Rauseo – Il restauro negato. *Senza Titolo* di Blu e Ericailcane al Padiglione d'Arte Contemporanea di Milano, Kermes 109, 2018, 20 – 25.

3, 4 – A. Macchia et al. Journal of Cultural Heritage 41 (2020) 232–237.

5 – P. Ortiz et al. Comparative study of pulsed laser cleaning applied to weathered marble surfaces, Applied Surface Science 283 (2013) 193– 201.

Note: product 5 was included being a specific cleaner for the removal of graffiti, but not in the context of street/urban art


## *WP5_ACTIVITY 3_TASK2: DATA SHEETS REPORT*

## *by UNITO*

*Please, evaluate the information provided by the technical data sheet of the 5 products selected for WP5_activity3_task1*

| | |
|---|---|
| The information reported in the data sheet are sufficient? Would you require more information about... | Chemical composition [Please, comment briefly for each one of the five datasheets of the products selected in WP5_activity3_task1]<br><br>**Plextol® B500 – Antares:** sufficient information<br><br>**Plextol® B500 – CTS:** sufficient information, but generic description of the type of polymer (acrylic), lack of detail on the type of structural units<br><br>**Silo 112:** sufficient information<br><br>**Prostone:** sufficient information<br><br>**AG09W:** sufficient information<br><br>**Elephant Snot®:** insufficient information: "Proprietary blend" is too generic, it does not give any information about the composition, especially if meant for conservation purposes) |
| | Chemical-physical properties [Please, comment briefly for each one of the five datasheets of the products selected in WP5_activity3_task1]<br><br>**Plextol® B500 – Antares:** sufficient information<br><br>**Plextol® B500 – CTS:** a lot of information (i.e. 17 chemical-physical parameters), more than in other data sheets, but two important parameters are missing: solubility and Tg<br><br>**Silo 112:** sufficient information (but no vapour permeability and water repellence, which are important parameters for protective coatings)<br><br>**Prostone:** insufficient (no information about solid content, density, particle size, viscosity, Tg, mechanical properties, vapour permeability, water repellency)<br><br>**AG09W: in**sufficient (no information about density, particle size, viscosity, mechanical properties, vapour permeability, water repellency)<br><br>**Elephant Snot®:** insufficient, no chemical-physical parameters are reported other than pH and boiling and flash point |

| | |
|---|---|
| | Application methodologies [Please, comment briefly for each one of the five datasheets of the products selected in WP5_activity3_task1]<br><br>**Plextol® B500 – Antares:** very detailed<br><br>**Plextol® B500 – CTS:** no information<br><br>**Silo 112:** sufficient information<br><br>**Prostone:** sufficient information<br><br>**AG09W:** sufficient information<br><br>**Elephant Snot®:** sufficient information |
| | Safety measures [Please, comment briefly for each one of the five datasheets of the products selected in WP5_activity3_task1]<br><br>**Plextol® B500 – Antares:** sufficient information<br><br>**Plextol® B500 – CTS:** sufficient information<br><br>**Silo 112:** sufficient information<br><br>**Prostone:** N.A. (not available)<br><br>**AG09W:** sufficient information<br><br>**Elephant Snot®:** sufficient information |
| | Storage and durability [Please, comment briefly for each one of the five datasheets of the products selected in WP5_activity3_task1]<br><br>**Plextol® B500 – Antares:** sufficient information<br><br>**Plextol® B500 – CTS:** sufficient information<br><br>**Silo 112:** sufficient information<br><br>**Prostone:** sufficient information<br><br>**AG09W:** sufficient information<br><br>**Elephant Snot®:** sufficient information |

Note: the table has been filled taking into account both the product technical data sheet and safety data sheet.


## ***WP5_ACTIVITY 3_TASK1: REPORT OF PRODUCTS SELECTION***

## ***by CCR***

*Please, fill the grid with the requested information about 5 products, commonly used street art conservation, according to your professional experience, the data collected with the preliminary survey and your WP4 activities. Please, attach the datasheets of the 5 selected products when sending back to CCR.*

| N. | Product | Manufacturer/ Supplier | Field of application | Chemical composition | Application methodology | Safety (H and P-phrases) |
|---|---|---|---|---|---|---|
| 1 | **Primal B60A** | AN.T.A.RES | Readhesion of detached scales | Acrylic resin-based water emulsion, solid content 47% (ethyl acrylate, methyl methacrylate) | Localised injection or application with small brush | Classification according to the European Community Regulation (CE) n° 1272/2008. Non hazardous substances or mixtures.<br><br>Classification according to the European Directive EU 67/548/CEE o 1999/45/CE: Non-hazardous substances or mixtures. |
| 2 | **Acrilmat** | AN.T.A.RES | Readhesion of detached scales | Hydroalcoholic solution of acrylic resin, methyl methacrylate copolymer. | Localised injection or application with small brush | Hazard statement: H225 Highly flammable liquid and vapor. H319 Causes serious eye irritation. H336 May cause drowsiness or dizziness. Prevention: P210 Keep away from heat/sparks/open flames/hot surfaces. — No smoking P233 Keep container tightly closed. P240 Ground/bond container and |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | receiving equipment. P241 Use explosion-proof electrical/ventilating/lighting/…/equipment. P242 Use only non-sparking tools. P243 Take precautionary measures against static discharge. P280 Wear protective gloves/protective clothing/eye protection/face protection. P261 Avoid breathing dust/fume/gas/mist/vapors/spray. P271 Use only outdoors or in a well-ventilated area. |
| **3** | **K52** | KREMER Pigmente | Consolidation (loss of cohesion) | Aqueous dispersion acrylic copolymer with an ultrafine particle size. | Spray in water/hydro-alcoholic solution (3-5%). | Classification according to Regulation (EC) No. 1272/2008 (CLP/GHS): This product does not require classification and labelling as hazardous according to CLP/GHS. |
| **4** | **Silo 112** | CTS | Superficial Protection and water repellent treatments | Mixture of reactive organosiloxane oligomers, dissolved in demineralised water | Applied by brush or spray (ready to use). | Classification according to Regulation (EC) No. 1272/2008 (CLP): Non-hazardous substances or mixtures. |
| **5** | **Iso octane** | AN.T.A.RES | Superficial cleaning | Saturated Hydrocarbon | Mixed with other solvents, useful to prepare solutions for unwanted paint/stain removal | according Regulation (EC) No 1272/2008<br><br>Hazard statement(s) H225 Highly flammable liquid and vapor. H304 May be fatal if swallowed and enters airways. H315 Causes skin irritation. H336 May cause drowsiness or dizziness. H410 Very toxic to aquatic life with long lasting effects. Precautionary statement(s) P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P273 Avoid release to the environment. P301 + P310 + P331 IF SWALLOWED: Immediately call a POISON CENTER/doctor. Do NOT induce |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | vomiting. P302 + P352 IF ON SKIN: Wash with plenty of water.Classification according to Dir. 67/548/CE and Dir. 1999/45/CE: narcotic effect. |


## *WP5_ACTIVITY 3_TASK2: DATA SHEETS REPORT*

## *by CCR*

*Please, evaluate the information provided by the technical data sheet of the 5 products selected for WP5_activity3_task1*

| | |
|---|---|
| The information reported in the data sheet are sufficient? Would you require more information about... | **Chemical composition**<br><br>ACRILMAT: sufficient description but more information about the solvents' solution (only in the safety data sheet are cited the two components: ethanol and isopropanol) and about the characteristic of the polymer (MMA) would be useful;<br><br>ISOTTANO: sufficient and detailed information, especially in the safety data sheet, where both the molecular and the structural formula are reported;<br><br>SILO112: very generic description of the type of polymer and poor details on the type of structural units (even though the active material content is up to 10%);<br><br>K52: insufficient information about the composition, lack of specific information about the polymers ("acrylic"), any further information about surfactants (if any) or other stabiliser for the dispersion;<br><br>PRIMALB60A: very poor description of the two polymers (EA and MMA) ration and content; none information about other minor substances, as surfactants, stabilisers,.. |
| | **Chemical-physical properties**<br><br>ACRILMAT: poor information in the technical data sheet, more are reported in the safety one but any information about density, particle size, viscosity, mechanical properties, vapour permeability, water repellency, gloss/colour variation is missing.<br><br>ISOCTANE: sufficient information;<br><br>SILO112: out of 24 chemical-physical properties, only 6 are described, for the others none information is available;<br><br>K52: poor information but all the most relevant parameters have been considered;<br><br>PRIMALB60A: poor information about the properties of the film formed the product once dried; most of the other relevant parameters are considered and described. |

| | |
|---|---|
| | **Application methodologies**<br><br>ACRILMAT: sufficient information, none mention of the possibility to use the products for localised re-adhesion of the painting layers, applying it under the scale with a syringe.<br><br>ISOTTANO: some of the possible use are suggested in the technical data sheet; a wider description would be too generic;<br><br>SILO112: detailed information, also with useful references to possible side-effects related to the presence of salts or other substances (water...);<br><br>K52: sufficient information about the suitable weather condition for the application, lack of suggested methodologies;<br><br>PRIMAL B60A: poor description of the possible uses, probably in reason of the wide versatility of the product. |
| | **Safety measures**<br><br>ACRILMAT: well and detailed description<br><br>ISOTTANO: most of the safety measures are referred to industrial uses of the products, poor notes on the conservation fields are included (what about, job tailored data sheets?);<br><br>SILO112: specific environmental condition reported in the technical data sheet;<br><br>K52: poor ecological/toxicological information;<br><br>PRIMAL B60A: sufficient information about the ecological/toxicological aspect; one of the constituent can provided with high toxicity toward water environment (Octylphenoxy polyethoxyethanol); |
| | **Storage and durability**<br><br>ACRILMAT: sufficient description, with the generic reference to “normal storage condition” that might allow to misunderstandings.<br><br>ISOTTANO: sufficient information;<br><br>SILO112: specific environmental condition reported in the technical data sheet;<br><br>K52: sufficient information in the technical data sheet, with description of the most suitable storing condition (in terms of temperature and light exposure), expiry date reported (8 months after the first opening).<br><br>PRIMAL B60A: sufficient information (lack of reference to an eventual expiry date, if any). |


