



DEPARTMENT OF CONSERVATION

Connecting the dots

- mapping the use of conservation records for
quantification and research

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ABSTRACT

This study addresses the potential use of information from conservation records for research and quantification purposes. The aim of this study is to map out the information types and documentation methods in Swedish museum databases. And to explain how the structure and the quality of data entry enable or obstruct scalability of information. A quantitative survey was used to map out the documentation in Swedish museums, this was complemented with samples of conservation modules in databases collected from five museums. A qualitative interview was carried out to get more insight into the need and use of conservation documentation from the perspective of a museum currently adjusting their conservation module. A literature review was used to explore the use of conservation records for research methods epidemiology and data mining. The study resulted in a mapping of the current documentation methods and the structure of digital conservation records in museums in Sweden. The data structure was found to be fragmented due to parallel recording and storing of information. Issues such as heterogeneity, inter- and intra-operability of information, object-centred systems and a lack of standardized terminology obstruct the potential use of records for quantification and research. The study provides an overview of the relevant aspects revolving the improvement of information retrieval and operability of conservation records and point out semantic technologies as a way to enable inter-operability. An increased level of retrievability and inter- and intra-operability would potentially benefit research and quantification. But there is a conflict of objectives separating the use of records at the institution level and sector level.

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Preface

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Terminology

CIDOC-CRM – an ontology for the Cultural Heritage domain by the ICOM CIDOC group.

Controlled vocabulary – a formalized reduced selection of terms from a thesaurus used as a system of standard references.

Data mining – the method of extracting patterns and knowledge from large data sets.

Epidemiology - come from medical science and analyses disease within a population to assess health, probability of survival and evaluate treatments, the application of epidemiological study designs in conservation research has been suggested.

Free text – unstructured data in the form of written text.

Inter-operability – operability of systems across institutions within a sector such as Cultural Heritage sector.

Intra-operability – operability of systems within one institution such as a museum.

Linked Open data – semantic technology that enable information to be linked and retrieved on the web.

Metadata – data structuring information resources to enable access, retrieval and administration.

Ontology – is a structure that maps out relationships between entities and events using formal language, it can be used to enable knowledge exchange and enhance data inter-operability within a knowledge domain.

RDF – Resource Description Format is a technology for storing and publishing data that builds on structuring information as triplets build up by subject, object and predicate.

Schema - restricts what can be recorded so that only expected data types are recorded in its specific fields.

Semi-structured data - has some structure that enable analysis can be XML, web pages or zipped files.

Structured data – data well-structured for analysis often found in databases, has pre-defined values, identifiers or relational keys, excel and SQL are example of structured data.

Thesaurus – a list of the relevant terminology within a knowledge domain.

URI - Uniform Resource Identifier is a unique web address that can be used to link data.

Unstructured data – data that lack data types and rules and is harder to analyse, can be word-files, PDFs, JPEGs or multimedia-files

Quantification – to measure or evaluate the quality of something by using numeric value. In this study quantification also refers to how information input can inform decision making.

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1. Introduction

Documenting is one of the core purposes of a museum as stated in the ICOM Museums definition. By collecting material and immaterial culture, museums aim to safeguard memories and provide access to current and/or past heritage (International Council of Museums (ICOM) 2007, 2019). Information on objects in museum collections such as type, material, use and provenance are commonly registered into a collections database. Previously this information was kept in acquisition catalogues or index card systems. Information on objects can be catalogued by registrars, antiquarians, curators, historians etc. The database is also used to track the physical placement of objects in storage. Conservators generally document the aspects regarding the preservation of objects, such as treatments, condition and climate specifications etc. This information is kept in conservation records and can be labelled conservation documentation. It is an invaluable tool for conservators as through these records one can see the history of the object and understand treatments carried out in the past.

This study aims to investigate how conservation records in Swedish museums are structured and their potential use for research. Quantitative and qualitative methods have been combined to triangulate the subject. A survey was used to map out the methods of recording and storing conservation records in Swedish museums as well as assessing the level of structure of the information recorded. Images from conservation modules in the databases of five museums were collected to provide insight on information types recurring and the general structure. An interview with an informant from the National Historical Museums (SHM) provided insight into the conservator- and organisational perspective on the use of conservation records. And a literature review was used to explore the potential use of conservation records for research methods epidemiology and data mining.

