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When Preservation & Conservation meet Open Science

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ABSTRACT:

Observations on Preservation and Conservation in this times of socio-economic-political and pandemic crises, stem from many factors, as the increasingly rapid climate change, natural or manmade disasters, effect lives, it also damages Cultural Heritage. Awareness and more education are necessary. We consider the relationships between Open Science and Preservation/Conservation, discovering the best practices for limiting the impact and creating more sustainable registered memories in libraries/archives and cultural institutions.

Programs, detailed action plans, projects, investments concrete possibility of curation over the longest possible time, to guarantee the conditions, both for access and use to physical and digital items. Digitized materials are a growing complex over time, should maintain the level and information quality of the metadata. For some years we have been talking about the need to train many crossing interdisciplinary figures, we need knowledgeable professionals to deal with delicate data, which require accuracy, awareness and subsequent interventions. You must have specific skills to collect and manage dynamic data, changing over time, document the context of these data, integrate the data with different sources, analyze them and preserve. The "data curator" is the interpretation of this figure.

Keywords: open science, digitization, preservation and conservation, data curator, Cultural Heritage

Introduction:

This talk intends to contribute to raising awareness on the issue of Cultural Heritage preservation, in libraries, archives and museums, of recorded documentary resources, not only books, but also intangible resources, and to consider, briefly, the interactions between Open Science and digital preservation/ conservation. Digital has now become a pervasive agent, with a significant daily impact, integrated into the cultural ecosystem, from which new opportunities arise. Globalization and socio-political crises, pandemics, climate change heavily affect the environment, its biodiversity and the greenhouse effect with global warming, the rapid reduction of natural and energy resources, the increase of natural

disasters, manmade, and war events, affect everyone. Dramatic repercussions and consequences also affect the local cultural heritage 'ecosystem', structures, relationships between actors, strategies for long-term sustainable preservation.

A reason that has become primary for digitization is that of "surrogate" of the object, to protect the analogue original, subject to physical damage, which can be consulted in a place, individually. This implies, the knowledge of the object, in all its material and content characteristics, requires sensitivity and skills, a conscious planning also in the selection of the material to be digitized. Approaches such as these have spread patchy, in academic circles, but also in general public libraries and in historical archives of local authorities and public institutes, proponents of sectorial projects for the protection and enhancement of bibliographic and documentary resources in the territory. The same is happening in public historical archives, because of dematerialization regulations, which entail the digitization of documents, which has become a massive activity, even for the first preservation treatment of native digital. It is an obligatory choice, linked to the administrative-legal, legal-historical informative value of documents, to preserve for a long time or permanently, and the conservation concern in the archival field is more widespread.

The product obtained from the scanning of analogue materials as a digital copy for online consultation, to safeguard the physical originals is to be considered, more than ever, a new resource, available both for more efficient back-office management and for all user services. Hence, this resource is a cultural item connected to the analogue original, by an articulate set of information (metadata), they must be taken care of for over time.

National and international regulations, require a considerable commitment, first of all financial and organizational, professional skills, which are often scarcely available in the public cultural institutions on the territory. This represents a strategic cultural issue to tackle urgently, little understood, underestimated at the decision-making levels of those responsible for the public community heritage. This need becomes a priority to be addressed consciously, due to recognizable evident risks and emergencies, but very frequently it is postponed, or managed in an inadequate manner, generally due to lack of staff and means, or entrusted to external services, with results that are difficult to control, and which do not provide guarantees for the future of digital. On the other hand, there appears to be little awareness of the preservation of the book heritage, both modern and contemporary, subject to discarding, replacement with new copies, maintenance work on bindings, only exceptionally restoration, eventually for the legal deposit of publications, sanctioned by legal obligations but still lacking sure permanent local conservation.

There seems to be little awareness or effective capacity to foresee and reduce digital-related risks, without having defined a detailed preservation and conservation policy. It also happens to private owners of cultural heritage, where the focus is on limited objects-documents, usually historical, important or precious, rare and valuable, clear evidence of civilization value, necessarily protected by law.

