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)

In collaboration with the International Committee
for Historic House Museums (DEMHIST),
held at the National Museum
of the Palace of Versailles and Trianon

From 29th November to 1st December 2017

Conference Proceedings

Under the scientific direction of
Danilo Forleo
*in charge of preventive conservation
and head of EPICO programme,
National Museum of the Palace
of Versailles and Trianon*

Editorial coordination
Nadia Francaviglia
*research assistant for EPICO programme,
Research Centre of the Palace of Versailles*

Translations
Clarisse Le Mercier, Camila Mora

This book brings together the presentations of the speakers at the international symposium organised as part of the EPICO (European Protocol in Preventive Conservation) research programme, by the National Museum of the Palace of Versailles:
Catherine Pegard, *president*
Laurent Salomé, *director of the National Museum of the Palace of Versailles*
Tierry Gausseron, *deputy head*
Association of European Royal Residences (ARRE)
Research Centre of the Palace of Versailles (CRCV)

With the participation of
Ministère de la Culture,
ICOM – DEMHIST (International Committee for Historic House Museums)

Scientific committee

Lorenzo Appolonia, *president, Italian Group of the International Institute for Conservation – IGIIC*

Florence Bertin, *head of Collection Department at MAD – Musée des Arts décoratifs*

Michel Dubus, *ICOM-CC group coordinator for preventive conservation, Centre de recherche et de restauration des musées de France – C2RMF*

Danilo Forleo, *in charge of preventive conservation and head of EPICO programme, National Museum of the Palace of Versailles and Trianon*

Nadia Francaviglia, *research assistant for EPICO programme, Research Centre of the Palace of Versailles*

Agnieszska Laudy, *deputy head of Architecture Department, Museum of King Jan III's Palace at Wilanów (Warsaw)*

Bertrand Lavedrine, *director, Centre de recherche sur la conservation des collections – CNRS*

Sarah Staniforth, *former president, International Institute for Conservation – IIC*

Organizing committee

Elena Alliaudi, *coordinator, Association of European Royal Residences*

Hélène Legrand, *assistant coordinator, Association of European Royal Residences*

Matilde-Maria Cassandro-Malphettes, *secretary general, Research Centre of the Palace of Versailles Bernard Ancer, in charge of general affairs, Research Centre of the Palace of Versailles*

Olivia Lombardi, *executive assistant, Research Centre of the Palace of Versailles*

Serena Gavazzi, *head of the Patronage Department, National Museum of the Palace of Versailles and Trianon*

Noémie Wansart, *research assistant at Curatorial Department, National Museum of the Palace of Versailles and Trianon*

Thanks to

Lorenzo Appolonia, Lionel Arsac, Jean-Vincent Bacquart, Wojciech Bagiński, Jérémie Benoît, Marie-Alice Beziaud, Céline Boissiere, Anne Carasso, Élisabeth Caude, Gabrielle Chadie, Thibault Creste, Stefania De Blasi, Elisabetta Brignoli, Hélène Dalifard, Gaël de Guichen, Ariane de Lestrange, Festese Devarayar, Françoise Feige, Christophe Fouin, Éric Gall, Thomas Garnier, Roberta Genta, Denis Guillemard, Michelle-Agnoko Gunn, l'équipe du Grand Café d'Orléans, Pierre-Xavier Hans, Nicole Jamieson, Thierry Lamouroux, Marie Leimbacher, Nadège Marzanato, Béatrice Messaoudi, Stefan Michalski, Christian Milet, Marya Nawrocka-Teodorczyk, Marco Nervo, Lucie Nicolas-Vullierme, Clotilde Nouailhat, Agnieszka Pawlak, Amaury Percheron, Arnaud Prêtre, Gérard Robaut, Bertrand Rondot, Valériane Rozé, Béatrice Sarrazin, Béatrix Saule, Didier Saulnier, Emma Scheinmaenn, Violaine Solari, Emilie Sonck, Pauline Tronca, Rémi Watiez, Thierry Webley, Sébastien Zimmerman

CHÂTEAU DE VERSAILLES

EPICO
European Protocol in Preventive Conservation

European Royal residences

Centre de Recherche
CHÂTEAU DE VERSAILLES

DEMHIST

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

Ministère
Culture

With the patronage of

RADEN-PLAST

BOSTON UNIVERSITY

POLYGON

testo

ABIOTEC
Innovative IPM technology

ILTI LUCE

CTS

Evaluating Collections: a Flexible Methodology

Abstract

SOS Collections® is a method for documenting, assessing and managing museum cultural heritage, the elements of a complex system which is the collection. This method allows to know and assess in parallel and in a very reasonable time frame, the nature, the conservation state and the vulnerability of each collection, even if very vast and belonging to one or several museums, while ensuring the possibility to compare the obtained results, always in relation to the specific environmental conditions of exposure or storage.

The time required to define a conservation strategy is significantly reduced thanks to the use of a single form system applicable to all types of collections, as well as the possibility of carrying out the study by using statistical sampling, customised software, textual and digital data, and image processing. Data comparison (constituent materials, types of damage and extent, types of treatments and time required, vulnerability and risk level) is based on the location of the collection and on the entirety of each museum's cultural heritage. This makes it possible to define and plan a strategy based on a real scale of identified priorities and the necessary financial and professional resources.