1.1 Background

In *Conservations skills*, Chris Caple (2000) state that the recording of conservation documentation represents the shift in conservation from a craft to a profession. There are a number of charters and guidelines that guide conservation documentation within the profession. Article 16 in the Venice charter (1964) states that the conservation process together with technical information should be documented and that the report should be retrievable in the future. The Venice charter was built on Cesare Brandi's principles of minimal intervention and ideas on preserving the aesthetic and historical value of the object. In European Confederation of Conservator-Restorers' Organisations E.C.C.O professional guidelines the need for treatment justification is also added as well as requirements for future preservation in the documentation (E.C.C.O 2002, p. 2). The United Kingdom's Institute of Conservation (ICON) code of conduct puts emphasis on conservation documentation as a legal document protecting the conservator and/or institution in a potential dispute (ICON, 2014, 4.9-10, p. 2).

The Swedish standard *Conservation of cultural heritage – Conservation process- Decision making, planning and implementation* (SS-EN 16853:2017) has a process perspective on conservation documentation and state that the recording of the conservation process is obligatory. The argumentation behind

decisions made, actions and plans are defined as essential parts of the conservation record and the documentation should conform to a structure for data or a systematic framework.

In Sweden, information in databases of public institutions such as museums have public access according to the principle of public access [offentlighetsprincipen] which is regulated in the Swedish constitution [Tryckfrihetsförordningen] and valid for documents that have been turned in to the institution, created by or held by the institution. It is valid for analogue as well as digital records, recorded sound or video or other media. With the exception of sensitive information that is protected by confidentiality (SFS 1949:105, chapter 2). Sensitive information in museum databases can be information on insurance value and placement in storage.

Digisam is a platform for sharing knowledge on digital access to Cultural Heritage in Sweden. In the *Guiding principles for digital cultural heritage* [Vägledande principer för arbetet med digitalt kulturarv] (2014) the focus lies on establishing inter-operability of digitized cultural heritage information. It states that institutions should implement standards and work with maintaining or enhancing the quality of metadata for their collections. Digitized text should be machine readable to enhance access and use. Linking of data semantically and using persistent identifiers such as URIs are advised to enable access and use. Many museums work with creating access to the objects in their collections via platforms such as Digitalt museum. In the *Checklist: metadata systems* [Checklista: Metadatatstatus] by Digisam it is clear that also conservation data is considered to be information that need metadata quality control.

SPECTRUM is a standard protocol which organize workflows within collection management in museums. It maps out and connect activities or events with the type of information that should be documented in connection to it. It does not guide in what type of structure or language the information should be recorded in or held (Bruseker et al., 2017, p 98). It does not commit to a specific schema or ontology but points towards structuring the information recorded. SPECTRUM state that for the subcategories of condition documentation a standardized format should be used for related dates and a standardized terminology should be used for condition and prioritizing for treatment. For conservation treatment documentation: names, dates and object-numbers should have a standardized format and for treatment method a standardised terminology should be used. It also states that documentation from outsourced conservation projects should be linked to the object post in the collection management system for future retrieval. (SPECTRUM 5.0, 2019, pp 110-111; 117-119).

Documenting our work is the best way to help conservators and heritage professionals in the future to understand both how we treated the object and why. Norms and justifications that seem self-evident today will be revised later and knowledge about conservation methods and materials evolve. Keeping retrievable records also prevent the risk of dissociation or information loss. In the Canadian Conservation Institute's 10 agents of deterioration, dissociation is defined as disintegration of ordered systems leading to loss of the physical objects, loss of information relating to objects or losing the connection between the object and its related information (Waller and Cato, n.d.).

Recording information is an integral part of the daily work of a conservator and serves many purposes; as a part of the investigation process; enabling monitoring of change; informing future professionals of chemicals used and potentially hazardous materials present to name but a few (Caple, 2000, pp. 70-74).

The information found in conservation records is a resource. To inform decision-making when retreating an object, to inform preservation planning or management planning. To enable research in objects stored in real-life conditions and evaluate materials, methods and processes. This study will explore the potential use of information from conservation records for research purposes and quantification.

1.2 Previous research

In the report *Byggnadsanknuten offentlig konst* by the Public Art Agency of Sweden [Statens konstråd] (2019) the lack of standardized documentation and poor connectedness between different registers is described. The report states that measures to increase knowledge regarding documentation and availability of digital information is needed, standards and methods need implementing. Due to the poor information accessibility the management and preservation of this cultural heritage is suffering, and public art is at risk in Sweden.

