

Preventive
Conservation
in Historic Houses
and Palace
Museums:
Assessment
Methodologies
and Applications

SilvanaEditoriale

Preventive Conservation in Historic Houses and Palace Museums: Assessment Methodologies and Applications

Conference of the National Museum of the Palace of Versailles (EPV), the Association of European Royal Residences (ARRE), and the Research Centre of the Palace of Versailles (CRCV)

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Preventive Conservation in the Vatican Museums

Abstract

The Vatican Museums conservation strategy has its roots in the ancient tradition of protection exercised by the popes, as it does in the practice of heritage preservation, which anticipates the very concept of the museum itself. Today conservation requires synergy and periodical application, scientifically tested protocols, the commitment of properly trained professionals, result checking and funding certainty.

The need to conserve at best the immense heritage as well as dealing effectively with the problems of anthropic pressure has led the Vatican Museums to create an office with the specific task of drawing up preventive conservation strategies and planned maintenance plans not only intended for collections, but also for equipments and settings. The model of integrated conservation in use for some years now in the Vatican Museums supports the climatic monitoring of the exhibition, work and storage spaces, the daily routine of interventions such as dusting and periodic monitoring of the conservation state of collections, as well as the timely repair for minor damage.

Keywords

Conservation, prevention, programmed maintenance, monitoring, dusting, documentation, decorations' repair, marble floors' reinstatement.

In 1543 Pope Paolo III Farnese established the figure of “preventive conservation officer.” With a famous *motu proprio*, he assigned the role of *Mundator* to Francesco Amadori, Michelangelo’s assistant, and tasked him with the well-paid task of providing for the periodic, widespread dusting of the paintings of the Sistine Chapel.¹

The “Last Judgement” had been finished for a little over a year but already the Pope understood the importance of prevention.

Since then, history has run its course, and the pendulum of consideration has repeatedly fluctuated between “maintenance” and “restoration” from 1970 to today, perhaps inclining more towards the latter since the results are spectacular and very effective for communication purposes.

[Urbani, 1973; Urbani, 1976; Urbani, 2000; Zanardi, 2009].

Mass tourism in the recent years and increasing cultural consumption have lead us to reevaluate old practices of care and maintenance, as

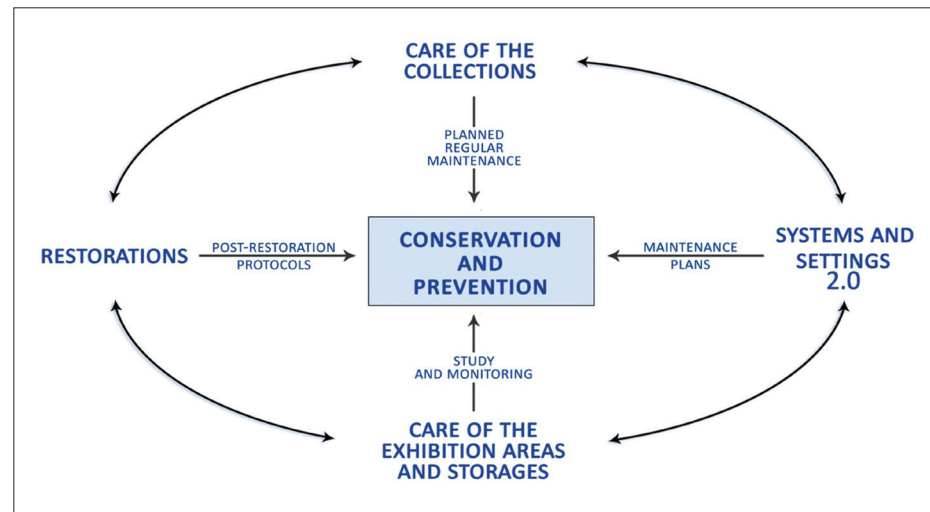
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Fig. 1
The “circular path” of the global, integrated and sustainable conservation model. (© Governatorato SCV – Direzione dei Musei)



they are more sustainable and effective for the prevention of both damages and wear to cultural heritage [De Guichen, 2005].