It is indispensable to focus today on the detailed design of library-documentary digitization processes, to be improved and updated over time, in order to guarantee online access to the bibliographic heritage, beyond technological obsolescence, by providing migrations and periodic checks, of the 'local digital library, or of individual books, or digitized collections. Digital copy for access is available in one (or more) repositories, in the open context of a library system. This happens not only in the academic, and university world, but also in the

public, sharing large open networks, including international ones. The experience of partnership, or at least cooperative online catalogues, consolidated for years, which link the initiatives of digital libraries and individual digitized books and collections. Electronic publishing has been producing e-books for years, but also mainly scientific periodicals and multimedia and other born digital. The pandemic has significantly contributed to drawing great attention to the communication and information potential of digital. The same applies to teaching, through digital didactics, applied to the entire school and degrees of education, which requires articulated conservation and updating processes of context data and semantic contents. Digital in all its declinations with respect to the need for Preservation and Conservation of Cultural Heritage represents a complex asset of objectives and programs for education.

Need professionalism, competence, continuous training

Major international professional associations and their national affiliations play a driving role in this area. UNESCO, IFLA, ICA, ICOM, ICCROM, ICOMOS and many others are promoting the exchange, the expertise and competencies. They produce and update technical descriptive and management standards, guidelines, recommendations, implementing tools and repositories, digital databases, to indicate selected collections and assets considered most at risk in the world (Red Lists, Memory of the World Library Map, Risk register for documentary heritage).

Large sharable repositories are developing of available data, then, digital libraries, of recorded documentary memories in various supports, forms and of various thematic technical contexts, aimed at professionals and users and researchers from a variety of disciplinary fields. Qualification and continuous updating, long life-learning of operators is required, offering contacts suggestions and proposing training initiatives, comparisons and exchanges to foster innovation, awareness acquisition, growth and active participation, planning, as well as sharing ethical principles in cultural venues, to develop more and more cooperation, quality services to the public through web, networks and communities of local and international professionals. Independent and international special interest groups on the topics of preservation and conservation of digital cultural heritage have also been active for years, with comparisons and discussions of problems, to find cost-effective solutions and best practices, such as ELAG: <https://www.elag.org/>, PASIG, Opened Preservation Foundation, in great and national libraries too.

The interventions necessary in cases of heritage at risk of lost, or damaged by calamitous events of various kinds, which are frequent throughout the world, require experts of various professional multidisciplinary skills, staff trained in the recovery of materials and restoration, offering qualified help. Often to collaborate in training projects on how to deal with documentary library emergencies in affected places there are more organizations as: Blue-shields, Blue Helmets (in Italy since 2015), Civil Protection, they are engaged together with experts, restorers in international common projects on Cultural Heritage at risk. The new relationships, collaborative participation, even voluntary participation of experts from different disciplinary fields, constitute a very significant adding value to consider, when choosing digital preservation and conservation strategies.

Some institutions and scientific universities have signed agreements or conventions by industrial companies, during the pandemic for research. There were important contributions in the sanitary field, building and defining common technical processes and methodologies

solving health problems, supporting resilience and restarting projects for sustainable development under the SDGs of the UN 30 agenda. Cultural institutions are committed to medium to long term sustainable goals for services and best practices, to increase, maintain and safeguard their accessible, digitally enriched, protected, certified bibliographic documentary heritage. Digital objects to be preserved require considerable flexibility in dealing with the specificities of professional fields in that Humanistic, which cannot be IT only

Open Science and Preservation

'Open science' is an expression whose meaning is variously interpreted. For years, open science has been offering new capacities and possibilities, making information, data project results available, giving rise to varied forms of multidisciplinary collaboration to address conservation problems in sustainable ways, both of the intrinsic components of physical assets and the intangible cultural assets, and thus the digital heritage connected to them. Between open science and preservation contexts, the relationship is inseparable, in many respects, but there is perhaps not yet widespread awareness of how to arrive at economically sustainable solutions over time, which ensure the longest life and vitality to the digital, beyond the predictable rapid technological obsolescence. It is necessary to maintain a high quality of preservation of the cultural heritage, digitized and native, over time and space, evaluating strategies and taking care of the analytical design of the preservation process and its articulated phases, performance impacts.