Besides lack of information affecting management another problem with poor retrievability is the evaluation of previous treatments. In the master's thesis *Guidelines for the evaluation of previous conservation treatments* Alissa Andersson (2019) aimed to suggest guidelines and non-invasive methods to evaluate past treatments. Evaluating objects stored in real-life conditions instead of controlled environments in a lab may enable quality-control and validation of treatments. The thesis lay bare the methodological difficulties of validity and reliability in evaluating previous treatments. The obstructions for evaluating conservation treatments within a Swedish context was identified. Anderson (2019) stated that conservation records are not standardized and relevant information for evaluation purposes are not always recorded, they are hard to access and there is a need for a standardized terminology to enhance retrievability.

An example of trying to improve data retrieval is described in *Layers upon layers* by Franzon and Glasemann (2017). The case-study describe the integration of the software application D-inspector with the database MuseumPlus at the Nationalmuseum in Stockholm. D-inspector is a condition reporting tool that enable mapping of damages in digital images that are layered. Each layer represents a point in time in the history of the condition of an object. Nationalmuseum aimed to integrate all of the documentation fully into the database to replace the previous fragmented structure. They tailored the documentation process following the standard SPECTRUM 4.0 and developed a hierarchal terminology for the institution to enable retrievability. Controlled vocabularies were developed for the sections: treatments, conservation material and damage. After the project, information can both be recorded in D-inspector or directly into pre-defined fields with controlled vocabulary in MuseumPlus. The authors state that

streamlining the documentation has led to more collaboration between departments, improved the quality of conservation documentation and enabled better information sharing.

In *Classification of deteriorated glass objects in a collection management system*, Charlotta Bylund-Melin and Maria Franzon (2019) describe how condition surveying integrated in the database MuseumPlus enabled quantification of degradation. A group of 820 objects from the older glass collection was surveyed in less than 5 weeks. The scale of 5 stages of crizzling established by Stephen Koob (2006) was transferred and adjusted to fit to the condition status scale of 1-4 existing in MuseumPlus. The survey enabled assessing the status of the objects informing decision-making and preservation planning. Other advantages of using the database for condition surveying was to secure the information for future reference, to monitor changes during relocation and to inform handling of the objects during relocation since the condition status is visible in all object-posts in MuseumPlus.

The article *Evidencing the Case for Preventive Conservation*, Helen Lindsay (2018) focused the collection care documentation practices and potential for evidence-based evaluation of preventive measures. Depending on what data is collected could enable pairing documentation from collections care with research questions. Being able to evaluate the effect of measures is important for preservation planning. Lindsay pinpoints that databases are often object-centred by design, there is a need for a convenient system for recording collection care activities. The risk of institutional memory loss increases with weak recording practices. Lindsay also pointed out that the perception of need influences documentation, a perceived use of the documentation recorded will motivate the task.

Some of the technological challenges with integrating data to enable retrievability is described in the article *Online event-based conservation documentation*, by Athanasios Velios (2016). The potential of sharing conservation records and publications to gather a mass of information to enable statistical analysis or Big data analysis is stated. The main obstacle being a fragmented structure. Velios described the problem of query across a collection in free-text systems. Information extraction can help when one needs to analyse free text information but more structured data in a schema enable better search results. A schema restricts what can be recorded so that only expected data types are recorded in its specific fields. Velios (2016) pointed out that this works at a local level but since schemas are not regulated within standards such as SPECTRUM it is hard to retrieve information across schemas of different organizations. From the user perspective it is often hard to conform to a single schema. A concept thesaurus used as controlled vocabulary can be applied across schemas to enable retrievability, the challenge being to define terms to represent a single concept. Velios suggest use of an ontology to organize concepts within a domain. This would enable data retrieval through a search engine despite differences in schemas and databases used.

In the proceeding *Beyond databases: Linked open data for bookbinding descriptions*, Athanasios Velios (2014) described how sharing records online as Linked Open Data could enable retrieval for research. The main issue to solve being the lack of standardised terminology that obstruct search and the difficulties to query across collections, making it hard to access representative samples.