The Preventive Conservation Office of the Vatican Museums was created in 2008, together with the new *Regolamento della Direzione dei Musei*.²

The preventive conservation officer, in concert with the management, the departments and the laboratories, analyses the Museum’s various activities and carries out studies aimed at solving specific problems: permanent or temporary exhibition methods, display cases protection, handling and transportation of artworks on loan, conservation in storage areas, disinfestation protocols and treatments, environmental control and monitoring critical issues, preliminary studies and post-conservation protocols, visitor flows.

The Preventive Conservation Office has the task of adopting the ICOM *Code of Ethics* [ICOM, 2004], the documents and guidelines that guide the processes of adaptation and development of museums [MIBACT, 2001], developing strategies and measures aimed at lowering the risk threshold and raising the quality level of the historical-artistic and archaeological heritage entrusted to the care and protection of the Vatican Museums. Outside the Museums, the Office is called to carry out its activity in all the places of representation or worship where the Holy See, in the exercise of its functions of protection, requires it, both inside and outside the State.

Comparable in terms of size and number of visitors to the major museums in the world, the Vatican Museums are a system of museums not conceived as a container of works of art but as the result of additions and the integration of parts of the Apostolic Palace which had religious, housing and representation functions. In addition to the collections, exhibited in a multitude of courtyards, rooms, galleries and narrow passages, it

is the rooms themselves, the chapels, the “secret” apartments, the galleries with famous frescoes, that are objects of interest and visit.

A continuous exhibition that unfolds over seven kilometres of precious rooms, displays thousands of works and welcomes more than six million visitors each year.

The need to preserve such an immense, but fragile, heritage, has led the Vatican Museums during the last ten years to experiment and subsequently adopt a *global, integrated and sustainable model of conservation* [Cimino, 2017], where coexists and effectively interacts all of the possible indirect protection protocols, the exhibitions’ environment care, the settings, the systems and the restoration work (fig. 1).

Exhibition and storage area care starts with an in-depth knowledge of them as well as understanding that artworks are not isolated systems but are, on the contrary, strictly related to their immediate environment’s influence.

Levels and variations must be measured over time, in order to understand or quantify the impact of natural or artificial environmental factors.

The Preventive Conservation Office carries out the thermo-hygrometric monitoring activity directly, without entrusting the service to third parties. By creating and managing a widespread detection network, the Office is able to receive and assess all the information recorded in a very short time.

The objectives are to:

- maintain existing air conditioning and treatment equipments at their best possible efficiency;
- ensure practical assistance to all the museum’s departments, by reporting “in real time” risk situations for the cultural heritage pieces or by drawing attention to specific environmental problems;
- assure the necessary maintenance operations or repairs of the equipments;
- provide advice and study material useful for drafting preventive conservation and conservation/post-restoration programmes, in new projects regarding structures, systems, and settings.

Thermo-hygrometric **monitoring**, together with the **control of light radiation and pollutants**, are performed by qualified personnel, using certified procedures and specific, periodically calibrated, equipment.³ The environmental monitoring system consists of a network of more than 100 sensors, located in the exhibition areas (rooms and galleries), conservation laboratories, libraries, and storage areas: anywhere where there are collections made of sensitive materials or situations to be investigated.⁴

The Vatican Museums have 13 Departments, 7 Conservation Laboratories, a Scientific Research Laboratory, numerous offices, and services. The monitoring data is processed in graphical diagrams and accompanied by explanatory comments and suggestions, it is then sent each month to the department's curators and to the heads of the laboratories and offices involved.

The Museums' Directorate only receives a written report summarising the data which includes brief explanations and suggestions for improvements. This allows the directorate to have a comprehensive vision of the general situation as well as being aware of the details.

The Storage Areas

The Vatican Museums have more than forty storage rooms distributed around various buildings. Some of them are technological environments, equipped with efficient humidity concentration control and air-conditioning devices at pre-set levels. Others are served by Air Handling Units (AHU), which ensure the content values even at very short intervals, others still need specific technical adjustments. There are also those (which house archaeological antiquities) that have kept the ancient name of *Magazzini* and that technology has not breached yet. In this case, the conservative precautions are mainly aimed at not disturbing or losing their magnificent, "historical" environment with needless innovations.

Whatever the storage area, waiting for a general review that may give it more dignity, more space, and more resources, the Vatican Museums have introduced a **periodical maintenance plan for storage areas** in order to ensure that all of them are thoroughly cleaned and reorganised twice a year. That is our philosophy: the best way to preserve cultural heritage is to know it, use it and maintain it.