A Manual containing a description of the methodology and the tools needed for its application makes the use of the software easier for conservation professionals. The method, because of its flexibility, will be used by the ISCR for the finalisation of the system for the *Risk Map of Italian Cultural Heritage*.

Keywords

Preventive conservation, museum collections, conservation plan, assessment, preservation conditions.

Bianca Fossà
Conservator, ISCR-Istituto Superiore per la Conservazione e il Restauro
bianca.fossa@beniculturali.it
http://www.iscr.beniculturali.it/

Marta Giommi
Conservator
marta.giommi@inwind.it

T he need to develop a methodology and tools to conduct a survey on the conservation of collections from one or more museums, sometimes with very different type of collections and in a short time, was born in Italy in the mid-1980s. This came from the experience of working in major national Italian museums, for the purpose of defining a conservation plan on the basis of identified priorities.

The ideas and practices now known as *preventive conservation* were then in their early stages, but the Italian museums, for different reasons and except for a few isolated cases [Urbani, 1976], suffered a tangible delay

in practicing conservation in museum collections. This happened despite the birth in 1987 of the *Risk Map of Italian Cultural Heritage:* a national project based on the principle that knowing the risks allows for all conservation activity planning to be done according to objective priorities. First an anthropogenic and natural phenomena database had to be created, which would help define maps of the entire Italian territory measuring its "dangerousness," and secondly cultural heritage – monument or collection object – were defined on the basis of its conservation condition, in other words, its "vulnerability." In this system, the "risk" of loss of cultural heritage is a function of these two indicators [Castelli, 1997].

In spite of the scientifically innovative nature of this project, we wondered about the necessary amount of time needed for its realisation and the application possibilities within museum collections: the challenge then was to find methodological and computer tools that could speed up the knowing preliminary investigation phase of collections in one or more museums, the assessment phase, and the data processing phase, thus enabling the definition and the application of a conservation plan and the protection of the collections.

But how to know the state and the needs of collections as vast and heterogeneous, when it is impossible to compile each cultural heritage's conservation form while assessing them so as to identify their needs and priorities? A bibliographical search showed us that a large number of foreign professionals were asking themselves the same questions and describing their experiences and approaches. The general assessment scheme now seems to be defined around three typologies: the *Conservation Assessment*, the *Collections Condition Survey* and the *Curatorial Assessment* [Berrett, 1994; Michalski, 1992; MWHCA, 1992; Vallas, 1995; Waller, 1994; Wolf, 1993].

Almost at the same time, we consulted Carl Drott and Suzanne Keene's publications: statistics, that were used for demographic surveys, could be adapted to museum *populations*, i.e. collections [Drott, 1969; Keene, 1991].

Drott's approach, created to assess the state of the collections of Californian university libraries, used what statistics calls *Random Sampling*: the sample to be inspected is representative of the studied set, which is identified randomly from a list of items with their location.

In the case where lists of objects and their locations aren't available, the *Cluster Sampling* must be used: here the sample to be studied is identified by the object's geographical location. Therefore it is usable, especially in the storage rooms of major museums so that an assessment in a reasonable amount of time is made, on a limited number of objects representative of each collection either in reference to constituent materials or the state of the objects. It must nevertheless be emphasised that the use of statistics is a possibility: if time and means are sufficient, the inspection of all the collection will be privileged.
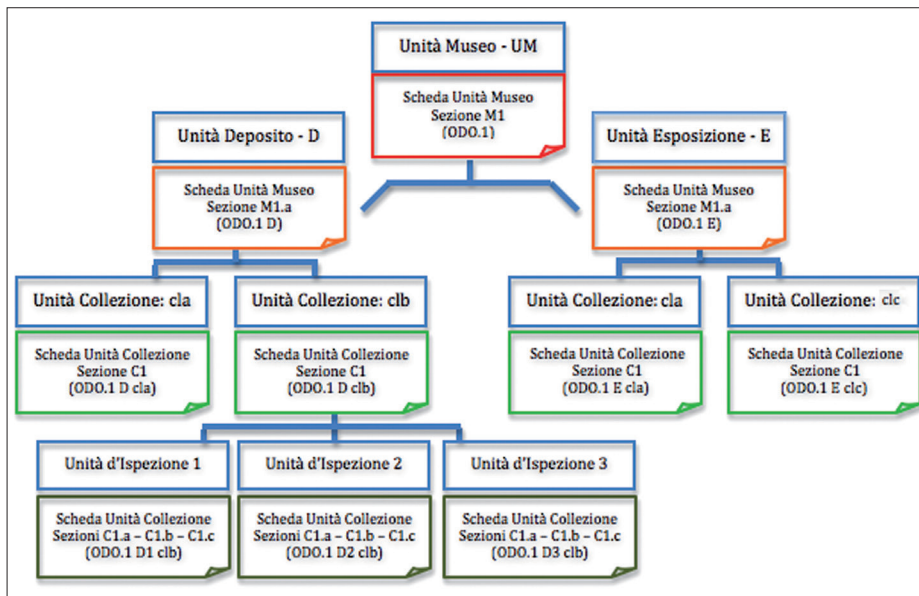
From the beginning, it was obvious that there was a vast quantity of data to be collected and its processing for interpretation would have been too complicated to manage: thanks to computer science, whose costs had become more and more accessible, and thanks to the collaboration of a computer scientist[1] we developed a custom software that has become an application of the software FileMaker Pro® [Fossà and Truglio,1997; Fossà and Giommi, 2013].