## ***WP5_ACTIVITY 3_TASK1: REPORT OF PRODUCTS SELECTION***

## ***by CESMAR 7***

*Please, fill the grid with the requested information about 5 products, commonly used street art conservation, according to your professional experience, the data collected with the preliminary survey and your WP4 activities. Please, attach the datasheets of the 5 selected products when sending back to CCR.*

| **N.** | **Product** | **Manufacturer/ Supplier** | **Field of application** | **Chemical composition** | **Application methodology** | **Safety (H and P phrases)** |
|---|---|---|---|---|---|---|
| 1 | Agar Agar | ANTARES | Cleaning | Complex polysaccharide deriving from *Gracilariales* and *Gelidiales* algae and formed by agarose and agaropectin fractions | Pre-formed as rigid gel, Fluid (by brush, 4%), 4% in stick | This product does not require classification and labelling as<br><br>hazardous according to CLP/GHS. |
| 2 | Ligroin 100-140 | ANTARES | Cleaning | Petroleum ether (*Mineral Spirit-Petroleum Spirit*) bp 100-140°C | Included in solvent surfactant gels formulation (applied by brush and removed with cotton swab) and in solubility tests (cotton swab) | H225 Highly flammable liquid and vapor.<br><br>H304 May be fatal if swallowed and enters airways.<br><br>H411 Toxic to aquatic life with long lasting effects. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | H336 May cause drowsiness or dizziness.<br><br>**Precautionary statements:**<br><br>P210 Keep away from heat / sparks / open flames / heated surfaces – Do not smoke<br><br>P241 Use explosion proof electrical / ventilation / lighting systems.<br><br>P261 Avoid breathing dust / fumes / gases / mist / vapours / aerosols.<br><br>P280 Wear protective gloves / protective clothing / eye protection / face protection.<br><br>P303 + P361 + P353 IN CASE OF CONTACT WITH SKIN (or with hair): take off immediately all contaminated clothing. Rinse skin / take a shower.<br><br>P405 Store locked up. |
| 3 | Velvesil Plus | ANTARES | Cleaning | Cyclopentasiloxane, C30-45 Alkyl Cetearyl Dimethicone Crosspolymer, PEG/PPG-20/23 Dimethicone | Applied by brush, loaded with benzyl alcohol | H227 Combustible liquid.<br><br>H361f Suspected of damaging fertility<br><br>(**Octamethylcyclotetrasiloxane**) |
| 4 | Nanorestore Cleaning Polar Coating S | CSGI | Cleaning | Water-based nano structured fluid containing an anionic surfactant and a mix of 1-pentanol, ethyl | In synergy with Nanorestore gel HWR | H225 - Highly flammable liquid and vapour.<br><br>H315 - Causes skin irritation. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | acetate and propylene carbonate | | H319 - Causes serious eye irritation.<br><br>**PRECAUTIONARY STATEMENTS:**<br>Prevention<br><br>P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No<br><br>smoking<br><br>P233 - Keep container tightly closed<br><br>P243 - Take precautionary measures against static discharge<br><br>Response<br><br>P303+P361+P353 - IF ON SKIN (or hair): take off immediately all contaminated clothing. Rinse<br><br>skin with water/shower<br><br>P305+P351+P338 - IF IN EYES: rinse cautiously with water for several minutes. Remove contact<br><br>lenses, if present and easy to do. Continue rinsing<br><br>P337+P313 - If eye irritation persists: get medical advice/attention<br><br>P370+P378 - In case of fire: Use CO2, foam, chemical powder for flammable liquids to<br><br>extinguish |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | Storage<br><br>P403+P235 - Store in a well-ventilated place. Keep cool. |
| 5 | Nanorestore Gel HWR (High Water retention) | CSGI | Cleaning | Transparent chemical hydrogel based on a pHEMA/PVP semi-interpenetrated network | Loaded with Cleaning Polar and Apolar Coating | This mixture is not dangerous under (CE) 1272/2008 e 790/2009 directives and subsequent amendments |


## *WP5_ACTIVITY 3_TASK2: DATA SHEETS REPORT*

## *by CESMAR 7*

*Please, evaluate the information provided by the technical data sheet of the 5 products selected for WP5_activity3_task1*

| | |
|---|---|
| The information reported in the data sheet are sufficient? Would you require more information about... | Chemical composition [Please, comment briefly for each one of the five datasheets of the products selected in WP5_activity3_task1]<br><br>• AGAR AGAR: CAS and EC not provided, no linear formula, no synonyms.<br>• VELVESIL PLUS: CAS and EC of components not provided, no systematic names of components. INCI name not included<br>• LIGROIN: CAS not provided, no linear formula, no synonyms. No purity degree and % presence of aromatics<br>• NANORESTORE CLEANING® POLAR COATING S: CAS and EC of components not provided, no systematic names of components and relative percentage<br>• NANORESTORE GEL® (HWR- High Water Retention): CAS and EC numbers of components not provided. |
| | Chemical-physical properties [Please, comment briefly for each one of the five datasheets of the products selected in WP5_activity3_task1]<br><br>• AGAR AGAR: quite complete (aspect, solubility, pH, gelling temperature, particle size). No purity degree, no odour<br>• VELVESIL PLUS: complete (aspect, odour, density, viscosity, solid content, flash point, solubility)<br>• LIGROIN: odour, aspect, density and solubility are reported. Boiling point is missing (reported in the product name) as well as vapour density and vapour pressure<br>• NANORESTORE CLEANING® POLAR COATING S: no chemical-physical properties of the single component is reported<br>• NANORESTORE GEL® (HWR- High Water Retention): no chemical-physical properties of the single component are reported |
| | Application methodologies [Please, comment briefly for each one of the five datasheets of the products selected in WP5_activity3_task1]<br><br>• AGAR AGAR: complete for application and preparation methods. Reference from literature are reported (not updated)<br>• VELVESIL PLUS: complete for application methods (list of possibilities from polarity modification to Pickering emulsions |

| | |
|---|---|
| | preparation)<br>• LIGROIN: as solvent, Teas parameters are included. Uses are listed (solubility test, solubilisation of synthetic resins, especially Regalrez series –LMW aliphatic resins- and Plexisol P550 for consolidation). Other applications are listed (for biocides like Algochene, C12 solvent surfactant gels, wax stain removal)<br>• NANORESTORE CLEANING® POLAR COATING S: well described how the product works as well as applications, starting from preliminary test, including practical suggestions i.e. how to reduce evaporation, application time, final clearance. Clear images and schemes are included, as well as FAQ and references<br>• NANORESTORE GEL ® (HWR): well described how the product works as well as uses, starting from preliminary test, including practical suggestions i.e. how to reduce evaporation, application time, removal, mechanical action, repeated application ed how to reuse the gel, loading with solvent-list included-. Application guidelines scheme and clear pictures (removal of hydrosoluble dirt, removal of varnishes/adhesives loading solvents) are included, as well as FAQ and references |
| | Safety measures [Please, comment briefly for each one of the five datasheets of the products selected in WP5_activity3_task1]<br><br>• AGAR AGAR: as CLP is not applicable, handling measures inly are included (i.e. how to avoid contamination and biological growth)<br>• VELVESIL PLUS: precautionary measures are included; other information is included in SDS<br>• LIGROIN: main hazards are listed together with precautionary measures; other information is included in SDS<br>• NANORESTORE CLEANING® POLAR COATING S: safety is included in the technical sheet. Other details are in SDS<br>• NANORESTORE GEL ® (HWR): safety is included in the technical sheet. Other details are in SDS |
| | Storage and durability [Please, comment briefly for each one of the five datasheets of the products selected in WP5_activity3_task1]<br><br>• AGAR AGAR: storage measures are reported (store in a dry cool place avoiding exposure to direct sunlight). Durability not included<br>• VELVESIL PLUS: ideal storage conditions are described and durability (2 years)<br>• LIGROIN: stability and storage condition are reported<br>• NANORESTORE CLEANING® POLAR COATING S: recommended condition of storage are precisely described as well as safety details<br>• NANORESTORE GEL ® (HWR): recommended condition of storage are precisely described as well as safety details |

## ***WP5_ACTIVITY 3_TASK1: REPORT OF PRODUCTS SELECTION***

## ***by AN.T.A.RES***

*Please, fill the grid with the requested information about 5 products, commonly used street art conservation, according to your professional experience, the data collected with the preliminary survey and your WP4 activities. Please, attach the datasheets of the 5 selected products when sending back to CCR.*

| N. | Product | Manufacturer/ Supplier | Field of application | Chemical composition | Application methodology | Safety (H and P-phrases) |
|---|---|---|---|---|---|---|
| 1 | **Anti-Stain** | An.T.A.Res (supplier) | protection for stones | Aqueous emulsion of fluoro-polymers and wax | Product ready to use.<br><br>It can be applied by brush, roller or low-pressure sprayer (two coats, wet on wet). Apply on clean and dry substrate | no H/P phrases<br><br>**EUH210** msds available on request<br><br>**EUH208** it contains: 2-Benzoisothiazol-3 (2H) -one<br><br>2-methyl-4-isothiazolin-3-one, a mixture of: 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one. May cause an allergic reaction. |
| 2 | **Hexafor** | Maflon | protection for | Aqueous emulsion of silicone-fluorinated | Product ready to use. | no H/P phrases |

| | | | | | | |
|---|---|---|---|---|---|---|
| | **SA-6320** | (manufacturer) | stones | polymer | It can be applied by brush, roller or low-pressure sprayer, from 1 to 3 coats. | **EUH210** msds available on request |
| **3** | **Pro-Stone** | Pelicoat Italia S.R.L. (supplier) | protection for stones | Aqueous emulsion of acrylic fluorinated copolymer | Product ready to use.<br><br>It can be applied by brush, roller or sprayer (until substrate's saturation). Apply on clean and dry substrate at pH 6-8 | no H/P phrases |
| **4** | **Protect Guard TC** | Guard Industrie S.A.S. (manufacturer) | Protection for acrylic surfaces | Aqueous acrylic emulsion | Product ready to use.<br><br>It can be applied by brush, roller or low pressure sprayer, 2 coats wet on dry.<br><br>Apply on clean and dry substrate | no H/P phrases<br><br>**EUH210** msds available on request |
| **5** | **Isograff** | Colorificio San Marco S.P.A. (supplier) | protection for stones | Aqueous dispersion of polymeric waxes | Product ready to use.<br><br>It can be applied by brush, roller or low pressure sprayer, 1 to 2 coats.<br><br>Apply on clean and dry substrate | no H/P phrases<br><br>**EUH210** msds available on request<br><br>**EUH208** it contains a 5-cloro-2-methyl-2H-isothiazol-3-one and<br><br>2-methyl-2H-isothiazol-3-one mixture (3:1 May cause an allergic reaction. |


## *WP5_ACTIVITY 3_TASK2: DATA SHEETS REPORT*

## *by AN.T.A.RES*

*Please, evaluate the information provided by the technical data sheet of the 5 products selected for WP5_activity3_task1*

| | |
|---|---|
| The information reported in the data sheet are sufficient? Would you require more information about... | Chemical composition [Please, comment briefly for each one of the five datasheets of the products selected in WP5_activity3_task1]<br><br>First of all, to understand the completeness of the information provided by the tds is imperative to consider the msds as well (section 3).<br><br>We noticed that the following info were missing:<br><br>- **All product**: specific info about polymers<br>- **Anti-Stain**: alkyd resin in the declared composition<br>In general, the data collected were sufficient for our aim.<br><br>Additional information was asked to supplier. |
| | Chemical-physical properties [Please, comment briefly for each one of the five datasheets of the products selected in WP5_activity3_task1]<br><br>First of all, to understand the completeness of the information provided by the tds is imperative to consider the msds as well (section 9) and other technical-scientific sheet on request.<br><br>We noticed that:<br><br>- **Tds of all products**: no homogeneous data (unit of measure, measure standard), different accuracy of the data, no detailed data about solubility of the coating, different list of parameters for each teds, parameters missing: Tg (if applicable), softening point, drop point (i.e. for waxes), MFFT (minimum film forming temperature)<br>We noticed the following info were missing /incomplete/inaccurate:<br><br>- **Anti-Stain:** experimental conditions about some data reported are missing: chromatic variation data post application/after aging, water absorption, thermal stress, wettability post application /after aging, degree of water vapour transmission; drying times<br>- **Hexafor SA-6320:** Degree of water vapour transmission; chromatic variation; water absorption; thermal stress; drying times<br>- **Pro-Stone:** boiling point; degree of water vapour transmission; |

| | |
|---|---|
| | chromatic variation; VOC; water absorption, thermal stress; wettability; drying times<br>- **Protect Guard TC:** flash point; active matter; degree of water vapour transmission; chromatic variation; water absorption, thermal stress; wettability; drying times<br>- **Isograff: pH,** boiling point; flash point, active matter; experimental conditions about some data reported are missing: degree of water vapour transmission, chromatic variation post application/after aging, water absorption, thermal stress; wettability;<br>In general, the data collected were no sufficient for our aim.<br><br>Additional information was asked to supplier. |
| | Application methodologies [Please, comment briefly for each one of the five datasheets of the products selected in WP5_activity3_task1]<br><br>The information declared were complete and accurate but in some instance has been adapted to our specific needs. |
| | Safety measures [Please, comment briefly for each one of the five datasheets of the products selected in WP5_activity3_task1]<br><br>First of all, to understand the completeness of the information provided by the tds is imperative to consider the msds as well (sections 2, 7, 8).<br><br>In general, the data collected were sufficient for our aim. |
| | Storage and durability [Please, comment briefly for each one of the five datasheets of the products selected in WP5_activity3_task1]<br><br>First of all to understand the completeness of the information provided by the tds is imperative to consider the msds as well (section 7). Shelf life is not always mentioned. In general, the data collected were sufficient for our aim. |