Periodical maintenance is preliminary and becomes the opportunity for organising special reorganising operations, always advantageous, and targeted cycles of dusting and control of the stored collections.

The aim of creating an "integrated system" capable of slowing down the deterioration processes, natural or induced, requires regular control protocols and structured environmental monitoring programmes. For that reason, besides "exceptional" cases, such as the Sistine Chapel's new air conditioning and lighting systems, a selected team of professionals is charged with dusting and checking cultural heritage, then repairing minor damages when needed.

The Directorate of the Vatican Museums' new philosophy relies on a close synergy between scientific and administrative areas, which provides for the necessary economic resources amounting to 0.3% of the



Fig. 2
The Sistine Chapel,
crowded as usual.
(© Governatorato SCV –
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annual revenues.

Periodical Maintenance Plans for Collections and Precious Rooms

In 2010, in order to ensure appropriate levels of conservation, decorum and enjoyment of the exhibited collections, while containing the possible damages due to pollution and wear resulting from the Vatican Museums high number of visitors (fig. 2), the first **plan for the periodical maintenance of movable collections** was implemented.

It consists in the coordinated, planned and repeated execution of dusting, checking and documentation of the thousands of objects throughout the entire exhibition, objects from all ages, origins, and materials [Paolucci, 2009; Paolucci, 2012].

It was a small revolution that entrusted to external restorers (highly-qualified professionals), brought together under a single manager,⁵ the strategic activity of care and control of the collections that the conservation laboratories, involved in many other operations and services, would not have been able to guarantee. The principle was: not to have a sporadic maintenance, but a regular, meticulous, continuous review of the totality of the Vatican museums' cultural heritage that bestows an equal dignity to

a masterpiece, the nearby fragment of a sarcophagus or a secondary piece.

The aim was to be able to ensure basic attention to all the collections in their exhibition environment. As well as maintaining the methodological correctness of the operation, the excellence of the results, the traceability of the work carried out and the archiving of the information gathered over time.

The quality objectives expected by the Directorate of the Vatican Museums are achieved through the organisation of programmes that take into account the needs of the curators while relying on the conservation and scientific research laboratories' technical supervision, which is under the coordination of the Preventive Conservation Office.

The restorers work five days a week during six consecutive hours, according to an agreed protocol that includes work methods, operations, compliance with handling criteria and tools, use of personal protective equipment, equipment and machinery.

The digital archiving program of the controls' results, represents a qualification point for the entire project. It is available online by all the interested departments, including both administrative and management departments. This allows the conservation laboratories to view the emerging conservation problems and then decide whether to act immediately or subsequently as part of a global program. The Preventive Conservation Office consults the data and then sends periodic reports to the Directorate, this maintaining it constantly informed of the activities carried out.

Encouraged by the good results, in 2015, the Vatican Museums began the **integrated maintenance plan**, which is also enriched by the **maintenance of valuable decorations and floors**, that are the parts of the museum most easily subject to physical wear and to small acts of vandalism, which are a result of the strong anthropic pressure.

In this way, it is possible to ensure a coordinated intervention on the cultural heritage works and their surrounding environment, avoiding episodic or disconnected operations.

Daily Practice

The group consists of 10 professionals: 6 restorers, 2 decorators, a marble worker and a coordinator. They work from Monday to Friday, from 1 pm to 6 pm.

The **six restorers** are responsible for the periodical maintenance of cultural heritage pieces exhibited in galleries, rooms or stored in storage areas: they are charged with **dusting** and **checking the conservation**



state of the cultural heritage pieces (fig. 3).

The necessary equipment consists of a set of soft brushes (from the “Japanese” ones made of goat hair for the most delicate surfaces, to those made of natural bristles in different shapes and sizes), antistatic and microfibre cloths, sponges of various types, vacuum cleaners with high-efficiency filters, ladders and aerial work platforms, window cleaning detergents, gloves, extension cords and lamps, cameras for documenting critical situations and filling in the conservation forms.

As an example, every month the conservators vacuum about 5.4 kg of dust, use 90 antistatic cloths and consume an unspecified quantity of different types of brushes.

When there is no possibility of working in a closed museum sector, bollards define a restricted workspace, in order to guarantee the safety of the objects and the visitors. As for the display cases, it is necessary to take a picture of them before maintenance, in order to document the exact position of the cultural heritage pieces in order to reproduce the exact position of the pieces.