The difficulties related to the creation of text and digital data archives, as well as graphics and photographic documentation, their consultation, treatment, presentation and processing of the data where not a problem anymore and almost became a game: we just needed to define a set of form templates for the collection and processing of digital data.

It was while realising numerous tests in the storage rooms of Villa Giulia in Rome that *SOS collections*® was developed: a methodology and a software [Fossà, 1995] that allow the survey of conservation conditions of the places and state of the collections so as to identify the risks, the types and the intervention treatment times for planning according to the identified priorities. The system provides the possibility to compare the results of data processing for each collection and each museum, as well as assessment data over time.

The methodological organisation adopted to carry out the assessment (fig. 1) needs a first phase of collecting general information on the museum. Called "Museum Unit," the building is considered as a large box placed in a defined geographical environment and characterised by the type of building and the management model.

Then the "Storage" or "Exhibition room" units are assessed: the number of rooms, their location in the building, the surfaces and the volumes

C1 – COLLEZIONE: Raccolta dati – Identificazione e parametri

Nome Museo: xxxx   **Sigla:** ODO   **Ispezione n.:** 1   **Data:** xxxx
Nome Collezione: Collezione Soliano b   **Sigla:** clb   **Operatori:** xxxx

MANUFATTI/MATERIALI COSTITUTIVI		TIPOLOGIE DI DANNO	
DTE	Dipinto su tela	S1	Danni strutturali maggiori
VET	Vetro, vetro dipinto	S2	Danni strutturali minori
MET	Metallo: lega di rame	SU	Danni strutturali di superficie
CUO	Cuoio	AL	Alterazioni
CER	Ceramica	CF	Degrado chimico/fisico del materiale
DMS	Dipinto murale staccato	BI	Danni di origine biologica
TES	Tessuto	II	Intervento inadeguato
LEG	Legno	DI	Depositi/incrostazioni

LIVELLO DI RISCHIO		TIPI DI INTERVENTO	
A	MOLTO BASSO. Stato di conservazione buono e stabile.	1	MANUTENZIONE ORDINARIA: spolveratura; imballaggio/supporto
B	BASSO. Manufatto danneggiato ma in condizioni di stabilità; necessita di un intervento curativo nel lungo termine.	2	MANUTENZIONE STRAORDINARIA: spolveratura; imballaggio/supporto; nuova collocazione
C	ALTO. Manufatto danneggiato con degrado probabilmente in atto; necessita di un intervento curativo nel medio termine.	3	INTERVENTO CONSERVATIVO/PRONTO INTERVENTO: spolveratura; adesione/protezione; imballaggio/supporto; nuova collocazione
D	MOLTO ALTO. Stato di conservazione inadeguato; degrado attivo; necessita di un intervento curativo nel breve termine.	4	INTERVENTO DI RESTAURO

they offer, the environmental and conservative observed conditions, the exhibited and stored collection types.

In order to know each space's conservation conditions, the data concerning climate and light is collected. Other information will also be needed in order to describe and evaluate structures (building material, access, building security), infrastructures (climate control systems,

1.c Raccolta dati: OGGETTI

ODO.1 D1.2 clb

Museo xxxxx **Isp. n°** 1 **Deposito n°** 1 **sala n°** 2 **Collezione** Collezione Soliano b

Data xxxxx **Operatore** xxxxx **Totale n. oggetti** 21

| | COLLOCAZIONE | | OGGETTO | | | | | | | | Tipi di Danno | | | | | | | | LR | TI | Tempi | Note |
	Identific.	Ogg. n.	Tipo	N° Inv.		Materiali	V	Larg dm	Prof dm	Alt dm	S1	S2	SU	AL	CF	BI	II	DI			m	
1	UF1	3	dipinto su tela	01	DTE	olio su tela		32	8	8	60	60	40	50	40	10		99	D	4	2880	
2	NC16	10	mattonella	917	CER	maiolica		0,5	0,5	2,5		10							A	1	30	
3	NC16	0	custodia	920	CUO	cuoio, tessuto		3,9	1	2,5	10	30	20	30	20	40		20	B	4	6000	
4	NC16	0	calzatura	923	LEG	legno, tessuto		3,2	1,5	1,6	30	50	50	40	40	40		99	D	4	1620	
5	UF22	10	dipinto murale	953	DMS	intonaco, velatino	x	8,6	1,4	8,9	10	40	70				90	30	D	4	1920	
6	UF22	0	dipinto murale	956	DMS	intonaco, velatino	x	11,4	1,4	9,4	50	50	50				90	30	D	4	1920	
7	UF22	0	dipinto murale	959	DMS	intonaco, velatino	x	20	1,4	14	50	50	50				90	30	D	4	1920	
8	UF24	2	paliotto	964	CUO	cuoio impresso		20,6	0,5	13	40	40	50	80	50	50		70	C	4	2880	
9	UF27	1	arazzo	975	TES	tessuto, legno	x	6,2	0,7	7,1		20	30		70			70	D	4	9600	

smoke detection, alarms, typologies and storage conditions or exhibition furniture, equipment such as ladders, trolleys, etc.) as well as the norms and procedures put in place.