Resource Description Framework (RDF) is a technology for storing and publishing data that builds on structuring information as triplets. Information from databases can be published as RDF enabling search across collections from different institutions. This without affecting the organisation of the local database, but the information must match the terminology of a thesaurus. The data published online is defined as Linked Open Data since it can be linked to other data enabling a bigger source material to query. The project Linked Conservation Data is a network of institutions and scientist that currently work on applying linked data technology to link conservation records resources and improve access.

In “Cultural Heritage Data Management: The Role of Formal Ontology and CIDOC CRM”, Bruseker et al (2017) described the problem of data heterogeneity and lack of data inter-operability within the Cultural Heritage sector and its consequences for research. Strategies to aid inter-operability in the past has been either maximalist such as the attempt of building one common database system applicable to all phenomena or data types or minimalistic where the information recorded has to conform to a sparse set of categories in one schema. The CIDOC CRM ontology could potentially solve the problem of data integration, one of the advantages being that it can be expanded when new needs or data types arise. One of the challenges being making it accessible in the Cultural Heritage sector and implement the ontology as standard at ground level.

1.3 Problem statement

The information structure for conservation documentation is fragmented in Sweden and conservation records are hard to access. Conservation documentation has not been structured or stored with retrievability, quantification or future use in mind. The retrievability is important in relation to the conservator’s ethical obligation to document, the public’s right to access of public records and use of the information recorded. Conservation records hold knowledge that when structured in a more accessible way can benefit both management of conservation but also inform the work of other professionals such as archaeologists and curators. As an evolving profession, there is a need for research in conservation materials, methods and processes. The preconception that the information in conservation records is a resource and a powerful tool for decision making and for research that can develop the profession further is the driving concept of this study.

1.4 Scope

Conservation documentation is produced using a range of methods and stored in a variety of analogous and digital formats. Within the different sectors of Cultural Heritage in Sweden - the private practice sector, the conservation studios, museums and the Swedish church etc. the methods, resources and structures for conservation documentation vary, meaning the accessibility and retrievability of conservation records is inconsistent. The focus of this study is limited to digital conservation records in databases of Swedish museums. When addressing research the focus lies on possible applications of data mining and epidemiology. When

addressing quantification, the focus lies mainly on decision making for management and preservation planning.

1.5 Hypothesis

The accessibility of conservation records is limited and even when a searchable database is used there is fragmentation, varying level of structure and lack of standardisation of data input. This affects the possibility to retrieve, query and quantify information from conservation records.

1.6 Research questions

- How are conservation records structured in a museum context in Sweden?
- Can information from conservation records from museums be retrieved and used for research and quantification?
- Can conservation records be used as resource for research using epidemiology and data mining methods?

1.7 Purpose

The purpose of this study is to map out the main documentation methods used for conservation records in museums in Sweden. It will also explore how the structure and the quality of data entry enable or obstruct retrieval and use of the information recorded.

1.8 Aim and objective

This study aims to provide an insight into the possibilities and limitations of retrieval and use of information in conservation records and point towards the measures to potentially increase accessibility and retrievability of conservation records.

1.9 Theoretical framework

The theoretical framework consists of three parts: firstly, a mapping of the information types generally recorded to understand what information can be found in conservation records. Secondly, a short review of relevant concepts and technologies to understand the mechanisms of retrieval and access. Thirdly, the model of unstructured, semi-structured and structured data to assess the structure of information recorded in museum databases.

1.9.1 Information types in conservation documentation

A model over information types and document types recurring in conservation records by Andersson (2019) is used to understand what kind of information conservation records hold. The information-types mapped out are environmental data, technical documentation, condition documentation, conservation planning, conservation documentation and other information related to preservation (Andersson, 2019, p. 39). The categories of the model were translated by the author, for original model in Swedish see appendix I.

- *Environmental data* can be LUX-exposure hours, air quality measurements, relative humidity and temperature.
- *Technical documentation* includes visual examination, structural and chemical analyses, descriptions and mapping of damages as well as photographic documentation.
- *Condition documentation*, the recording of the current condition often occurring repeatedly over a period of time. Most commonly recorded in a condition report or in condition or collection surveys. The condition is often graded in a set scale. There are digital tools and analogue form to aid condition reporting. Often with some type of controlled vocabulary or set terminology.
- *Conservation planning* refers to the planning of conservation for example treatment proposals, preliminary investigations and the process of antiquarian subsidy [kyrkoantikvarisk ersättning] within the Swedish church.
- *Conservation documentation* or records over treatments.
- *Other preservation related documentation* such as data on transport history, packing instructions and insurance documents.