In addition to removing atmospheric particulate matter and other weakly coherent deposits from the sculptures, paintings on canvas and panels, ceramics, metal artefacts, objects made of etherogeneous materials, from ethnographical collections, papal carriages and automobiles, the restorers check the conservation state of the collections and record the data in a **specifically developed database**.

The two decorators, following the technical indications provided by the Painting Conservation Laboratory and the Scientific Research Laboratory, are responsible for all the decorations “at human height” on the walls and repairing the minor damages caused by natural degradation

Fig. 3
Periodic maintenance of the Chiaramonti Gallery.
(© Governatorato SCV – Direzione dei Musei)

Fig. 4
Periodic maintenance of the decorations in the Round Room of the Pio-Clementino Museum.
(© Governatorato SCV – Direzione dei Musei)

phenomena and anthropic pressure (fig. 4).

These interventions are aimed at solving problems related to detachments, decohesion of the paint film, alterations due to salt efflorescence but mainly abrasions and scratches produced by shocks, rubbing and wear.

In the Vatican Museums, the pictorial techniques are those of fresco, lime secco and tempera. The reintegration technique is chosen on the basis of its affinity with the original materials: watercolours, lime milk, and powder pigments, industrial tempera colours.

In the case of plaster loss, the decorators use lime putty and marble dust and then finish with a well-evened layer of plaster prepared to receive the colours.

The **marble worker** is responsible for the repair of different surfaces – such as marble floors and inlays, mosaics – throughout the Vatican Museums' entire exhibition (fig. 5).

The operational programme consists of:

- urgent repairs;
- the review and documentation of the conservation state of the floorings.

After three years, it is possible to define a typology of the most common problems:

- lack of pieces in the marble inlays;
- loss of adhesion, due to decohesion of the mortar screed or degradation of floor adhesives, both original and related to previous maintenance works;
- broken marble pieces on inadequate bedding layers;
- old and inappropriate reintegrations.

The Digital Database: an Essential Tool for an Effective Maintenance

The best practices for cultural heritage conservation are: environmental control, checking and documenting the conservation state of the collections and regular maintenance.

Moreover, it is essential that all these measures be complemented with a systematic recording of these activities in a digital database.

The **Museum Maintenance Programme** is actually more than a filing system: it is easy to use and manage a “genuine dialogue” with the Vatican Museums' collections.

Fig. 5
Marble floor repair inside the Gallery of Maps.
(© Governatorato SCV – Direzione dei Musei)





Fig. 6
The Gallery of Tapestries,
crowded as usual.
(© Governatorato SCV –
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This constantly updated database is consultable on the Museums' intranet. It contains all the recorded maintenance activities since 2010 – 5.000 working days – and gives access to images and charts, produces statistics and develops working strategies based on requests and alerts.

An Indicative Example: Tapestry Maintenance

Conservation practices have always existed and with them, the awareness that heritage maintenance is a necessary condition for its own survival.

Today – compared to the past – a better technical and scientific training of the operators, the motivation of conservation experts together with the new possibilities offered by information technology applied to diagnostics and documentation, constitute a great opportunity to overcome the limits of an episodic and disconnected approach.

By comparing all the information gathered from the dusting activity, it is possible to define the application of intervention protocols and increasingly adequate behavioural styles.

An indicative example is given by the approach to the dusting operations carried out on the tapestries of the Upper Galleries. An intervention that is absolutely necessary because the precious manufactures are exhibited without protective barriers in the corridor that leads to the Sistine Chapel, which is usually very crowded (fig. 6).

The protocol gives ample space to the inspection and recognition method for evaluating and documenting over time the quality of the particulate, the quantity that is present on the surfaces and, through microscopic analysis, for identifying in it the possible presence of original textile fibres (fig. 7).

After ideally subdividing the surface of the tapestry into areas of 1 or 1.5 square meters, the intervention method requires the frontal aspiration of the artefact, indirectly, through the interposition of a filter on the nozzle of a low power vacuum cleaner, for about 10-15 minutes (fig. 8).