In the case of a museum with very heterogeneous collections, for example, archaeological collections, costumes, armours, paintings and sculptures, they are studied as different and comparable sets: each collection forms the "Collection Unit."

In order to carry out a detailed inspection of the premises, of the storage furniture and the collection sample, the collection will be studied in each room where it is kept: the set is named "Inspection Unit: Room – Storage elements – Objects."

The scheme just described will be applied starting from a first phase of the survey, the "pilot inspection," the assessment's most delicate phase, which can require up to 20% of the survey's total time. At the museum level, we will define the "survey profile" by deciding if we start in the storage space or in the exhibition hall.

For each collection, we will also define the statistical profile and the variable parameters. If the profile is well identified, for a collection of tens of thousands of objects, only a thousand objects will need to be inspected to obtain reliable results of +/-5%.

The survey will be lead by conservators specialised in the typologies of materials and the inspected collections: their capacity to recognise an alteration and to understand its causes will be fundamental, as well as defining risk levels, the types of interventions that are needed and the time required for their completion.

For each Collection Unit we will define variable parameters: up to a maximum of 8 classes of material constituting the cultural heritage and the 4 types of direct interventions to achieve, whereas the alterations, grouped into 8 categories and the risk, classified according to 4 levels, are

Fig. 4
Example of an art museum's object data collection form [Fossà, Giommi].

3 Elaborazioni UNITÀ COLLEZIONE

ODO.1 D clb

Museo xxxx **Isp. n°** 1 **Tipo di locali** Deposito **Collezione** Collezione Soliano b

Operatori xxxx **Data** xxxx

3.c OV - OGGETTI

Rapporto "oggetti isp. / oggetti"	1: 2,7 **[33]**	
Rapporto "collocazioni isp. / collocazioni"	1: 1 **[34]**	
Totale ispezionati	n. **[35]**	21
Totale nelle collocazioni ispezionate	n. **[36]**	57
Stima del totale nelle US del CS	n. **[37]**	57
Stima del totale nelle UI	n. **[38]**	57

Inventario : senza n°

Ispezionati	n.		
Stima	n.		
Senza n°	0,0%	del totale	

Tempi d'intervento

Ispezionati	h	4867
Stima	h	13211
Media	m	13906
Massimo	m	48000

Materiali

	Isp.	Stima	
DTE	1	3	5%
VET	2	5	10%
MET	1	3	5%
CUO	2	5	10%
CER	2	5	10%
DMS	10	27	48%
TES	2	5	10%
LEG	1	3	5%
Tot	**21**	**57**	

Tipi di Danno

	Isp.	Stima	
S1	14	38	67%
S2	17	46	81%
SU	13	35	62%
AL	6	16	29%
CF	7	19	33%
BI	11	30	52%
II	9	24	43%
DI	18	49	86%

Livello di Rischio

	Isp.	Stima	
A	4	11	19%
B	2	5	10%
C	2	5	10%
D	13	35	62%
Tot	**21**	**57**	

Tipi d'Intervento

	Isp.	Stima	
1	3	8	14%
2			
3			
4	2	5	10%
	16	43	76%
Tot	**21**	**57**	

Fig. 5
Part of a Collection Unit processing with information about the objects [Fossà, Giommi].

Fig. 6
Collection's material classes, partially stored and partially exhibited and their distribution in each of the 3 exhibition halls [Fossà, Giommi].

predefined macro categories (fig. 2).

For all the parameters an even number of choices have been established in order to limit the risk of always falling on the intermediate answer and to have results on an average value that would not have been probative.

The actual survey starts with the collection of data from the rooms and the collections according to the identified profiles and with the creation of
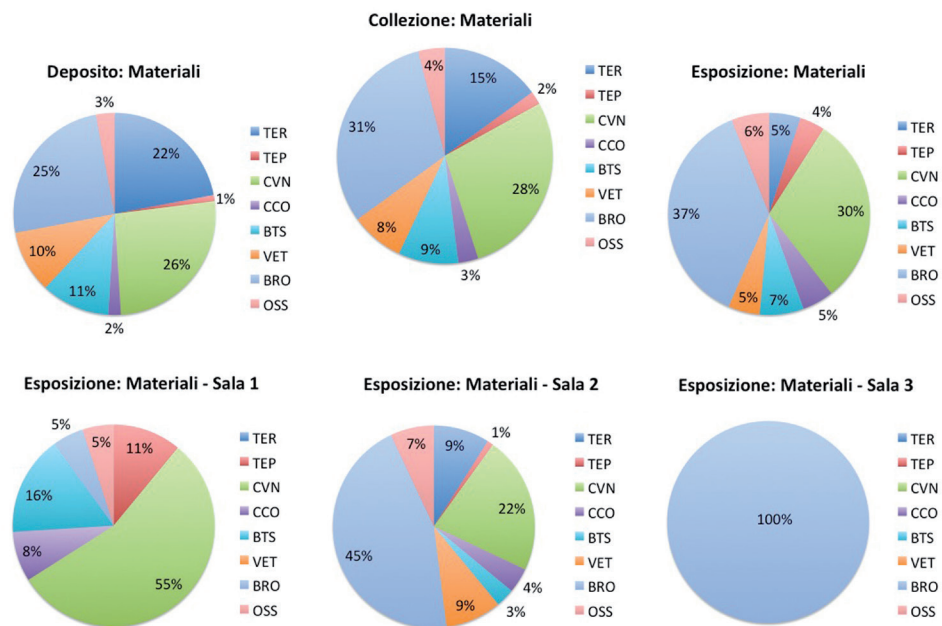
Locali esistenti e Stima dei locali necessari