## ***WP5_ACTIVITY 3_TASK1: REPORT OF PRODUCTS SELECTION***

## ***by CICS***

*Please, fill the grid with the requested information about 5 products, commonly used street art conservation, according to your professional experience, the data collected with the preliminary survey and your WP4 activities. Please, attach the datasheets of the 5 selected products when sending back to CCR.*

***(Deadline: April, 30th)***

| N. | Product | Manufacturer/ Supplier | Field of application | Chemical composition | Application methodology | Safety (H and P-phrases) |
|---|---|---|---|---|---|---|
| **1** | Tecero wax 3534 F | Deffner&Johann | Protective coating | microcrystalline wax | Wax dispersion method:<br>T10 - 20 parts wax,<br>90 - 80 parts white spirit/turpentine substitute.<br>Hot application:<br>the wax is heated and partially applied to the object using a brush or cloth | |
| **2** | **Cocopaste Bitumen-** | Scheidel | cleaning | Fatty acid ester / surfactant mixture, | brush | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | **& Graffitientferner**<br><br>**For: Mineral substrates, Paint and plastic surfaces, metal** | | | thixotropic | | |
| **3** | **C6 Gel Graffitientferner**<br><br>**For: solvent-resistant substrates** | Scheidel | cleaning | Solvent / surfactant mixture, thixotropic | brush | |
| **4** | **Acetone** | Kremer Pigmente | cleaning | Organic solvents | Cotton pads,<br>gel | R: 11-36-66-67; S: (2-)9-16-26 |
| **5** | **White spirit** | Kremer Pigmente | Cleaning, protection in combination with waxes | Hydrocarbons, C7-C9, n-alkanes, iso-alkanes, cyclic compounds | Cotton pads | R11, R38, R51, R53, R65, R66, R67 |


## *WP5_ACTIVITY 3_TASK2: DATA SHEETS REPORT*

## *by CICS*

*Please, evaluate the information provided by the technical data sheet of the 5 products selected for WP5_activity3_task1*

| | |
|---|---|
| The information reported in the data sheet are sufficient? Would you require more information about... | **Chemical composition**<br><br>**Tecero** Wax: microcrystalline wax<br><br>**Cocopaste**: Fatty acid ester / surfactant mixture, thixotropic<br>**C6 Gel**: Solvent / surfactant mixture, thixotropic<br>**Acetone**: acetone<br>**White Spirit**: Hydrocarbons, C7-C9, n-alkanes, iso-alkanes, cyclic compounds |
| | **Chemical-physical properties**<br>**Tecero:**<br>Solidification point (ISO 2207): 87 - 91° C<br>Drop point (ISO 2176): 92 - 96° C<br>Penetration at 25° C (DIN 51579): 5 - 10, 0.1 mm<br><br>**Cocopaste:**<br>State of aggregation: solid<br>Appearance: solid<br>Colour: yellowish<br>smell: of coconut<br>Odour threshold: not determined<br>pH value at 20 °C: 6.0 - 7.0 / 1.0 % by weight<br>melting point/freezing point: -14 °C<br>Initial boiling point and boiling range: 76 °C<br>Flash point: 98 °C<br>Vapour pressure at 20 °C: 0.5 mbar<br>Relative density:<br>Density at 20 °C: 0.93 g/cm³<br>Method: Pycnometer<br>Solubility in water (g/L) at 20 °C: insoluble<br><br>**C6 Gel:**<br>State of aggregation: Liquid<br>Appearance: viscous<br>Colour: amber<br>Odour: typical of the species<br>pH value at 20 °C: 8.4 / 1.0 % by weight |

| | |
|---|---|
| | Flash point: > 62 °C<br>Vapour pressure at 20 °C: 13.3 mbar<br>**Acetone:**<br>Form: liquid<br>Colour: colourless<br>Odour: characteristic<br>Odour threshold: 47.5 mg/m3<br>pH value: 7 (10 g/l; 20°C)<br>melting point/freezing point: -94°C<br>Boiling point/Boiling range: 56.05°C<br>Flash point: -17°C<br>Evaporation rate:<br>No data available.<br>Flammability (solid, gaseous):<br>not applicable<br>Upper explosion limit: 14.3 % by volume<br>Lower explosion limit: 2.5 vol.%<br>Vapour pressure: 240 hPa (20°C); 800 hPa (50°C)<br>Relative vapour density: 2.0<br>density: 0.79 g/cm3 (20°C)<br>Solubility in water: miscible<br>Distribution coefficient: n-<br>Octanol/water:<br>-0.24 logKOW (20°C)<br>Auto ignition temperature: 465°C<br>Viscosity, dynamic: 0.32 mPa.s (20°C)<br>Explosive properties:<br>The product is not explosive, but the formation of<br>explosive vapour/air mixtures possible.<br>Oxidizing properties:<br>not oxidizing<br>Solubility in solvent:<br>Viscosity, kinematic<br><br>**White spirit:**<br>Form: liquid<br>Colour: colourless<br>Odour: petrol like<br>Odour threshold:<br>No data available.<br>pH value:<br>not applicable<br>Melting point/freezing point:<br>not available<br>Boiling point/Boiling range: 100 - 140°C<br>Flash point: < 10°C<br>Evaporation rate: 1.4 (butyl acetate =1)<br>Flammability (solid, gaseous):<br>not applicable<br>Upper explosion limit: 6.8 vol.%<br>Lower explosion limit: 0.9 vol.%<br>Vapour pressure: 35 hPa (20°C)<br>Relative vapour density: > 1 (air = 1.0) |

| | |
|---|---|
| | density: 0.725 - 0.748 g/cm3 (20°C)<br>Solubility in water: slightly miscible<br>Distribution coefficient: n-<br>Octanol/water:<br>4 - 5.7<br>Auto ignition temperature: > 200°C<br>Viscosity, kinematic 0.5 - 1.5 mm2/s (20°C) |
| | **Application methodologies**<br>**Tecero:**<br>Wax dispersion method:<br>T10 - 20 parts wax,<br>90 - 80 parts white spirit/turpentine substitute.<br>Hot application:<br>the wax is heated and partially applied to the object using a brush or cloth<br><br>**Cocopaste**:<br>unstated<br><br>**C6 Gel:**<br>unstated<br><br>**acetone:**<br>unstated<br><br>**white spirit:**<br>unstated |
| | **Safety measures**<br>**Tecero:**<br>Not stated<br><br>**Cocopaste**:<br>Avoid contact with skin, eyes and clothing<br>Do not discharge into drains or watercourses.<br>Ensure good ventilation. This can be achieved by local or room extraction. If this is not sufficient to<br>aerosol and solvent vapour concentration below the occupational exposure limits, a suitable<br>Breathing apparatus must be worn. Keep away from strong acids, strong bases and strong oxidizing agents to avoid exothermic reactions.<br>For longer or repeated handling use the glove material: KCL Camatril<br><br>**C6 Gel:**<br>Avoid contact with skin, eyes and clothing<br>For longer or repeated handling use the glove material: KCL Camatril<br><br>**Acetone**:<br>Keep container tightly closed. Ensure good ventilation/exhaustion at the workplace. Do not inhale vapours, spray and gas.<br>Keep away from food and drink. At work do not eat, drink or smoke. Before the breaks and during Wash hands at the end of work. Avoid contact with skin and eyes. Remove contaminated and/or soaked clothing immediately. |

| | |
|---|---|
| | **White spirit:**<br>For sufficient air exchange and/or extraction into the workrooms. Ensure adequate ventilation. Open and handle containers carefully.<br>Do not inhale vapours or aerosols. Avoid contact with eyes and skin. |
| | **Storage and durability**<br>**Tecero:**<br>Not stated<br><br>**Cocopaste:**<br>Follow the instructions on the label. Store in well ventilated and dry rooms between 15 °C and 35 °C. Protect from heat and<br>Protect from direct sunlight. Keep container tightly closed. Remove all ignition sources.<br><br>**C6 Gel:**<br>Store in well ventilated and dry rooms between 5 °C and 35 °C. Keep container tightly closed. Keep away from strongly acidic and alkaline materials and oxidizing agents.<br><br>**Acetone**:<br>Keep container tightly closed, cool and dry.<br>Protect product from heat and direct sunlight.<br>Keep in a place with a solvent-proof base.<br>Suitable container material: Steel or stainless steel.<br>Keep away from heat and ignition sources. Do not smoke.<br>Store away from: food, beverages and Pet food.<br>Store separately from: oxidizing agents.<br>Take measures against electrostatic charge. All Ground the devices.<br>Use only in explosion-proof areas.<br>Explosion-proof devices/fittings and spark-free<br>Use tools. Keep ignition sources away - do not smoke.<br>Take measures against electrostatic charge.<br><br>**White spirit:**<br>Container tightly closed, placed on a cool and well ventilated<br>Store in the place. Keep in a place with a solvent-proof base.<br>Flammable liquid. Store separately from: Oxidizing agents. Vapours may form an explosive mixture with air. Keep away from heat and ignition sources. Do not smoke. Take measures against electrostatic charge. |


## ***WP5_ACTIVITY 3_TASK1: REPORT OF PRODUCTS SELECTION***

## ***by SCHMINCKE***

*Please, fill the grid with the requested information about 5 products, commonly used street art conservation, according to your professional experience, the data collected with the preliminary survey and your WP4 activities. Please, attach the datasheets of the 5 selected products when sending back to CCR.*

| N. | Product | Manufacturer/ Supplier | Field of application | Chemical composition | Application methodology | Safety (H and P phrases) |
|---|---|---|---|---|---|---|
| 1 | ACPU-Clearlaquer | Schmincke/ Schmincke | Protection | Acrylic-Polyurethane, water based | Brush, Paint rollers | EUH208; Biocides |
| 2 | tutoProm bright | Merck/ Schmincke | Protection | Polysilazan, solvent based; n-butyl acetate | Wipe up with microfibers applicator or roller, spray apply | H225, H302, H314, H336, H412<br><br>P210,P260, P264,P280, P301+330+331, P305+351+338,P310 |