"Open science" is also a policy priority for the European Commission and the standard method of working under its research and innovation, funding programs, as it improves the quality, efficiency and responsiveness of research. It concerns many aspects of the research cycle, from scientific discovery and scientific review to research assessment, publishing and outreach; most important being open access to publications and research data. Fundamental since 2016, is the Commission Open Data FAIR: Findable, Accessible, Interoperable and Re-usable. The data and open data sharing should become the default for the results of EU-funded scientific research. The European Open Science Cloud (EOSC) is also a 'federated ecosystem of research data infrastructures, allowing the scientific community to share and process publicly funded research results and data across borders and scientific domains. Interoperability of systems, by adoption of standard communication, is a fundamental prerequisite, as is networking and as free access to digital resources, increasing new value and more knowledge of Cultural heritage.

Open access, of research is functional to restoration, delicate and complex, even in the documentary field. The adoption of innovative methods of project management can give better results and add value to the assets themselves. From the original constituent materials of cultural assets, to semantic contents, for their knowledge, management and valorization, using diagnostic methods to measure effects of the environmental context of the object to preserve, open data, and linked data, big data too are used. Historical knowledge about the artefact is increased, and more cross-relationships with other entities, networks, places and people grow up. Development and implementation costs have reduced by sharing organizational resources and multidisciplinary expertise. Participatory experimentation also involves interested users and stakeholders, who help to create common ground for good practice and new uses of digital heritage data, closely collaborating with libraries and archives institutes of recorded memories and not yet surveyed. The scenario is changing faster than in the past. The ecological and the digital transition are parallel in global

complexity. The risks of digital memories may increase due to underestimation of impacts of social communication, consumption and waste of resources and lack of cohesion and coordination of preservation strategies. There is a need for higher professional quality, in step with the evolution of skills and flexibility in teams, also in smart work based on the increased possibility of social communication, open access knowledge, extended in various directions, collaborations, relationships and exchanges unthinkable a few years ago.

Brief mention is made of achievements limited to specific, significant humanities-informatics collections, where preservation and open access fruitfully meet.

Digitized ancient manuscripts of the Biblioteca Ambrosiana, freely consultable with features typical of the open access and on a collaborative platform, with accurate, enriched, standard metadata, supplemented by external experts of various consolidated recognized experience through various open collaborative platforms curated by the Catholic University of the Sacred Heart ¹

The Ricordi Historical Music Archive, holding manuscripts and bound publications of national interest, largely digitized, on a collaborative platform, is an innovative open project started during the pandemic. They adopted international standards in an open environment with an extraordinarily growing enrichment, obtained with collaborations of users, students, professors, musicians, who added new metadata, new information, related to more sources on the web, existing on other public and private platforms. This has increased the value of the archive's held materials with sources located in other interoperable contexts. You can see an innovative story-telling approach of the historical periodical Gazzetta, told by the old founder, and for which gaps in collection, the files is downloaded virtually for external integrations, through Wikimedia²:

Several experimental realizations are underway in universities and generate opportunities, start-ups and new creativity with the re-use of data and materials for different fields, where the concept of crowdsourcing and an interdisciplinary collaborative participation allow interaction between public and private actors and cultural venues, open, but sometimes controlled by restrictions for non-expert audiences.

This means that scientists should also have the necessary skills and support to apply open science research routines and practices working on Cultural heritage domain. The concept of science for citizenship is also growing. 'Citizen Science' gives opportunities to the public to make significant and valid recognized contributions,

Preservation and Conservation

The terms can assume different meanings depending on the local tradition in restoration or adopting international standards for digitization and related metadata sets to describe the items, the conditions to be preserved. What IFLA is doing in its commissions and structures in program promoting best practices and standards for curation and preparedness of emergency plans, organizing webinars and workshops, collaborating internationally in many projects of Preservation and Conservation in the world with the contribution of PAC Centers adopting an open science policies.

¹ <https://www.ambrosiana.it/scopri/biblioteca-digitale/>

² <https://www.archivioricordi.com/>

UNESCO programs have been a great impact in 2021 with *Libraries are Cultural rights defenders* ensuring the safeguarding of the memory of the world in all its diversity and together IFLA, which has long been advocating for libraries as essential players in the safeguarding and provision of access to cultural heritage.