Nome Collezione	Sigla	N. Sale	Superfici m²				Volumi m³			
			Esistenti	Necessari UI	Rapporto	Necessari UC	Esistenti	Necessari UI	Rapporto	Necessari UC
Collezione Soliano a	cla	1	34	9	378%	9	120	32	378%	32
Collezione Soliano b	clb	1	38	24	157%	24	133	84	157%	84
Collezione Soliano c	clc	1	125	77	162%	77	626	232	270%	232
Collezione Soliano d	cld	1	40	37	105%	37	138	112	123%	112
Transetto e	cle	3	18	52	34%	52	62	156	40%	156
Collezione Soliano f	clf	1	31	30	104%	30	108	103	104%	103
Transetto g	clg	1	111	145	76%	145	387	436	89%	436
TOTALI		9	396	375	106%	396	1573	1156	136%	375

Stima delle Unità di Stoccaggio necessarie

Nome Collezione	Sigla	Superfici m²								Volumi m³							
		Orizzontali				Verticali				Orizzontali				Verticali			
		Presenti	Necessari	Rapporto	UC	Presenti	Necessari	Rapporto	UC	Presenti	Necessari	Rapporto	UC	Presenti	Necessari	Rapporto	UC
Collezione Soliano a	cla	0	3	0%	3	155	63	246%	63	0	2	0%	2	63	9	703%	9
Collezione Soliano b	clb	0	11	0%	11	0	84	0%	84	0	8	0%	8	0	12	0%	12
Collezione Soliano c	clc	77	130	54%	130	0	2	0%	2	104	56	169%	56	0	0	0%	0
Collezione Soliano d	cld	0	61	0%	61	0	32	0%	32	0	26	0%	26	0	4	0%	4
Transetto e	cle	0	43	0%	44	0	140	0%	141	0	31	0%	34	0	15	0%	17
Collezione Soliano f	clf	0	71	0%	91	0	0	-	0	0	44	0%	56	0	0	-	0
Transetto g	clg	0	73	0%	73	0	20	0%	20	0	105	0%	105	0	11	0%	11
TOTALI		77	393	9%	412	155	340	14%	341	104	271	10%	286	63	51	29%	53

an archive of graphics and photographic documents (fig. 3) to ensure the correct interpretation and evaluation of text and digital data.

In all the sheets, the data concerning a room, a type of storage furniture or an object are collected on a line (fig. 4).

Once completed the observation campaign, the software will process the data, and the study of the results will allow us to write a final report, which will be able to contain:

– the documentation archive (digital, graphics, photographic and textual documentation);

– the development of digital data;

– a description of the collections;

– an audit of the identification of the risks related to the conservation conditions and the associated priorities;

– the museum's conservation plan;

– the estimation of financial means and the necessary human resources.

To give an example of the rendering obtained on the basis of acquired information, figure 5 shows a part of the Collection Unit Processing Form with the objects information, and the same model is followed by the Museum Form, the Storage/Exhibition Halls Forms and each Inspection Unit Processing Forms.

All the numbers are always also expressed in percentages of the total: the total number of objects (an estimated number, if we used statistics),

Fig. 7
The existing and necessary surfaces and volumes of rooms and storage furniture for a museum's 6 different collections [Fossà, Giommi].
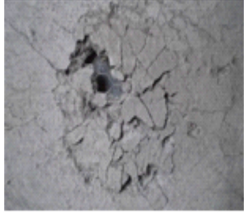
TIPI DI DANNO	CLASSI DI MANUFATTI /MATERIALI COSTITUTIVI			
	Ceramica	**Dipinto murale**	**Legno**	**Materiale lapideo**
42% **Danni strutturali**				
	Ceramica	**Dipinto murale**	**Dipinto su tela**	**Materiale lapideo**
28% **Depositi**				
	Metallo	**Tessuto**	**Carta**	**Materiale lapideo**
12% **Degrado chimico/fisico**				
	Dipinto su tavola	**Carta**	**Cuoio**	**Scultura lignea**
10% **Danno biologico**				
	Ceramica	**Legno**	**Dipinto su tavola**	Legno
8% **Interventi inadeguati**				