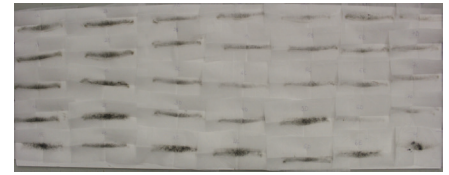
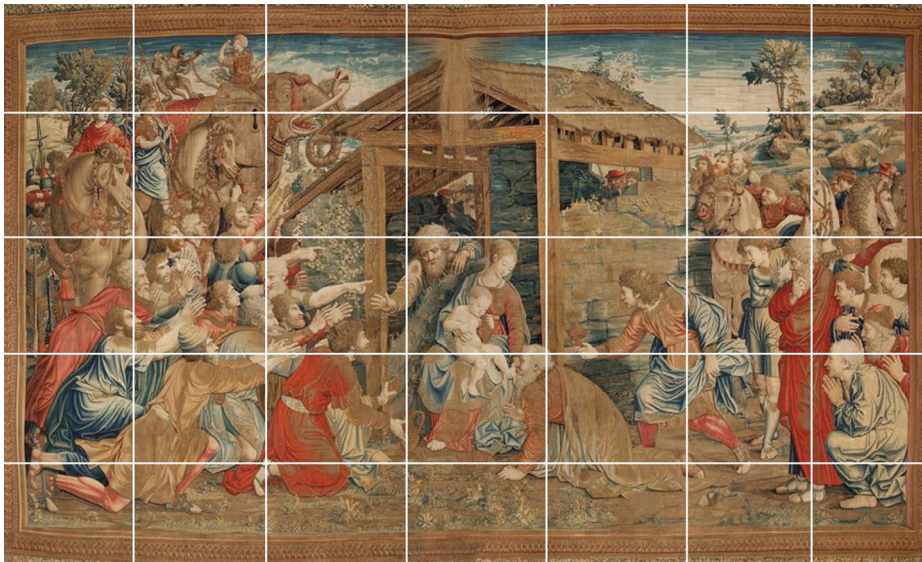
The analysis of the used filters, substituted and orderly collected (fig. 9-10), makes it possible to elaborate maps of particulate distribution (fig. 11), to establish correlations with previous campaigns and to advance hypotheses on the possible reasons for the accumulation of particulate matter (airflows coming from doors or windows, convective motions deriving from the air-conditioning system, visitors). In addition to this, also the verification of the inventory data and a punctual graphic and photographic documentation must be added as it preserves not only the memory of any “accidental” damage but of any other condition of interest such as incoherent or coherent deposits, undulations, and deformations,



Fig. 7
Periodic maintenance in the Gallery of Tapestries. (© Governatorato SCV – Direzione dei Musei)

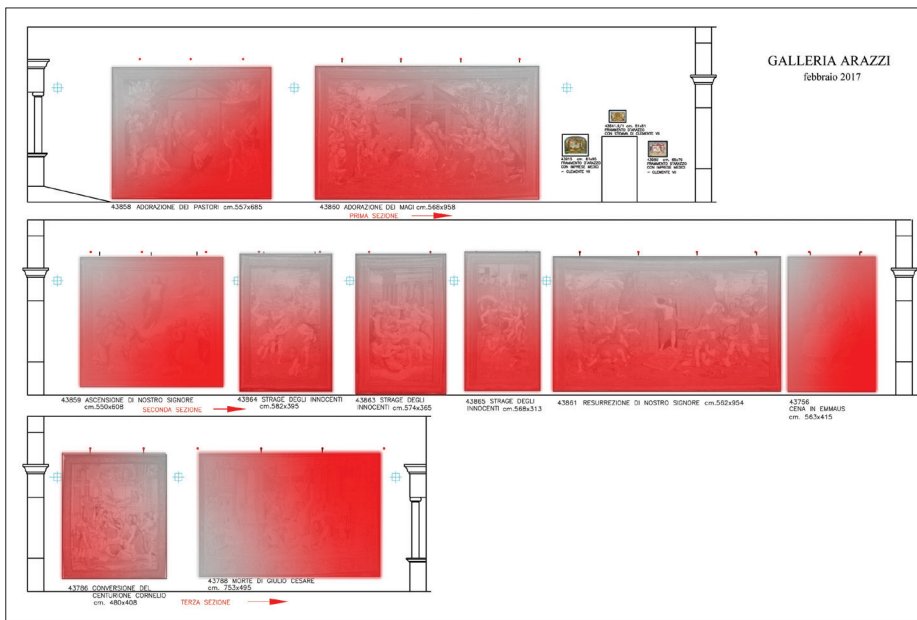
Fig. 8
Intervention methodology: detail. (© Governatorato SCV – Direzione dei Musei)





Figg. 9-10
Virtual division of the tapestry surface into small areas. Detail of the filters before analysis. (© Governatorato SCV – Direzione dei Musei)

Fig. 11
General map of particulate matter distribution. (© Governatorato SCV – Direzione dei Musei)



unstitched supports, loose warps, localisation of worn out areas, lacunae, fading (fig. 12).