## ***WP5_ACTIVITY 3_TASK2: DATA SHEETS REPORT***

## ***by SCHMINCKE***

*Please, evaluate the information provided by the technical data sheet of the 5 products selected for WP5_activity3_task1*

| | |
|---|---|
| The information reported in the data sheet are sufficient? Would you require more information about.. | Chemical composition<br><br>This questionnaire is somewhat confusing for the manufacturer, as it asks for a statement on his own data:<br><br>1) ACPU- Clear-Laquer : Acrylic-Polyurethane, water based<br><br>2.) Polysilazane, solvent based<br><br>Is sufficient from our point of view. |
| | Chemical-physical properties<br><br>Information according to technical data sheets is sufficient. |

| | |
|---|---|
| | Application methodologies<br><br>Information according to technical data sheets is sufficient. |
| | Safety measures<br><br>Information according to safety data sheet according to EU directives absolutely sufficient (legally required). |
| | Storage and durability<br><br>Storage conditions and durability adequately described. |


## ***WP5_ACTIVITY 3_TASK1: REPORT OF PRODUCTS SELECTION***

## ***by Academy of Fine Arts Warsaw***

*Please, fill the grid with the requested information about 5 products, commonly used street art conservation, according to your professional experience, the data collected with the preliminary survey and your WP4 activities. Please, attach the datasheets of the 5 selected products when sending back to CCR.*

| N. | Product | Manufacturer/ Supplier | Field of application | Chemical composition | Application methodology | Safety (H and P-phrases) |
|---|---|---|---|---|---|---|
| 1 | **CALOSIL-E** | IBZ-SALZCHEMIE GMBH (Germany) | consolidation | Nanoparticles $Ca(OH)_2$ | Depending on the needs. Applied with a brush, through impregnation, or by spray | The product is not classified as dangerous. |
| 2 | **Paraloid™ B-72** | Kremer Pigmente GmbH & Co. KG (Germany) | Protection, consolidation, adhesion | Acrylic polymer, Ethyl methacrylate co-polymer | Depending on the needs. Applied with a brush, through impregnation, or by spray | The product is not classified as dangerous |
| 3 | **PRIMAL™** | C.T.S. (Spain) | Protection, consolidation, adhesion, binder for | Acrylic emulsion polymer, dispersion of an acrylic resin | Depending on the needs. Applied with a sprayer, roller or brush | The product is not classified as dangerous |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | waterborne paints | | and by injection | |
| **4** | **Ledan® TB** | Kremer Pigmente GmbH & Co. KG (Germany) | Protection, consolidation, adhesion | Synthetic hydraulic lime (Special chemically stable hydraulic binding agent components with minor amount of salts, silica powder, very fine Terra Pozzuoli and a special additive mixture) | Depending on the needs. Applied with a sprayer, roller or brush and by injection. | The product is not classified as dangerous. |
| **5** | **Plextol® B500** | C.T.S. (Italy) | Adhesion, binder for waterborne paints | Dispersion of an acrylic thermoplastic resin | Depending on the needs. Applied with a sprayer, roller or brush | The product is not classified as dangerous. |


## ***WP5_ACTIVITY 3_TASK2: DATA SHEETS REPORT***

## ***by Academy of Fine Arts Warsaw***

*Please, evaluate the information provided by the technical data sheet of the 5 products selected for WP5_activity3_task1*

| | |
|---|---|
| The information reported in the data sheet are sufficient? Would you require more information about... | Chemical composition [Please, comment briefly for each one of the five datasheets of the products selected in WP5_activity3_task1]<br><br>**Paraloid™ B-72:** sufficient information<br><br>**CALOSIL-E:** sufficient information<br><br>**PRIMAL™:** sufficient information<br><br>**Ledan® TB:** sufficient information<br><br>**Plextol® B500:** sufficient information |
| | Chemical-physical properties [Please, comment briefly for each one of the five datasheets of the products selected in WP5_activity3_task1]<br><br>**Paraloid™ B-72:** sufficient information<br><br>**CALOSIL-E:** sufficient information<br><br>**PRIMAL™:** sufficient information<br><br>**Ledan® TB:** sufficient information<br><br>**Plextol® B500:** sufficient information |
| | Application methodologies [Please, comment briefly for each one of the five datasheets of the products selected in WP5_activity3_task1]<br><br>**Paraloid™ B-72:** sufficient information<br><br>**CALOSIL-E:** sufficient information<br><br>**PRIMAL™:** sufficient information<br><br>**Ledan® TB:** sufficient information<br><br>**Plextol® B500:** no information |

| | |
|---|---|
| | Safety measures [Please, comment briefly for each one of the five datasheets of the products selected in WP5_activity3_task1]<br><br>**Paraloid™ B-72:** sufficient information<br><br>**CALOSIL-E:** sufficient information<br><br>**PRIMAL™:** sufficient information<br><br>**Ledan® TB:** sufficient information<br><br>**Plextol® B500:** sufficient information |
| | Storage and durability [Please, comment briefly for each one of the five datasheets of the products selected in WP5_activity3_task1]<br><br>**Paraloid™ B-72:** sufficient information<br><br>**CALOSIL-E:** sufficient information<br><br>**PRIMAL™:** sufficient information<br><br>**Ledan® TB:** sufficient information<br><br>**Plextol® B500:** sufficient information |

Note: the table has been filled taking into account both the product technical data sheet and safety data sheet.


## ***WP5_ACTIVITY 3_TASK1: REPORT OF PRODUCTS SELECTION***

## ***by UVIGO***

*Please, fill the grid with the requested information about 5 products, commonly used street art conservation, according to your professional experience, the data collected with the preliminary survey and your WP4 activities. Please, attach the datasheets of the 5 selected products when sending back to CCR.*

| N. | Product | Manufacturer/ Supplier | Field of application | Chemical composition | Application methodology | Safety (H and P-phrases) |
|---|---|---|---|---|---|---|
| 1 | **CARLUX AGUA** | EGA | Protection | Acrylic resins | Dissolution at 5% in water | Not provided |
| 2 | **BV000- BARNIZ AL AGUA SATINADO** | PROA | Protection | Unknown | Dissolution (0-10%) in water | Cleaning the application tools with water. |
| 3 | **IP-000 FIJADOR ABRILLANTADOR PROACRYL** | PROA | Intervention layer | Acrylic resins | Dissolution (10-25%) in water | Does not damage natural stone or building materials.<br>Dilute only the amount of PROACRYL to be used.<br>Do not apply on wet surfaces, or at ambient temperatures below 5ºC, since it would not form a film. |

| | | | | | | |
|---|---|---|---|---|---|---|
| **4** | **QUITA GRAFFI 200** | PROLISER | Graffiti remover | 1-Ethyl-2-pyrrolidinone, gamma-Butyrolactone, Dimethyl succinate | Directly | Protective clothing.<br><br>Use of protection mask in high pressure rinses and mask in poorly ventilated places.<br><br>Risk of serious eye damage.<br><br>Not classified as dangerous product. |
| **5** | **The adhesive pair:**<br><br>**Araldite® AY 103-1**<br><br>**+**<br><br>**HY 991** | HUNTSMAN | Adhesion | Modified bisphenol A epoxy resin preparation | Directly | Araldite AY 103-1 and HY 991 hardener can be stored for up to 3 years at room temperature and stored in hermetically sealed containers. The expiration date is found indicated on the label.<br><br>Araldite AY 103-1 and HY 991 hardener can be handled without risk respecting certain precautions needed in the handling of chemical products. The unhardened materials must not be in contact, for example, with food products or utensils of kitchen. They must not be in contact with the skin.<br><br>Normally, it is necessary to wear waterproof plastic or rubber gloves and use protection for the eyes. Workers must carefully clean the skin after each work with hot soapy water. The use of solvents should be avoided. Paper towels of only one use (not fabric) should be used to dry. Adequate ventilation of the workplace is recommended. These precautions are described in greater detail in the safety data sheet sheets of each individual product which should be consulted for more complete information . |

# ***WP5_ACTIVITY 3_TASK2: DATA SHEETS REPORT***

## ***by UVIGO***

*The required information was not always detailed in the data sheets.*

| |
|---|
| ***Chemical composition*** |
| **CARLUX AGUA:** Acrylic resins |
| **BV000- BARNIZ AL AGUA SATINADO:** Not provided |
| **IP-000 FIJADOR ABRILLANTADOR:** Acrylic copolymers |
| **QUITA GRAFFI 200:** 1-Ethyl-2-pyrrolidinone, gamma-Butyrolactone, Dimethyl succinate. |
| **Araldite® AY 103-1 / HY 991:** Modified bisphenol A epoxy resin |
| ***Chemical-physical properties*** |
| **CARLUX AGUA:**<br>Viscosity: 110-125 K.U.<br>Density: 1.00-1.05 g/cm³<br>Solvent: Water<br>Drying: 1-2 hours<br>Repainting: 6-8 hours. |
| **BV000- BARNIZ AL AGUA SATINADO:**<br>Finish: Smooth, homogeneous.<br>Colour: Colourless, transparent.<br>Yield: 08-16 $m^2$ for dry 30/40 µm<br>According to the roughness of the surface.<br>Density: 0.950 ± 0.050 Kg/L<br>Viscosity: 110 ± 30 s in Copa Ford nº4 at 20ºC.<br>Non-volatile matter: 33 ± 5% weight. |

Dry to the touch: 1 hour.

Drying between applications: From 3.5 hours

**IP-000 FIJADOR ABRILLANTADOR:**

Colour and appearance: Completely transparent and colourless once applied and dried but white in its presentation form as an emulsion.

Yield: 30- 40 $m^2$ /L, depending on the roughness and the degree of absorption of the support.

Dry to the touch: approximately 20 minutes.

Repainting: 5 or 6 hours, although a minimum of 24 h is recommended under normal environmental conditions

**QUITA GRAFFI 200:**

Viscous yellowish liquid.

Specific weight 1.09 kg /L.

Mild odour.

Flash point> 90ºC.

**Araldite® AY 103-1 / HY 991 (a pair):**

Low viscosity

Heat-resistant to 50$^{o}$C approx.

Easy to apply on large areas

Solvent free

Attaches a wide variety of materials

## *Application methodologies*

**CARLUX AGUA:**

*Outdoors:*

If the support is wood, before its application, a coat of WOODOXIL FONDO should be applied as protection against attacks by microorganisms. This last product penetrates into the pores of the wood and keeps it elastic.

After 24-48 hours, CARLUX WATER diluted to approximately 5% is applied. After 6-8 hours, and after sanding, a new coat of undiluted CARLUX WATER.

*Indoor:*

Seal the support with TEPPILACK AGUA Tapaporos, due to its high filling power and ease of sanding. After a minimum of 1 hour, sand and finish with two coats of CARLUX AGUA with an interval of 6-8 hours between applications.

**BV000- BARNIZ AL AGUA SATINADO:**

By brush, roller or spray (dissolved in water at 0-10% vol.).

Apply with a temperature above 15ºC and relative humidity below 75%.

WOODEN SURFACES:

Prepare the wood, cleaning and sanding in order to obtain an ideal final finish.

Give approximately 2 applications, giving a very light sanding between them, in order to promote adhesion between coats.

**IP-000 FIJADOR ABRILLANTADOR PROACRYL:**

Preferably by brush or roller and should always be diluted with water. Dilute 4 to 6 parts of water for one of PROACRYL, depending on the absorption of the substrate. On highly absorbent surfaces, it is recommended the application of two coats of the PROA fixer Proasell. On highly glazed, PROASELL PS000 should be applied.

Dilute only the amount of PROACRYL to be used.

Do not apply on wet surfaces, or at ambient temperatures below 5ºC, since it would not form a coating.