Fig. 8
Table summarising the main types of observed alterations on each collection's material class with photographs taken during the report [Di Napoli, Rivaroli, Talone].
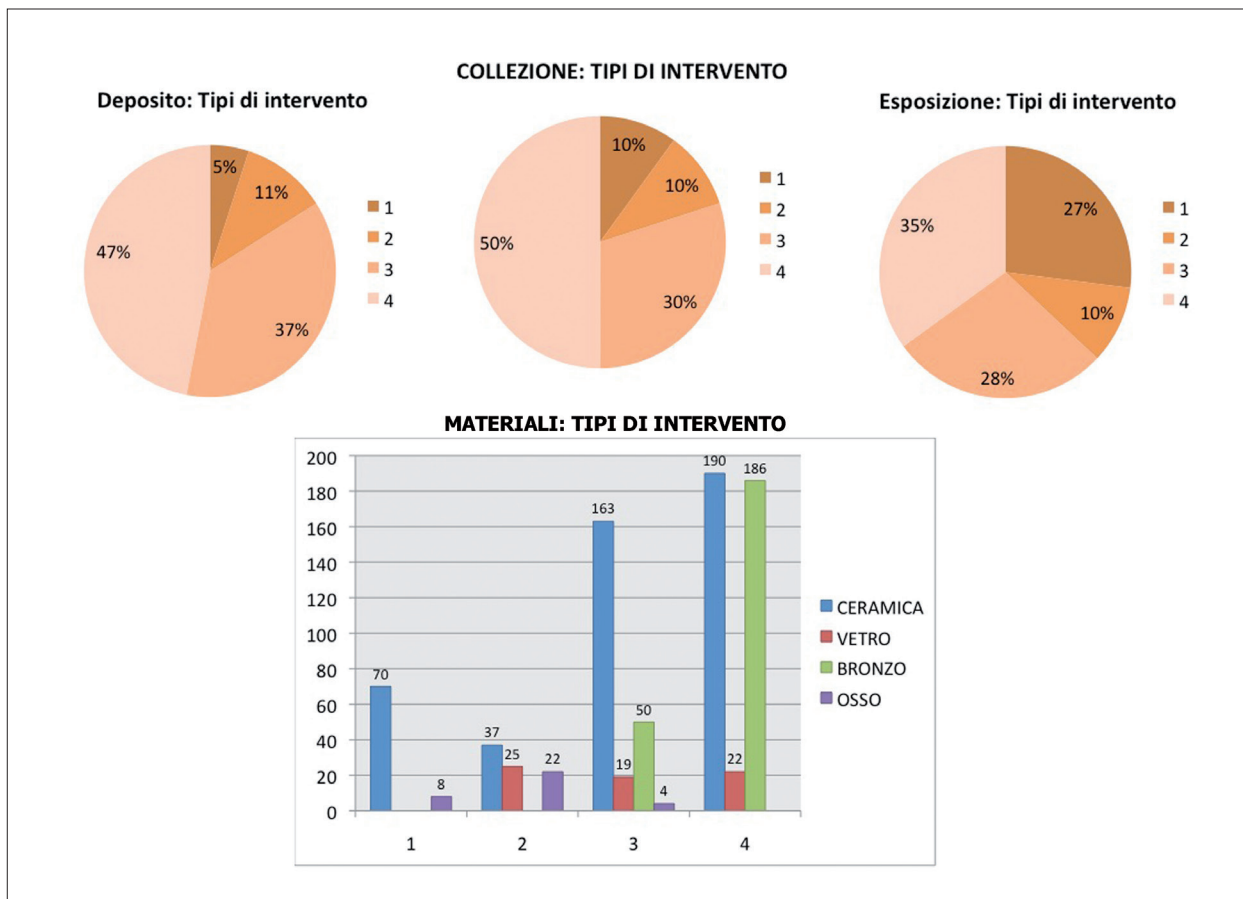
Fig. 9
Graphics of the types of interventions for a collection, for the objects in the storage room and for the exhibition collections and with respect to each class of materials [Fossà, Giommi].

of items without an inventory number, of material class, type of damage, risk level, type of interventions and intervention time.

In the report it is useful to integrate graphics and photos: figure 6 shows an example of circular diagrams created for the Collection, the Storage, the Exhibition and also for each exhibition room because of the distribution of material classes where very heterogeneous.

The volume data will be very useful for the evaluation of the storage rooms and in particular in case of remodelling the storage space: the software calculates the volumes, the horizontal and vertical surfaces, as well as the objects' real clutter at the moment of the observation, but also the volumes and the horizontal or vertical surfaces needed to store in an ideal way the collections [Walston and Bertram, 1992] in terms of space, but also in terms of storage furniture (fig. 7).

This data is processed with respect to each class of material, allowing to plan in detail a reorganisation of the collections based also on the objects' constituent materials and the associated conservation requirements [Pearce, 1990].

The alterations identified on the objects are recorded in 8 macro categories that can be used for all the materials: the goal isn't to document the alterations of a single object but to be able to assess the degradation

risk. For each object, it is possible to indicate the percentage of the affected area by each type of alteration, and these 8 categories are sufficient for making an exhaustive report. The creation of tables with the images of observed alterations on the inspected objects (fig. 8) proves very useful for monitoring the evolution of the degradations over time.

The level of risk for each object is marked by the assessor on the basis of observed damages and observed conservation conditions. During the pilot inspection, especially if several evaluators are involved, it is therefore very important to define in which conditions each of the 4 levels will be marked for each material class, taking into account that each level is linked to the speed of the risk of degradation over time.

The recommendations concerning the treatments to be carried out will identify for how many objects of each material class are needed for the 4 different established treatments typologies: this information is obviously very important for planning operations over time (fig. 9).

Finally, the estimation of the times associated with the recommended interventions, expressed in hours and minutes, will allow us to define the executive projects (fig. 10).