Thanks to the now substantial case studies, the Vatican Museums decided to carry out on the dusting of the tapestries once a year, and with the methodology above described and all the necessary precautions, considering such interval of time is sufficient for the good conservation of the artefacts and has an optimal cost-benefit ratio.

Conclusion

In 2008, the Vatican Museums established an Office for Preventive Conservation, which ensured the implementation of regular care and

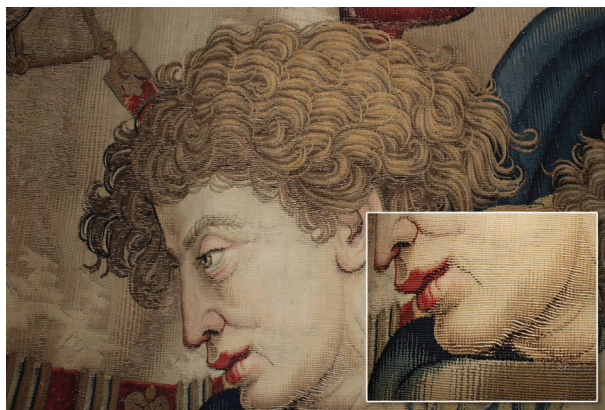


Fig. 12
Conservation state documentation: detail
of a weak area. (© Governatorato SCV –
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Endnotes

[1] The periodic maintenance on the Sistine Chapel was flanked by that of the adjacent Pauline Chapel and Regal Room: the operations included removing any accumulations of dust and smoke from the walls, with the greatest possible care (“...a pulveribus et aliis immunditiis prefatis mundare et a mundatis tenere omni cum diligentia...”) [Motu proprio, 1543].

[2] “The Conservator’s Office, in agreement with the Directorate, the Departments and the Laboratories, develops and implements strategies aimed at ensuring the prevention of the risks of deterioration that may affect the works and monuments entrusted to the Directorate and the protocols necessary for the best conservation after restoration. 2) It analyses the environmental and structural factors that can generate risks for the conservation of the collections, including situations where the works are permanently or temporarily exhibited to the public, kept in storage areas or moved, indicating the necessary measures to achieve the optimal conditions for the conservation and exhibition. 3) It works with the competent Departments, encouraging technical support and specific indications in the choice of materials, exhibition structures, equipment, and systems in relation to the conservation of the collections and the monuments. 4) A conservator with a degree in scientific disciplines is assigned to the Office” [Regolamento, 2009].

The Conservator’s Office of the Vatican Museums is actually the equivalent of the Preventive Conservation Departments established in other European museums.

[3] The Conservator’s Office is entrusted to Vittoria Cimino, head and coordinator, assisted by Marco Maggi, first assistant, and Alessandro Barbaresi. The team has recently been reinforced with the help of an architect, Matteo Mucciante.

[4] This last mode allows to detect and communicate in real time any deviations of behaviour that are noteworthy, in order to carry out the necessary maintenance operations.

All the data are kept in the Office’s database and processed into charts that allow the study of individual situations and their evolution over time.

maintenance operations dedicated to the conservation of huge heritage buildings, archaeological areas, historic interiors and movable artworks of every period, origin and material.

The new integrated and sustainable conservation model that is being successfully experimented is a multi-lane system where – alongside traditional restoration activity – the care of the exhibition areas, the prevention of risk conditions and programmed maintenance plans coexist and effectively interact. Attention and resources are directed to the constant and systematic review of the exhibited heritage pieces and to the prompt repair of the small damages caused by wear, as well as the effects of anthropic pressure. The aim is to preserve the collections while ensuring propriety and enjoyment.

[5] Since 2010 CROMA, a company composed of qualified conservators has always been awarded the tenders for the assignment of the service. cromasrl.2017@gmail.com.

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