The application of a single application of PROACRYL is very convenient as a preparation layer for the final painting, and essential in the case of plaster, perlite, etc.

*For new surfaces.*

Respect the setting and curing times of the material before painting (cement, plaster, etc.)

Apply a single undercoat of PROACRYL. Wait at least 24 hours and apply the plastic paint.

*For already painted surfaces.*

It is convenient to remove the previous remains of poorly adhered paints, as well as the temperas, glues, etc. that present dusty surfaces, based on washing and brushing before undertaking the fixing of the surface

Old moisture stains, fumes, etc. must be fixed before painting with a special paint. .

**QUITA GRAFFI 200:**

Apply QUITA GRAFFI 200 GEL with a brush or spray.

Spread well on the surface, leave to act until the graffiti dissolves, from 20 minutes to 4 hours. In cold conditions, the action time increases. Rinse with hot water under high pressure (90ºC, 150 bars). The lance nozzle should be 15-25º and the water flows 15-20 L/ min.

For metal surfaces do not use high pressure. Clean with a sponge or cloth and rinse with lukewarm water.

**Araldite® AY 103-1 / HY 991 (a pair):**

The resin/hardener mixture is applied directly or with a spatula to the pre-treated and dry joint

surfaces.

A layer of adhesive 0.05 to 0.10 mm thick will induce the highest shear strength to the joint.

The bonding components (fragments) should be assembled and fixed as soon as the adhesive has been applied. Uniform contact pressure across the entire bonding area will ensure optimum cure.

## *Safety measures*

**CARLUX AGUA:** not provided

**BV000- BARNIZ AL AGUA SATINADO:**

Cleaning the application tools with water

**IP-000 FIJADOR ABRILLANTADOR:**

Does not damage natural stone or building materials.

Dilute only the amount of PROACRYL to be used.

Do not apply on wet surfaces, or at ambient temperatures below 5ºC, since it would not form a film**.**

**QUITA GRAFFI 200:**

Protective clothing.

Use of protection mask in high pressure rinses and mask in poorly ventilated places.

Risk of serious eye damage.

It is not classified as dangerous product.

**Araldite® AY 103-1 / HY 991 (a pair):**

Araldite AY 103-1 and HY 991 hardener can be stored for up to 3 years at room temperature and stored in hermetically sealed containers. The expiration date is found indicated on the label.

Araldite AY 103-1 and HY 991 hardener can be handled without risk respecting certain precautions needed in the handling of chemical products. The unhardened materials must not be in contact, for example, with food products or utensils of kitchen. They must not be in contact with the skin.

Normally, it is necessary to wear waterproof plastic or rubber gloves and use protection for the eyes. Workers must carefully clean the skin after each work with hot soapy water. The use of solvents should be avoided. Paper towels of only one use (not fabric) should be used to dry. Adequate ventilation of the workplace is recommended. These precautions are described in greater detail in the safety data sheet sheets of each individual product which should be consulted for more complete information.

## *Storage and durability*

**CARLUX AGUA:**

Up to a year in places protected from frost.

If the container has been opened, close it tightly and use the content soon.

| | |
|---|---|
| | **BV000- BARNIZ AL AGUA SATINADO:**<br><br>Not provided |
| | **IP-000 FIJADOR ABRILLANTADOR:**<br><br>Not provided |
| | **QUITA GRAFFI 200:**<br><br>Approximately 24 months in a closed container. |
| | **Araldite® AY 103-1 / HY 991 (a pair):**<br><br>Araldite AY 103-1 and HY 991 hardener can be stored for up to 3 years at room temperature provided<br><br>and when the components are stored in hermetically sealed containers. The expiration date is found indicated on the label. |

# 5. ACTIVITY 4: Tests for the assessment of conservation products properties and for the evaluation of intervention methodologies.

## 5. 1. Description and structure of the activity

The “activity 4” of working pack 5 aimed to highlight the perception and the different approach to the issue of sustainability in the field of public art conservation, in the perspective of reducing the impact of the whole conservation process on the environment and the human health.
The activity was subdivided in the following two tasks:

- TASK 1: (for commercial partners only) investigate the approach and the measures adopted in relation to the issue of sustainability during the whole manufacturing process, starting from the seeking of the raw materials to the transformation of the products, the packaging and the selling on the market.
- TASK 2: (for academic partners only) investigate the role played, if any, by the topic of sustainability within the setting of a conservation intervention, in relation to the selection of products and methodologies, to the time/cost analysis and the evaluation of the impact on the environment and the social context.

## 5. 2. Methodology and partners’ involvement

According to the different purpose of the two tasks of activity 4, different surveys were prepared by the WPL and shared with the partners. In particular, the survey related the approach toward sustainability within the manufacturing process (task 1) has been addressed only to commercial partners, asking them to describe tests and evaluation used within their context. On contrary, the survey set up for task 2 was specifically addressed to academic partners, with the aim of investigating the approach toward the issue of sustainability within conservation intervention.
Considering the different professional specialisations, some of the partners grouped in national clusters for this activity, as follow[3]:

- TASK 1:

- Research group 1: includes partner 4, AN.T.A.RES (Italy)
- Research group 2: includes partner 6, Schmincke (Germany)
- Research group 3: includes partner 16, Montana Colors

[3] The following references to the partners’ number are based on those reported in the CAPuS “detailed project description”

- TASK 2:

- Research group 4: includes partner 1, University of Turin (Italy)_UNITO
- Research group 5: includes partner 2, Centro Conservazione e Restauro “La Venaria Reale” (Italy)_CCR
- Research group 6: includes partner 3, CESMAR 7 (Italy)
- Research group 7: includes partner 5, Cologne Institute of Conservation Sciences (Germany)_CICS
- Research group 8: includes partner 7, Academy of Fine Arts of Warsaw (Poland)
- Research group 9: includes partner 10, University of Split (Croatia), partner 11, METRIS (Croatia), and partner 13, Sisak Municipal Museum (Croatia)
- Research group 10: includes partner 15, University of Vigo (Spain)

### 5. 3. Analysis of the results

All partners, both commercial and academic, provided well-structured definitions of sustainability for products / methodologies used in conservation. In particular, it was highlighted that any definition should include many different aspects: environmental impact, toxicity and health threats for workers, costs, effectiveness and durability of the products. Within this context, UNITO recalled the **UN Agenda 2030**, with particular reference to **targets 8.8** (Protect labour rights and promote safe and secure working for all workers), **9.4** (Adoption of clean and environmentally sound technologies and industrial processes), **12.4** (Achieve the environmentally sound management of chemicals and all wastes throughout their life cycle and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment) and **12.6** (Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle).

Task 1_Commercial partners:

Focusing on sustainability, both AN.T.A.RES and Schmincke reported the importance of an appropriate product profiling and selection of raw materials: if possible, raw materials should be environmental-friendly, not classified as hazardous and ensure long shelf life and high stability. If materials potentially toxic are used, technical and safety data sheet must be provided to workers, as well as personal protective equipment. AN.T.A.RES underlined also the importance of an appropriate product waste disposal and a reduction of the procurement / logistic costs. Schmincke pointed out that most of the electricity used for the production phase comes from they own solar power system. A critical issue is reported about the durability of products after application: although this is a desired feature for products, this is often in contrast to reversibility.

Task 2_Academic partners:

Beyond the environmental impact and safety for workers, the academic partners stressed the importance of selecting a product / conservation methodology which allows the best compromise among time required for the treatment, effectiveness and costs. Ease of use and lower exposure time to organic solvents or hazardous substances for workers must be preferred. More specifically, CESMAR7 recommends the use of self-prepared products, in order to avoid not declares additives. Anyway, the technical and safety data sheets should be clear, complete, updated and multilingual.

Furthermore, sustainable products / methodologies should be as much selective as possible and linked to the concept of "minimal intervention", as highlighted by CESMAR7. Despite the critical reversibility, all the academic partners stated the high stability and durability of products after application is crucial in order to avoid cyclic and recurring treatment, thus reducing the costs of maintenance. Some aging tests may be performed prior to application to assess the products durability.
The cost of any product or conservation methodology resulted as one of the factors that most influences the final choice of intervention. This is also related to the operator's time requested for the application and is even more relevant when dealing with large artworks, such as murals and urban art.

### 5. 4. Problems encountered & implemented or proposed solutions.

Despite the growing awareness toward the different issues related to the sustainability, considered in the economic, environmental, art-respectful and human perspectives, the activity showed that more efforts are necessary to fully analyse the impact of a conservation treatments: e.g. aspects as the impact on the environment of the conservation products (especially in relation to the manufacturing process) are usually not considered valuable criteria within the planning of intervention methodologies. Other factors, especially those related to the cost/time evaluation and the absence of "negative" interactions with the constitutive materials still played the major role in the products selection.
Considering the activity, the survey resulted useful to outline the frame of the approach toward the sustainability issues, but the lack of countable parameters made the analysis of the results more multifaceted and difficult to describe in numerical terms.

### 5. 5. List of the hereby attached documents received from partners

- TASK 1:

- Research group 1: WP5_ACTIVITY4_TASK1 report by AN.T.A.RES (Italy)
- Research group 2: WP5_ACTIVITY4_TASK1 report by Schmincke (Germany)

- TASK 2:

- Research group 4: WP5_ACTIVITY4_TASK1 report by UNITO
- Research group 5: WP5_ACTIVITY4_TASK1 report by CCR
- Research group 6: WP5_ACTIVITY4_TASK1 report by CESMAR 7 (Italy)
- Research group 7: WP5_ACTIVITY4_TASK1 report by Cologne Institute of Conservation Sciences (Germany)_CICS
- Research group 8: WP5_ACTIVITY4_TASK1 report by Academy of Fine Arts of Warsaw (Poland)
- Research group 10: WP5_ACTIVITY4_TASK1 report by University of Vigo (Spain)
-
-