In one of the museums where this method was used, we estimated the time required to perform this type of evaluation, compared to the time needed to fill up a "classical" Conservation sheet for each object.[2] A campaign report with this "classical" form would have required two years of work for one evaluator, while with *SOS Collections*® thanks to the statistical method, the same evaluation required one month's work. If the campaign was conducted on all of the museum's objects, it would have taken four months with this method.

Once the description of the collections has been completed, the information gathered from all the forms is compared: the audit phase is the most delicate because it is necessary to identify the existing relationships between the observed alterations, the risk levels marked for the objects and the observed conservation conditions. All this information will be fundamental to define the conservation plan and convince the recipients of the report of its validity.

The conservation plan will indicate the priorities and the treatment typologies, the possibilities (or not) to realise them in parallel, the human resources necessary for their realisation, etc., but also the norms and the procedures to be followed after intervention in the different contexts of exploitation of the collections, in order to reduce the present risks by ensuring their conservation for the future generations.

Over the years, the methodology has been taught to university students studying to be conservators in France and in Italy and in the framework of international projects; it has also been used for degree dissertations [Giommi and Sgarzi, 2003; Di Napoli, Rivaroli and Talone, 2011] and by professionals working in archeological and fine art museums [Fossà *et al.,* 2006; Giommi, 2009].

MATERIALI		DTE	VET	MET	CUO	CER	DMS	TES	LEG	Totali	Totale h	Media min.
Oggetti	n.	3	5	3	5	5	27	5	3	57		
Spazi necessari												
Sup	m2	6,9	0,1	0,0	0,4	0,1	82,4	4,1	0,1			
Vol	m3	5,6	0,0	0,0	0,4	0,0	11,6	1,7	0,0			
Alt media	dm	8,0	1,9	1,8	7,8	2,2	12,3	6,3	1,6			
Sup media	dm2	256,0	1,5	1,4	7,1	2,0	303,5	74,9	4,8			
Vol medio	dm3	2048,0	2,9	2,5	71,8	3,8	427,8	306,1	7,7			
Ogg Oriz	n.	3	5	3	5	5		3	3	27		
Sup	m2	6,9	0,1	0,0	0,4	0,1		2,9	0,1			
Vol	m3	5,6	0,0	0,0	0,4	0,0		1,6	0,0			
Alt media	dm	8,0	1,9	1,8	7,8	2,2		5,5	1,6			
Sup media	dm2	256,0	1,5	1,4	7,1	2,0		105,7	4,8			
Ogg Vert	n.						27	3		30		
Sup	m2						82,4	1,2				
Vol	m3						11,6	0,1				
Alt media	dm						12,3	7,1				
Sup media	dm2						303,5	44,0				
Tipi di Danno												
	S1	3			5	3	24		3			
	S2	3	3		5	5	24	3	3			
	SU	3	3		5	3	16	3	3			
	AL	3			5		5		3			
	CF	3		3	5		3	3	3		**Tempi d'Intervento**	
	BI	3			5		19		3			
	II						24				Totale h	Media min.
	DI	3	5	3	5	3	24	3	3			
Livello di Rischio												
	A		3 50%			5 100%		3 50%			47	258
	B		3 50%		3 50%						293	3240
	C			3 100%	3 50%						1411	15600
	D	3 100%					27 100%	3 50%	3 100%		11460	19486
Tipi d'Intervento												
	1		3 50%			3 50%		3 50%			3	23
	2											
	3		3 50%			3 50%					65	720
	4	3 100%		3 100%	5 100%		27 100%	3 50%	3 100%		13143	18158
Tempi d'Intervento												
Totale	h	1303	23	109	1574	45	8990	435	733			
Media	m	28800	255	2400	17400	495	19872	4805	16200			

A manual describing the methodology and the software's instructions now allows professionals to have a good command of it. The methodology will be integrated to the *Risk Map's System,* where the object's risk will be calculated by an already existent algorithm [Fossà and Giommi, 2011].

In conclusion, "*SOS Collection*®" was conceived with a systemic approach, wishing to relate the state of the collections and the storage or exhibition spaces conservation conditions. The method was developed for the sake of user flexibility, measurability, and data comparability, keeping the evaluation on schedule and in the different examined spaces and the adaptability to computer tools other than File Maker Pro. Data interpretation allows a prioritisation of preventive conservation or curative actions with the necessary resource estimation for their implementation" [Forleo, 2017, p. 43].

Fig. 10
Part of a Collection Unit processing form where the times associated with the 4 recommended interventions are developed in relation to material classes, risk levels and typologies of intervention [Fossà, Giommi].

Notes

[1] We thank Mr. Maurizio Truglio who has gratuitously created a custom software and all the updates we asked to test the methodology in different contexts.

[2] We refer to the form that conservators use to document conservation treatments and, if many models exist, most of them have several pages and their compilation can even take several days.

Bibliography

Berrett K., 'Conservation Surveys: Ethical Issues and Standards,' in *Journal of the American Institute for Conservation (JAIC)* 33 (2), pp. 193-198, 1994.

Castelli G. (under the leadership of), *La Carta del Rischio del patrimonio culturale*, Ministero per i Beni Culturali e Ambientali, Ufficio Centrale per i beni archeologici, architettonici, artistici e storici, Istituto Centrale per il Restauro, Rome, 1997.