I want to mention also the Faro convention,³ where a reinforcement to preservation in the concepts of cultural heritage is clear and introducing the context, as the landscape, to be sustained and transmitted to future generations. The principles affirm the necessity of the process of identification, study, interpretation, protection, conservation and presentation of the cultural heritage. Every country can have different situations in the mission of the cultural venues, if they are public or private. The Faro Convention for libraries and archives, as well as for museums, and landscape in Europe, represents a general reference, obligatory, when the ratification of the convention exists in a country.

The importance of developing the use of digital technology is evident. Digital enhances access to cultural heritage and the benefits deriving from it; it encourages initiatives that promote the quality of contents and help to secure diversity of languages and cultures in the information society.

The convention obliges countries: to adopt international standards; the study on preservation and conservation; the enhancement and security of cultural heritage. It also asks to combat illicit trafficking in cultural property, seeking to resolve obstacles to access to information relating to cultural heritage, particularly for educational purposes, whilst protecting intellectual property rights, recognizing that the creation of digital contents related to the heritage should not prejudice the conservation of the existing heritage.

In order to enable comparisons and exchanges, the need for shared operational standards has become stronger and more generalized, increasingly adopted to overcome fragmentation and thus the impossibility of sensible cooperation in the scientific field. Interoperability is unavoidable, as is networking, free access to information resources, also for the valorization of heritage, but it emphasizes that these are necessary conditions for preservation. The decision of strategies requires awareness constant commitment and guarantee of continuity to be effective, to ensure the longest life of the digital heritage. Preventing the risks of the objects to protect needs appropriate methodologies, measuring environmental parameters, monitoring the physical state of the assets with the widest knowledge and up-to-date techniques and diagnostics from scientific research offers the best guarantee of arriving at long-term sustainable conservation programs.

In relation to Open Science a concept that has been declined in various ways and aspects, because of the quantity of applications deriving from the use of open and linked data and increasingly collaborative platforms existing between different subjects, on the basis of agreements. They consider the management processes of tangible and intangible heritage expressly include preservation and conservation, in terms of a relationship that could be much broader, not yet adequately investigated, as an impact, perceived as indispensable, but not fully recognized by political decision-makers.

³ https://en.wikipedia.org/wiki/Faro_Convention; <https://rm.coe.int/1680083746>

There are national and European projects where the investment and priority for the digitization of cultural heritage gives rise to massive and specific interventions, with common characteristic, given precisely to the combination of the financial availability of European and national funds. Other private funds, contribute to make strategic programs, aimed at reducing the existing fragmentation of disparate digital initiatives.

In Italy, post-pandemic initiatives in the university and in the central government are starting, thanks to European funds for the PNRR, the resilience plan, and other private funds. The premises for the design of a partly already detailed national plan bode well also for digital preservation, but also for the previous first digitization of documents, to verify the accessibility. It represents a sort of strategy for a possible preservation planning in open science environments. There is great openness to other collaborative possibilities for managing the quality and richness of data, over time, as well as generating value for new creativity and reuse of digital assets, not excluding commercial entities. The national participatory design of the National Digitization Program (PND M1C31.1)⁴ for digital native Cultural heritage seems to have more support through an increased advocacy on the importance of safeguarding and protecting documentary cultural heritage, that has an attractive, demonstrative, legal value over time. This commits the project team to the timely definition of maintenance processes suitable to ensure the security of sustainable development of assets and related services over time for today's users and those in the future, increasingly varied in proximity and increasingly creative and remotely usable.

In addition, all issues concerning the creative common and copyright as considered, based on European and international directives generated by products and services related to the use of digital copies.

For some time, many theoretical aspects and methodologies for the conservative restoration of book and documentary cultural heritage may be considered established, those of a serious long-term digital preservation strategy, however, are not.

There are widespread open source platforms also adopted in Italy for example: Archivematica, Canadian s/w and widespread standards on digital preservation as METS, PREMIS, Dublin Core, the Library of Congress Baglt specification, EAD and packages like meta-standard OAIS: <http://www.oais.info/>, PERSIST, born in the archival field, promoted by UNESCO and supported by international organizations, recommended also by IFLA.