## *WP5_ACTIVITY 4_TASK1: SUSTAINABILITY EVALUATION – AN.T.A.RES*

| | |
|---|---|
| **According to your company, what definitions of product sustainability can you provide?** | [Please, describe the field of application of the concept of sustainability (environment, workers, time, cost...)]<br><br>Antares believe that environment sustainability entails an all-round approach that has to take into account the stringent demand to exploit resources in a manner that will preserve them to the benefit of future generations; therefore, product choice, method of working/application, sourcing, disposal should all be considered in the light of this imperative. If our approach is respectful of the long term environmental goals this will in turn result in a virtuous circle of economic/environmental rewarding results.<br><br>**Product profiling:** our aim is to identify green products with a high score of life cycle assessment (LCA) for their specific use in terms of<br><br>1. Source of components/manufacturing chain<br>2. Availability<br>3. Recyclability<br>4. Renewability<br>5. Not classified as hazardous according to CLP/ GHS<br>6. Water based (in accordance with the type of application, not always possible)<br>7. Low VOC content<br>8. Low ecological toxicity<br>9. Easy and ready to use<br>10. If the product is used in a mixture, the mixture should be as simple as possible in terms of nature and number of components<br>11. Long shelf life and high stability<br>12. Ongoing matching of product profile with legal requirement i.e. REACH<br><br>**Procurement/logistic costs:** |

| | |
|---|---|
| | 1. Minimize distances supplier-user<br>2. Minimize supply purchase frequency<br>3. Minimize supply purchase quantity (concentrated formula would be ideal)<br>4. Minimize warehousing space<br><br>**Product waste disposal:**<br><br>1. Not classified as hazardous by CLP/ GHS<br>2. Not classified as hazardous by local regulations<br>3. Biodegradable<br>4. Miscible with water<br>5. Low bioaccumulation<br>6. No special accidental release measures required<br>7. Long shelf life<br>8. Reuse of the container by the user or waste company<br><br>**User safety:**<br><br>1. Not classified as dangerous by CLP<br>2. No special handling measures required for users<br>3. No special storage measures required for users<br><br>If sustainability parameters are met these could allow the product/method of application to be accepted by public entities in published or to be published protocols and guidelines. |
| **Considering the production phase, have you set up strategies for sustainability, in relation to the...** | Environment: [Please, describe the strategies, specifying the considered aspects and all the assessment protocols.]<br><br>See above |
| | Workers (users)/ general public: [Please, describe the strategies, specifying the considered aspects and all the assessment protocols.]<br><br>See above, please note that workers/users should be equipped with suitable PPE |

| | |
|---|---|
| | Time requested for the operations: [Please, describe the strategies, specifying the considered aspects and all the assessment protocols.]<br><br>The production plan should optimize batch production time and warehouse requirements |
| | Durability of the products after the application: [Please, describe the strategies, specifying the considered aspects and all the assessment protocols.] |
| | Cost:<br><br>[Please, describe the strategies, specifying the considered aspects and all the assessment protocols.]<br><br>We have developed a "**cost sheet" for each product** that calculates its ultimate cost. It takes into account:<br>o Raw materials costs<br>o Packaging costs<br>o Lab costs<br>o Direct operation cost<br><br>It should be checked and updated as and when necessary and in any case at least once a year |
| Among the above mentioned aspects, which one(s) can you consider the most important in relation to the market trends? | [please, give a brief description of the most important criteria and evaluation]<br><br>Economic sustainability ought to be the result of a concerted effort in technical/marketing/operational/financial activities carried out in the frame of a strategic long term plan that should deliver profit and cash flows rewarding the business and its stakeholder.<br><br>However today, and more so in the future, product features will have to meet the demand for a better environment, therefore it looks highly probable that any strategic plan should start by looking at environmental sustainability first.<br><br>Therefore, to achieve economic sustainability before setting the product price (which indeed could result in a "premium price" if the environmental sustainability is fully met) the following should be taken into account:<br><br>a) **Product performance**: does the product meet the user needs at the same level, or even better, compared to competitor offer |

| | |
|---|---|
| | b) **Product innovation**: does the product offer features that outpace the others: i.e. “green” components, high level of technology and know-how, lower rate of application, easy to use and easy to dispose of etc…<br><br>c) **Product acceptance**: prior to launching the product and its application methods influencers approval and support should be sought<br><br>d) **Product sourcing and manufacturing**: as far as feasible (as well as far as legally acceptable) sourcing should be secured through binding/exclusivity arrangements<br><br>e) **Product Patent**: as long as possible/practical and economically feasible patent rights and trademarks should be sought<br><br>All the above considered and taken into account, a “premium price”, compared to “current old fashioned products” on offer, could be set because we would have determined a new selling proposition/trend. |

## ***WP5_ACTIVITY 4_TASK1: SUSTAINABILITY EVALUATION - SCHMINCKE***

| | |
|---|---|
| **According to your company, what definitions of product sustainability can you provide?** | When selecting raw materials, only the best raw materials are used as sustainably as possible and if possible without labelling. Our products with possible long storage times and high resistance in application. |
| **Considering the production phase, have you set up strategies for sustainability, in relation to the...** | Environment: Environmentally friendly raw materials (if possible), with environmentally friendly disposal (if necessary)<br><br>Our electricity for production comes mainly from our own solar power. |
| | Workers (users)/ general public: Use of unmarked products if possible, otherwise active protective measures for employees.<br><br>Provision of a technical data sheet and a safety data sheet for users. |
| | Time requested for the operations: Improvements to the products is a permanent process. |
| | Durability of the products after the application: Long durability and best possible protection. However, this claim is contrary to the easily removable protection of our products. |
| | Cost: Economical production, but the best product features come before costs. |
| Among the above mentioned aspects, which one(s) can you consider the most important in relation to the market trends? | That the product works perfectly during long shelf life. |


## ***WP5_ACTIVITY 4_TASK2: SUSTAINABILITY EVALUATION - UNITO***

| | |
|---|---|
| **According to your institution, what definitions of product sustainability can you provide?** | [Please, describe the field of application of the concept of sustainability (environment, workers, time, cost...)]<br><br>At UNITO, Department of Chemistry, the concept of sustainability is declined for the various application fields according to the 2030 Agenda and the Sustainable Development Goals identified there. With reference to products (for restoration):<br><br>8. Decent Work and Economic Growth<br><br>8.8 **Protect labour rights and promote safe and secure working environments for all workers**, including migrant workers, in particular women migrants, and those in precarious employment<br><br>9. Industry, Innovation, and Infrastructure<br><br>9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater **adoption of clean and environmentally sound technologies and industrial processes**, with all countries taking action in accordance with their respective capabilities<br><br>12. Responsible Consumption and Production<br><br>12.4 By 2020, **achieve the environmentally sound management of chemicals and all wastes throughout their life cycle**, in accordance with agreed international frameworks, **and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment**<br><br>12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle<br><br>Of course, another aspect is economic sustainability in terms of the price of |

| | |
|---|---|
| | the product on the market, and costs associated with the application of the product (which also include the operator's time). In the case of consolidants and protective coatings, economic sustainability also depends on the stability and durability of the product after application, its removal and replacement.<br><br>In a broader perspective of sustainability, the conservation of art public spaces can also contribute to the following SDGs:<br><br>8. Decent Work and Economic Growth<br><br>8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services.<br><br>11. Sustainable Cities and Communities<br><br>11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries<br><br>11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage |
| **According to your institution, what definitions of methodologies sustainability can you provide?** | [Please, describe the field of application of the concept of sustainability (environment, workers, time, cost...)]<br><br>Since the UNITO team is mainly composed of chemists, as for the aspects of sustainability methodologies strictly related to the conservation field, we prefer to rely on the opinion and experience of conservators of the Conservation and Restoration Centre "La Venaria Reale".<br><br>More in general, the definition of methodologies for sustainability could go through:<br><br>- the identification of the most significant fields of application (i.e. environment, workers, cost...),<br><br>- the definition for each of them of sustainability criteria,<br><br>- the definition of indicators that allow to quantify and rank products based on the level of sustainability achieved,<br><br>- the validation of the method (for example through the comparison between technical and safety data sheets of products currently on the market, with those of similar products on the market 20-30 years ago) |
| **Considering products selection and methodologies definition, what criteria can you take into** | Environment: [Please, describe the strategies, specifying the considered aspects and the related evaluations.]<br><br>Choice of raw materials: not harmful to humans and the environment;<br><br>Process sustainability: evaluation of the resources used (energy, water, $CO_2$ |

| | |
|---|---|
| **account for sustainability, in relation to the...** | emissions, other gases and liquids, ...) |
| | Workers (users)/ general public: [Please, describe the strategies, specifying the considered aspects and the related evaluations.]<br><br>Reduction or elimination of the use of dangerous substances (i.e. organic solvents), in favour of aqueous systems or non-toxic solvents and substances;<br><br>use of formulations that involve application methods that guarantee a lower and shorter exposure of the operator to any harmful products. |
| | Time requested for the operations: [Please, describe the strategies, specifying the considered aspects and the related evaluations.]<br><br>Formulations and application methods that involve a lower and shorter exposure of the operator to any harmful products: use of gels and poultices, short setting time. |
| | Durability of the products after the application: [Please, describe the strategies, specifying the considered aspects and the related evaluations.]<br><br>Durability is a fundamental requirement for 'permanent' (non-sacrificial) products. It occurs through monitoring of chemical and physical-mechanical properties: colour/gloss changes, mechanical properties (yield strength and strength / elongation at break), solubility and therefore removability.<br><br>Aspect related to periodic maintenance costs. |
| | Cost: [Please, describe the strategies, specifying the considered aspects and the related evaluations.]<br><br>Formulations and methods that require less time for application;<br><br>best compromise between effectiveness, safety and cost.<br><br>In street art the acceptable costs for the realization and possible conservation of the artwork depend on its recognition as a work of art by institutions and citizens, and on the intent of the artist. The same applies to the attention to the durability of the materials and the execution technique: often there is a lot of attention to the quality of the products, even if more expensive, but it is the opposite if the artwork is intended as ephemeral. |
| **Among the above mentioned aspects, which one(s) is the most relevant in the definition of an intervention methodology?** | [please, give a brief description of the most important criteria and evaluation]<br><br>It depends on the context. For routine maintenance: economic (i.e. low costs and short time) aspects, safety for workers. For more complex interventions on works of art of greater value (i.e. because of the subject, of the impact on the community): durability, safety for workers. |


## ***WP5_ACTIVITY 4_TASK2: SUSTAINABILITY EVALUATION - CCR***

| | |
|---|---|
| **According to your institution, what definitions of product sustainability can you provide?** | To define the sustainability of a conservation product different aspects should be considered:<br>- low environmental impact (raw materials supply / waste disposal / $CO_2$ emissions)<br>- low toxicity for conservators / general public<br>- high stability and good durability<br>- fair cost<br>- effectiveness and selectivity<br>- time requested for its use / application<br><br>Although some of these characteristics are reported either in the technical or safety data sheets, it is not always simple for users to gather all this information in detail. |
| **According to your institution, what definitions of methodologies sustainability can you provide?** | As a Conservation and Restoration Centre, it is our duty to always look for the best and more sustainable treatments. Each conservation action should be based on the selection of the most effective and environmental-friendly products, with an eye also on health issues for conservators and the general public. The development of sustainable methodologies should consider the goals included in the UN Resolution known as "Agenda 2030". Even in the conservation field, just as in all others, each intervention should guarantee safe work condition (Goal 8), focus on sustainable production processes and responsible waste disposal (Goal 12), reducing the risk of contamination of watercourses (Goal 14) and pollution of terrestrial ecosystems (Goal 15).<br><br>Moreover, when facing the conservation of Cultural Heritage, any methodology applied should pursue the objective of "reversibility", although any product used is requested to have high stability and durability. Following the principle of "minimal intervention", all treatments should also be as much selective and controllable as possible.<br><br>Finally, to define the sustainability of a conservation methodology other aspects, such as costs and time requested for application, should be |

| | |
|---|---|
| | considered. This is even more relevant in the case of large street artworks and contemporary murals in public spaces. |
| **Considering products selection and methodologies definition, what criteria can you take into account for sustainability, in relation to the...** | **Environment:**<br>• lowest $CO_2$ emissions related to the industrial production processes<br>• lowest emission of pollutants and toxic by-products after application<br>• appropriate waste disposal |
| | **Workers (users)/ general public:**<br>• Lowest toxicity (considering parameters such as the TLV, Threshold Limit Value)<br>• Recommended use of green solvents<br>• Supply of appropriate personal safety protection devices to workers |
| | **Time requested for the operations:**<br>• Ease of application and the shortest time possible for the operations are crucial to ensure economical sustainability of the conservation actions |
| | **Durability of the products after the application:**<br>• Conservation products should provide the highest stability and durability possible; on the other hand, they should ensure the lowest chemical interaction with the original materials of artwork in order to allow their reversibility |
| | **Cost:**<br>• Best compromise between costs and effectiveness should be sought<br>• The costs of the conservation actions are strictly related to the time needed for the intervention / application of products |
| **Among the above-mentioned aspects, which one(s) is the most relevant in the definition of an intervention methodology?** | All the above-mentioned aspects are crucial in the definition of a sustainable intervention methodology. Although the cheapest treatments are often valorised, it should be pointed out that “fair” costs should be fostered if related to environmental sustainability, safety for both conservators and general public and safeguard of the artworks’ original materials. |