Di Napoli M., Rivaroli L., Talone R. *et al.*, 'I depositi del Museo dell'Opera di Orvieto: studio conservativo e proposte di allestimento. La Scheda Collezione come soluzione delle problematiche correlate allo studio ed alla salvaguardia di collezioni cospicue di beni culturali,' in *Atti del Convegno Lo Stato dell'Arte, IX Congresso Nazionale IGIIC*, Cosenza, Italy, 13-15 October 2011, Nardini, Florence, 2011, pp. 247-255.

Drott C. M., 'Random Sampling: a Tool for Library Research,' in *College and Research Libraries,* 30, mars 1969, pp. 119-125.

Forleo D., Francaviglia N., Wansart N., 'L'évaluation des collections,' in Forleo D. (ed.), *Cronache 7 – Méthodes d'évaluation de conservation des collections dans les demeures historiques,* Sagep Editori, Genoa, 2017, p. 43.

Fossà B., *Une stratégie préventive pour la conservation des collections en réserves. Une expérience dans le musée archéologique national de la Villa Giulia à Rome*, mémoire de maîtrise dirigé par Denis Guillemard, Université Paris I-Panthéon-Sorbonne, MST en Conservation-restauration des biens culturels, not published, 1995.

Fossà B., Truglio M., 'SOS collections®: un programme personnalisé au service de la conservation préventive,' in *Informatique & conservation restauration du patrimoine culturel, 8es journées d'études de la SFIIC*, Chalon-sur-Saône, 23-24 October 1997, SFIIC, Champs-sur-Marne, 1997, pp. 61-69.

Fossà B., Giani E., Giommi M. *et al.*, 'Studio conservativo delle armi e armature Odescalchi: nuove metodologie per la schedatura di una collezione,' in *Bollettino d'Arte*, fascicle 137-138, 2006, pp. 115-142.

Fossà B., Giommi M., *SOS Collections®: metodo e strumenti per la schedatura conservativa, la valutazione e la gestione delle collezioni museali. Manuale d'uso.* 1-2, ISCR, Rome, unpublished, 2011.

Fossà B., Giommi M., 'SOS Collections®: metodo e strumenti per la gestione conservativa delle collezioni museali,' in *Bulletin ICR – Nuova Serie (27)*, 2013, pp. 36-49.

Giommi M., Sgarzi S., *La conservazione in ambito museale: nuove proposte per il sistema di schedatura delle collezioni e degli ambienti. I depositi del Museo Nazionale di Palazzo Venezia: la collezione Odescalchi di armi e armature*, mémoire de maîtrise dirigé par Bianca Fossà, Ministero per i Beni e le Attività Culturali, Scuola di Alta Formazione e Studio dell'Istituto Centrale per il Restauro di Roma, unpublished, 2003.

Giommi M., 'Indagine conservativa sulla collezione con metodo statistico,' in Prisco G. (ed.), *Filologia dei materiali e trasmissione al futuro. Indagini e schedatura dei dipinti murali del Museo Archeologico Nazionale di Napoli*, Gangemi Editore, Rome, 2009, pp. 119-131.

Keene S., 'Audits of Care: a Framework for Collections Conditions Surveys,' in *Storage-Preprints for UKIC Conference, Restoration 91, October 1991*, UKIC, London, pp. 6-16, 1991.

Michalski S., *A Systematic Approach to the Conservation (Care) of Museum Collections*, Canadian Conservation Institute, Ottawa, 1992.

Ministry of Welfare Health and Cultural Affairs, *Delta Plan for the Preservation of Cultural Heritage in the Netherlands. Final Report*, International Workshop, 21-23 October 1992, Restoration RAI, Ministry of Welfare Health and Cultural Affairs, Amsterdam, 1992.

Pearce S. M., 'Approaches to Storage,' in *Archaeological Curatorship*, Leicester University Press, London/New York, 1990, pp. 88-102.

Urbani G. (ed.), *Piano pilota per la conservazione programmata dei beni culturali dell'Umbria. Progetto esecutivo*, Istituto Centrale per il Restauro, Rome, 1976.

Vallas P., 'Maîtrise de l'état des collections et définition des besoins,' in Oddos J. P. (ed.), *La conservation. Principes et réalités.*, Editions du Cercle de la Librairie, Paris, 1995, pp. 57-74.

Waller R., 'Conservation Risk Assessment: a Strategy for Managing Resources for Preventive Conservation,' in Roy A., *Preventive Conservation. Practice, Theory and Research*, Preprints of the Contributions to the Ottawa Congress, 12-16 September 1994, International Institute for Conservation of Historic and Artistic Works, London, 1994, pp. 12-16.

Walston S., Bertram B., 'Estimating Space for the Storage of Ethnographic Collections,' in *ARAAFU, La conservation préventive, Actes du 3e colloque sur la Conservation-Restauration des Biens Culturels. Recherches et Techniques Actuelles, 8-10 October 1992*, Association des Restaurateurs d'Art et d'Archéologie de Formation Universitaire, Paris, 1992, pp. 137-144.

Wolf S. J., 'Conservation Assessments and Long-Range Planning,' in Rose C. L., Williams S. L., Gisbert J. (ed.), *Simposio internacional y primer congreso mundial sobre preservacion y conservacion de colecciones de historia natural, 3*, 10-15 May 1993, Ministerio de Cultura, Madrid, pp. 289-307.