It represents an indispensable reference for digital preservation, from the design of a preservation plan under every technical and legal profile, to organize the description of metadata, including emergency response programs and recovery of resources damaged by any natural or manmade disasters or environmental event. Each country has its own legislation that considers the preservation of cultural heritage, libraries and archives and places of culture for which accessibility is differently organized. The preservation for digital very often focuses on the management of access to digital copies of services to the public, which can provide in memory institutions, where limited organizational and instrumental resources affect the long-term preservation of cultural heritage.

⁴ <https://www.digitalibrary.cultura.gov.it.obiettivi/>

One thinks of the public Cloud as a repository, and of the possibilities offered by AI, Artificial Intelligence, applicable in the Humanities for interpretations, translations and recovery of ancient texts and digital restoration. They will require more and more attention and choices, as well as awareness in defining strategies, processes and management, more skills for digital security in cultural venues, and thus new training and updating of the personnel involved.

Interdisciplinary competences also are the result of collaborations together with networks, even external contributions from users, scholars, or stakeholders, to cope with the necessary change in a sustainable, cost-effective and "green" way, as recommended by the goals of the UN Agenda 2030 for sustainable development: <https://www.coe.int/en/web/programmes/un-2030-agenda>, also for libraries and archives of cultural memories.

Since the advent of the internet, all connection systems and platforms tend to guarantee quality, data security, certainty of transmission of originals and their meaning and semantic content. It is a matter of defining integrated program of processes not only on single assets, but involves a cultural ecosystem, no longer based only on the specificity of the object to be protected, but also on the methods and thus resources and tools needed to generate that contextual process for certified prevention. Science that is also open to this need in a variety of ways implies flexibility and a systematic collaborative capacity, in order to guarantee the overall result of prevention and security of the digital heritage, which is fragile due to the increased risks of cyber-attack and conflicts. In addition, the sustainability of the use of functional energy resources will be increasingly necessary in the processes. Special attention should have the new metadata, to add subsequently to the basic metadata and produced in the first cognitive moment of the asset.

A “Data Curator” for digital preservation?

Programs and precise lines of action and investment over time to maintain the high information quality of the accompanying, digital items data are necessary and fundamental. To prepare or train crossing interdisciplinary staff in a library a new professional figure to create a flexible professional, capable of working in teams, aware of managing relationships, and dealing with fragile and delicate data, which require accuracy and periodic quality control and certification. He must have specific skills to manage dynamic data, changing over time, to document, the context of these data, to integrate data from different sources, to analyze them, to preserve them, to clean them.

This role is particularly requiring in-depth study by professionals: conservators, data curators for digital preservation and conservation. They may be librarians, archivists, or conservators. Restorers, with the appropriate disciplinary skills to intervene also for digital.

The interpretation of the figure of the ‘*data curator*’ is relatively new, because similar to the traditional librarian or archivist, qualified and trained, primarily engaged in the service to the public, not only on analogue materials. For those experts the support and intrinsic characteristics could be relatively stable, making use of consolidated technical knowledge, for the description and for the physical management of the material, first digitization included.

A ‘data curator’ is a librarian or an archivist, responsible not only for the first phase of metadata included in the cataloging process of the digital item., but can also receive again to add new data on the registration in the system. This happens also in the phases of control,

when technological updating is necessary, giving an enrichment, or because a migration to another medium, has to be organized. The quality certification should be assured, to ensure the durability of the digital item that has become a cultural asset, to be safeguarded, prepared for the future use, with the best quality and all the old and new assumed features. This enriched item is a value, allowing the reuse for new services or other digital products.

It is necessary to train the librarian as '*data curator*', or to get a specific professionalism sharing in cooperation. An attempt is made to understand what relationship with Open Science can be and what impact is sustainable, with respect to the state of preservation of past cultural assets and the possibility of maintaining them in the best possible conditions of access and use, for as long as possible.

Not only books in libraries but also documents, born-digital works, digitized materials represent a complex reality of resources to care of with the utmost attention.

The discussion is still open in various academic contexts. Data curator competence should be available anyway in a library, archive and museum for digital preservation of all contents on digital media.

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