## *WP5_ACTIVITY 4_TASK2: SUSTAINABILITY EVALUATION - CESMAR7*

| | |
|---|---|
| **According to your institution, what definitions of product sustainability can you provide?** | [Please, describe the field of application of the concept of sustainability (environment, workers, time, cost...)]<br><br>As CESMAR7 is no profit association mainly involved in formative modules and workshop for restores and conservators, as well as on research on products, the idea of sustainability is strictly connected with practical activity, but also with the main theoretical points and researches in which Association has been involved for twenty years.<br><br>A sustainable product should have/be:<br><br>● Low toxicity also in a confined environment (i.e. workshop)<br>● Good balance between product costs and effectiveness<br>● affordable cost also for private conservators<br>● ease of use/controllable action (selectivity)<br>● simple formulation, that the conservator could understand<br>● Long term stability (chemical, physical) reducing the necessity of cyclic conservation treatments and therefore chemical waste disposal<br>● Low environmental impact (waste disposal and biodegradable)<br><br>Moreover: products that can be self-prepared should be preferred (avoiding not declared additives). Composition should be clear and technical sheet as well as SDS should be complete, available, multilingual and updated. In case of structural treatments, the product selected if found to be inadequate, should be removed and replaced without causing any damage to the artwork.<br><br>For biocides and products for biological treatment, product sustainability is determined by preliminary challenge tests (in vitro and then in vivo) in order to determine minimal effective concentration, minimize/optimize chemical products on the artwork. A complete preliminary study of the |

| | |
|---|---|
| | environmental parameters should be carried out. Yet, product of low environmental impact, low toxicity for the conservator, active at very low concentration and biodegradable should be preferred. |
| **According to your institution, what definitions of methodologies sustainability can you provide?** | [Please, describe the field of application of the concept of sustainability (environment, workers, time, cost...)]<br><br>A sustainable methodology is connected with the costs for the workers in relation with time requested for the treatment, especially for big dimensions' artworks (like murals and urban art). Great attention should be payed to the environmental impact and workers' safety. The application should be rapid but controllable, obtainable with tools and equipment that conservators could afford. Sustainability is also strictly linked to the concept of *minimal intervention*, i.e. performing only the operations necessary for the artwork survival under a conservative point of view. As CESMAR7 from the very beginning of the activity is involved in research on cleaning methods, a good example could be the one connected to this treatment. A sustainable cleaning methodology should be/have:<br><br>● Selective (acts only to a targeted material or layer)<br>● Minimal complexity of formulation (low number of components)<br>● Controllable<br>● Low toxicity for the worker<br>● Low risk of residues (and in case, of low reactivity)<br>● Low environmental impact<br>● Feasible (in relation with artwork dimension and position) |
| **Considering products selection and methodologies definition, what criteria can you take into account for sustainability, in relation to the...** | **Environment:** [Please, describe the strategies, specifying the considered aspects and the related evaluations.]<br><br>● products with low environmental impact should be preferred, avoiding the ones with the classification of possible environmental hazards (CLP Regulation 1272/2008)<br>● Low impact industrial processes in terms of emissions and pollutant agents ($CO_2$, toxic by-products) |
| | **Workers (users)/ general public:** [Please, describe the strategies, specifying the considered aspects and the related evaluations.]<br><br>● Low toxicity (avoiding organic solvents and hazardous substances in favour of green formulation and water based systems)<br>● Product costs in balance of time required for the treatment and effectiveness |
| | **Time requested for the operations:** [Please, describe the strategies, specifying the considered aspects and the related evaluations.]<br><br>● Lower exposure time to chemical substances for the operators<br>● Best compromise with selectivity and ease of use |

| | |
|---|---|
| | **Durability of the products after the application:** [Please, describe the strategies, specifying the considered aspects and the related evaluations.]<br><br>● Stability of the product after application could be crucial in order to avoid cyclic retreatment. For structural treatments, mechanical and physical properties should be taken into account; for protective treatments, optical properties have to be considered (gloss and chromatic stability) together with solubility stable during time (assuming that the choice is done considering the removability with selective methods with respect of the artwork solubility range). In street art or urban art conservation, as far as the ephemeral nature of the mural is concerned, the durability could a parameter to be considered only in limited cases (commissioned murals or relevant for the social context); moreover, from artists' voices themselves it is important that the protective coating allows cyclic and complete remaking of the wall, as well as repainting. |
| | **Cost:** [Please, describe the strategies, specifying the considered aspects and the related evaluations.]<br><br>● Related to time required for the operation, it is of extreme importance that this point would not affect the quality of treatment and the quality of the products used<br>● Linked also to effectiveness of both method and product selected, in balance with low toxicity for the worker and respect of the artwork characteristic |
| **Among the above mentioned aspects, which one(s) is the most relevant in the definition of an intervention methodology?** | [please, give a brief description of the most important criteria and evaluation]<br><br>According to our opinion, it depends from the artwork. For urban art conservation, if the mural is commissioned and/or it has a great value for the community, considering the big dimensions, the more relevant points are costs, attention for workers' health and durability of the product used (especially for protective coatings in terms of optical properties and stable solubility) |

## ***WP5_ACTIVITY 4_TASK2: SUSTAINABILITY EVALUATION - CICS***

| | |
|---|---|
| **According to your institution, what definitions of product sustainability can you provide?** | In lectures, research projects and projects of the university administration, environmental protection competences and topics on sustainability are developed and taught. We use energy, water, materials and space sparingly and in an environmentally friendly manner.<br><br>We want to reduce or completely avoid environmentally harmful emissions as far as possible, taking into account economic efficiency, financial viability and health and safety at work. |
| **According to your institution, what definitions of methodologies sustainability can you provide?** | At CICS, various scientific studies on sustainability issues are conducted and new methods are tested.<br><br>For example, a study on terahertz radiation for the evaluation of restorative treatment steps is being carried out, in which the focus is on the exemplary development of new procedures for testing the penetration and spread of consolidation agents in the treatment of damaged works of art made of organic materials. A further study deals with the suitability of green solvents for use in the restoration of paintings.<br><br>The implementation of restoration measures is always justified by necessity. |
| **Considering products selection and methodologies definition, what criteria can you take into account for sustainability, in relation to the...** | Environment:<br><br>Contamination of the environment must be avoided. When using harmful cleaning agents, consolidating agents or protective coatings, it is important to ensure that the environment is protected and that no harmful substances are released into the environment (soil, air, etc.). |
| | Workers (users)/general public:<br><br>As far as it can be avoided, no toxic chemicals are used. If the object requires the use of harmful substances that could be dangerous for the workers or for the general public, the necessary work and public safety is ensured during the implementation of the measures. |
| | Time requested for the operations:<br><br>In education, students can use various methods to examine and work with an object. In addition to new technologies for the examination and treatment of works of art, CICS also supports scientific studies by students on examinations and measures which are cost-effective and less time-consuming and can therefore be carried out in everyday restoration practice. |
| | Durability of the products after the application:<br><br>The durability of the products and the conservation treatment has, in addition to factors such as changes in colour and gloss, chemical and physical properties, a major influence on the choice of products and treatment. The more durable the materials and the conservation measure, the lower the probability of further interventions in the future. |

| | |
|---|---|
| | Cost:<br><br>The costs depend on the object. |
| **Among the above mentioned aspects, which one(s) is the most relevant in the definition of an intervention methodology?** | Every object is different, so there can be no aspect that is equally relevant to every object. To meet the requirements of the respective object and the durability of the products brought in, but also, if necessary, the possibilities to reverse the measures are important aspects in the conservation. |

## ***WP5_ACTIVITY 4_TASK2: SUSTAINABILITY EVALUATION – Academy of Fine Art of Warsaw***

| | |
|---|---|
| **According to your institution, what definitions of product sustainability can you provide?** | Products used for the conservation of cultural heritage objects are aimed at preventing their destruction and strengthening their structure. According to the concept of sustainable development, these products must not be harmful to the environment and to the health of conservators. It is also important that they are well balanced in economic terms. |
| **According to your institution, what definitions of methodologies sustainability can you provide?** | Development of the conservation method requires conducting appropriate laboratory tests and tests on the object or on mocks-up. The main purpose of these activities is to find an effective method, which, however, will not cause additional damage to the object and will not change its character. Therefore, when cleaning the surface of an object, it should be assessed to what extent this treatment can be carried out without destroying the original substance. When consolidating an object, we must choose products that not only effectively strengthen its structure, but are also compatible with the original substance and will not cause further damage in the future. |
| **Considering products selection and methodologies definition, what criteria can you take into account for sustainability, in relation to the...** | Environment:<br>All conservation measures should be carried out to prevent harmful chemicals from entering the ground and the sewage system. Therefore, after the procedure, all harmful substances remaining after it should be disposed of. |
| | Workers (users) / general public:<br>Conservation contractors should have completed higher studies in the field of monument conservation. Some work may be carried out by unskilled workers but under the supervision of a conservator. Only in this way can you carry out safe conservation that will bring positive results.<br>If the conservator uses substances harmful to health (e.g. when he fixes the surface of the painting with a substance dissolved in an organic solvent or cleans the surface of the object with compresses that emit harmful fumes) he should do so in appropriate protective clothing and in an absorbing mask. In addition, toxic products should be replaced as far as possible with those that are effective and do not cause poisoning. The place where maintenance is carried out should be isolated from pedestrians. |

| | |
|---|---|
| | Time requested for the operation:<br>The deadline for maintenance of the object should be set so as to take into account technological breaks between individual treatments. Very often, the client's imposing too short time for conservation is unfavourable for the object. In addition, it should be provided that some treatments can be performed only at certain times of the year, e.g. only at positive temperatures. |
| | Product durability after application:<br>All materials that we introduce to the object should be checked for durability. Therefore, it is necessary to carry out aging tests on new products. Products previously used should be used in accordance with conservation experience. In this case the exchange of information between individual conservators is important. |
| | Cost:<br>Unfortunately, currently the cost of conservation is a basic factor when choosing the conservation contractor by the client. Very often, too low prices have a negative effect on the quality of treatments. In order to reduce costs, conservation companies employ unqualified employees and use cheaper and inappropriate materials. |
| **Among the above mentioned aspects, which one(s) is the most relevant in the definition of an intervention methodology?** | The most important thing is that professional conservators after higher education participate in the protection of cultural heritage objects. This guarantees the selection of appropriate conservation products and the development of effective conservation methods as well as the commissioning of necessary laboratory tests. Time and cost are also of some importance - because in most cases conservation of monuments is a costly and time consuming process. |

## *WP5_ACTIVITY 4_TASK2: SUSTAINABILITY EVALUATION – UVIGO*

| | |
|---|---|
| **According to your institution, what definitions of product sustainability can you provide?** | The concept of sustainability applied to the conservation of the tangible cultural heritage gathers the effectiveness of the treatment, its durability, the protection of the environment and the workers' health and the costs induced. It is a difficult achievement and must be continually under investigation. |
| **According to your institution, what definitions of methodologies sustainability can you provide?** | UVIGO team always perform scientific studies based on the cleaning, consolidation and water-repelling of cultural heritage materials providing results not only related to the effectiveness but also evaluating the impact of the treatment on the physical, chemical and mineralogical properties of the valuable material. For example, in researches based on effectiveness of cleaning methodologies for stone heritage, it is very important to study the effect of the procedure on the support without the coating to be removed such as black crust, graffiti, etc. in order to identify the by –effects, as chemical contamination for chemical cleanings, grain extraction and fissuring for mechanical procedures or melting and cracking of mineral grains due to laser application. |
| **Considering products selection and methodologies definition, what criteria can you take into account for sustainability, in relation to the...** | Environment:<br><br>Leakages produced during chemical and wet mechanical cleanings of walls should be considered. The penetration of these leakages into the structures or into the ground could produce chemical contamination that subsequently would cause irreversible damage. |
| | Workers (users)/ general public:<br><br>Chemicals can release harmful gases for workers or for the general public that circulates freely during the execution of the artwork. Therefore, it is important to know the hazard gases released from the common products used as cleaners, consolidants, etc. |
| | Time requested for the operations:<br><br>Although time should not be a limiting factor, unfortunately it is, because the longer a worker works, the more she/he will have to earn. Herein lies the importance of detailing the costs of the |

| | |
|---|---|
| | conservation interventions in the scientific works. In most researches, very effective treatments are applied being those very expensive and impractical from the applicability point of view. Therefore, research has to ensure the effectiveness of the treatment but also reducing costs related to the time. |
| | Durability of the products after the application:<br><br>For UVIGO team, durability is one of the most decisive factor when designing a conservation intervention for cultural heritage materials, such as contemporary wall paintings. This durability must be understood as the keeping of the improvement obtained by the treatment over time; i.e. the improved achieved should be as durable as possible. This durability cannot threaten the properties of the surface such as the colour, the gloss, the hydric physical properties such as the absorption of water, the absorption of water vapour, water capillary, etc. |
| | Cost:<br><br>The cost of the conservation treatment is linked to the historical and artistic value of the work. It is preferable to make a greater investment in an effective treatment and avoid carrying out many cheaper and less effective interventions. |
| **Among the above mentioned aspects, which one(s) is the most relevant in the definition of an intervention methodology?** | Durability of the conservation treatment is one of the most important aspects, because the scientific research has to ensure that conservation treatments are effective but also durable. If the procedure gathers these requirements, important criteria that are valued in the selection of a methodology will also be included, such as the cost, because future maintenance campaigns will be avoided. |

# 6. CAPuS GLOSSARY: STREET ART and CONSERVATION

Street Art & Graffiti and Conservation fields are complex and vast, therefore the selection of fundamental words for a glossary is a challenging task. They are “living” disciplines, their linguistic expressions are constantly developing and changing over the time.

The aim of the present task of the CAPuS project was to make a survey of pre-existent glossaries on street art subject, if any, and about degradation phenomena, in order to build up a reference glossary, tailored for the specific needs of the project itself.

The present Glossary was realized for educational purposes and does not claim to be complete and exhaustive. It is addressed to non-expert users and to specialists as a “working tool” useful to guide in the selection of suitable terms for the description of both the artistic/technical aspects and the condition of a contemporary artwork in public spaces.

The first proposal of its structure was presented to all partners during the 2nd CAPuS meeting held in Split in July 2018, then discussed in the 4th meeting held in Venaria Reale in October 2019. Specific issues in relation to the convenience of inserting some terms (as “vandalism”) and to the definitions of specific terms (as overpainting/repainting) were tackled during a steering committee carried out in July 2020 (in virtual meeting mode) to arrive to the final version approved by the team, here enclosed.

The CAPuS glossary was conceived in two forms, a more complete English monolingual illustrated glossary containing several terms and definitions, and a series of reduced bilingual illustrated glossaries ENGLISH-XX, one for each current language of the CAPuS partners’ countries (CROATIA, GERMANY, ITALY, POLAND, SPAIN).

It is divided into two sections, Street Art & Graffiti and Conservation, each supplied with a List of pictures and credits, Bibliographic References and an Index. In particular, the section Street Art & Graffiti was developed with the great help of the Montana team.

Overall, the glossary counts 141 definitions. Street Art & Graffiti sections contains General (3), Cultural (38), Style (26) and Techniques (15) terms while Conservation section has a sub-classification in 9 families: General terms (5), Addition of substances (7), Biological alteration (2), Chemical alteration (7), Deformation (5), Loss of cohesion (10), Loss of material (11), Optical alteration (6) and Previous intervention (6).

The goal of each definition was to be accurate and concise. When possible, international glossaries already existing were taken as a reference and terms were illustrated with a telling picture. Cross-references and indication of true, near and “fake” (not to be confused with) synonyms were indicated. Please, be aware that some of the terms may potentially refer to more than one category. Terms that imply some negative reputation in common language and could implicate a different and subjective judgement are intentionally not included (e.g. vandalism).

All the work was conducted by the research teams, multilingual glossaries were realized by art and conservation experts but not by professional translators or linguistic experts.

The following documents can be found enclosed apart

**ENGLISH MONOLINGUAL CAPUS GLOSSARY**
**ENGLISH-CROATIAN BILINGUAL CAPUS GLOSSARY**
**ENGLISH-GERMAN BILINGUAL CAPUS GLOSSARY**
**ENGLISH-ITALIAN BILINGUAL CAPUS GLOSSARY**
**ENGLISH-POLAND BILINGUAL CAPUS GLOSSARY**
**ENGLISH-SPANISH BILINGUAL CAPUS GLOSSARY**

# 7. CONDITION REPORT

Documentation phase before the intervention is an important issue and it is useful to share practical tools that allow to carry out it in the simplest but complete and effective way.

The analysis of the conservative condition of the object, realized following a workflow that, starting to the preliminary optical observation, led to a detailed comprehension of the degradation phenomena affecting the object, in relation to their extension, localization and interactions with the constitutive materials is a preliminary step in the intervention action.

Within the CAPuS project, a condition report template was draw up with the aim of guiding the analysis of the degradation phenomena and leading to a deeper knowledge of the object and its history, to be used together with the glossary presented in the previous paragraph.

The draft of the document was presented to all partners during the 2nd CAPuS meeting held in Split in July 2018 and approved in its structure and contents in that occasion.

Condition reports were filled in by some partners during WP2/WP3 activities.

You will find enclosed apart:

**CONDITION REPORT FORM**

and the filled forms received from partners

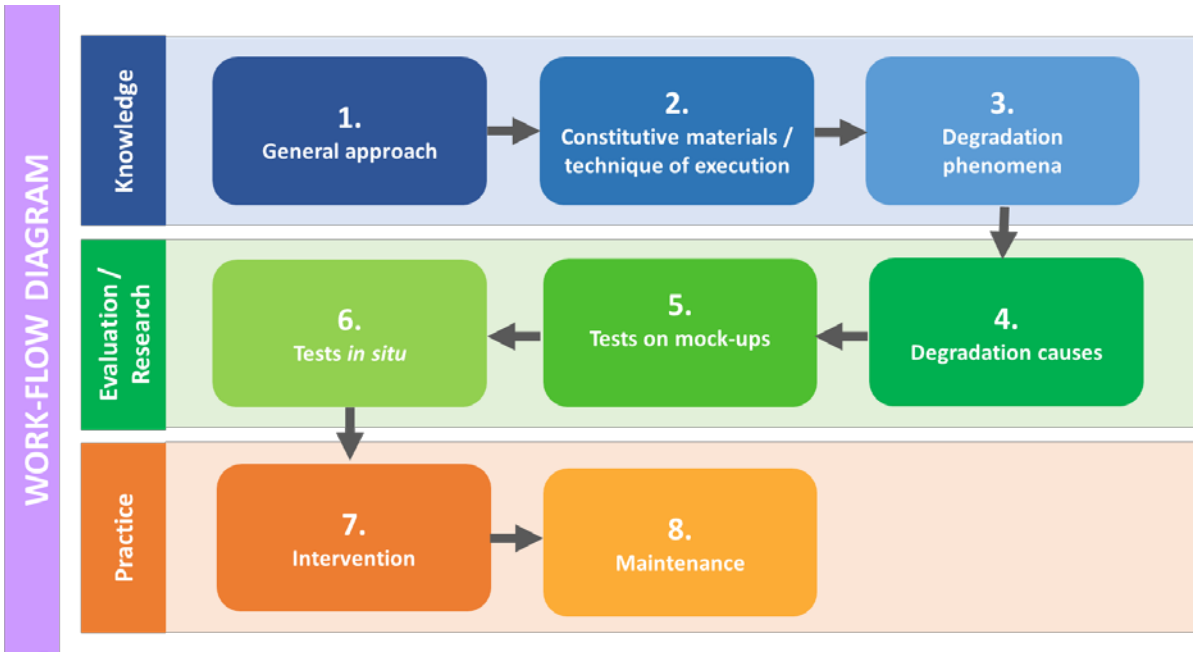
- **Condition reports by CCR –UNITO (Italy)**
- **Condition reports by CESMAR 7 - ANTARES (Italy)**
- **Condition reports by Cologne Institute of Conservation Sciences (Germany)_CICS**
- **Condition reports by University of Vigo (Spain)**

## 8. GUIDELINES for the conservation intervention

One of the main output of the WP5 activity within the project is a document containing the GUIDELINES for the implementation of an appropriate conservation methodology, in particular for product selection, on-site treatments evaluation and preventive conservation & maintenance.

This document was drawn up by the CCR team, following the deep knowledge gathered in the field of conservation of cultural heritage over the years and improved with the specific experiences carried out within the CAPuS project. It contains the methodological guidelines that must be undertaken to implement a conservation intervention, following step by step all the technical and scientific actions and suggesting a proper sequential operative approach. The aim of the document wasn't to give a simple list of materials or technical methods that could be eventually applied, but supply some tools to face in a critical and conscious way the "conservation road-map", in other words all the questions and the issues to be solved during a restoration work. Each intervention is always an *unicum,* it is impossible to recommend standard and pre-packaged answers, but solutions have to be tailored to the specific artwork, to its specific condition state and to its specific context.

The document contains eight sections, represented in the workflow diagram hereafter:




Each section is organised in subsections as following:

**OBJECTIVE**

*General goal of the step described in the section…*

…

**CAPuS STATE OF THE ART**

*Short overview of the activities / reflections / results collected by the partners during the CAPuS project (or possibly through their ordinary activities)*

…

**QUESTIONS**

*Questions to face the topic of the section and set a proper methodology / approach*

…

**FIND THE ANSWERS**

*Techniques / tools or criteria to solve the issues presented in the section*

…

**FOCUS**

*Case study within the CAPuS project underlining some of the aspects described in the section*

…

**MATERIALS**

*Documents, deliverables, reports or interviews realised within the CAPuS project*
*Bibliographic / web references*

…

The document is intentionally structured in this way taking into consideration that the guidelines can be used not only by professionals and experts but as well as an educational tool for students. We thought that to make explicit the logical pathway and the questions that arose at the moment of facing the conservation actions would be a clear and efficient manner to set up the problem solving approach. Moreover, the organisation of materials structured in this manner, provides different contents easily usable for the innovative formative module, facilitating WP6 activities.

Several partners contributed to the FOCUS sections, preparing the excerpts of their own case studies.

You will find enclosed apart

**GUIDELINES for the CONSERVATION INTERVENTION**