1.9.2 Concepts and technologies for retrieval and access

Information retrieval (IR) has to do with organizing information to provide access. The representation and storage of documents, catalogues, records, web pages and multimedia objects. The term IR date back to the 1950s and initially IR was adopted within library systems. IR is linked to accessing information for example using keywords to find a specific document from a document collection (Baeza-Yates, 2011, pp 1-3).

Information extraction (IE) is part of the field natural language processing (NLP) and are techniques enabling extraction of facts from unstructured data (Wang and Justice, 2005, p. 278). It is a way to transform unstructured information into structured data, to extract relationships, facts or identifying a document type. IE is sensitive to spelling errors and can be hard to apply on historical texts without first establishing the relationship between terms (Blake and Prescott, 2016 p. 191-192).

A thesaurus is a sort of list of important terms and its related synonyms within a knowledge domain. A thesaurus can enable search by formalising a controlled vocabulary where indexes and terms are reduced to the most relevant concepts, forming a system of standard references (Baeza-Yates, 2011, pp 228-229). The Getty Research Institute (GRI) have several thesauri for the Cultural Heritage sector such as art, conservation, archival material terminology. AAT for materials, techniques and styles; TGN for geographical names and ULAN for artist names under the umbrella Getty Vocabularies. The resource is open source and is available in formats XML, Linked Open data (LOD), Relational Tables and APIs (Harpring, P., 2018). Sweden there is no standardized terminology for damages, treatments and conservation materials (Andersson, 2019, p. 44).

An ontology is a tool for data interoperability within a domain and a way to enable knowledge exchange. It uses formal language to map out relationships between concepts. The concepts or *entities* are ordered ranging from the general to the specific in hierarchical relationships and can be used to model different activities. An advantage is that temporal aspects can be mapped out, such as the events of adding, modifying or removing bindings in a book. Focusing on events enable scalability at a more detailed level than when using an object-centred terminology (Velios and Pickwood, 2019, p. 118). The CIDOC CRM was developed by the International Committee for Documentation of ICOM (CIDOC) to solve the problem of heterogeneity in data and difficulties of integrating data from museum databases (Bruseker et al, 2017, p.108). The CRM (Concept Reference Model) is the core, new extensions can be developed to add specific relations or entities for the specific needs within the Cultural Heritage domain, such as the extension CRMcr that specifies conservation-restoration data (Bannour et al. 2018) and the extension draft for non-destructive test documentation (Kouis and Giannakopoulos, 2014).

Linked data is part of semantic web technologies that allow data to be linked and retrieved on the web. The data is published as RDFs which builds on structuring information as triplets built up by subject, object and predicate (Velios, 2014, p 13). Unique resource identifiers (URI) is the equivalent of a unique web address and can be used for labelling terminology from a thesaurus as well as relationships formulated in CIDOC CRM and make it retrievable (Linked Conservation data - webinar 2019).

1.9.3 The structure of data

The Latin meaning of the term *data* is *fact* or *given*. Mayer-Schönberger and Cukier (2013, p.78) define data as:

“a description of something that allows it to be recorded, analysed and reorganized”

The terms unstructured, semi-structured and structured data recur frequently in the literature to describe the data structure within fields like Big data, information extraction and machine readability. Unstructured data is defined as free text or multimedia in the formats word, pdf, jpeg or ppt. It is not organized according to a data model, it is irregular and lack data types and rules. The majority of data existing is unstructured. Semi-structured data has some structure such as markers or tags and is easier to analyse, it can be Web pages, XML or zipped files. By applying IE and NLP semi-structured data can be structured (Rusu et al., 2013). Structured data is often found in databases and is well structured for analysis, it has pre-defined values, relational keys and identifiers, Structured Query Language (SQL) and excel are examples of structured data.

The structure of the data makes it more or less accessible for quantitative analysis, this should not to be confused with the idea that unstructured data cannot be analysed – it can of course. But it needs more sophisticated tools to first transform it to a more structured format (Blake and Prescott, 2016 p. 191).

1.10 Method and material

Quantitative and qualitative methods have been used in combination in the line of triangulation – looking at a problem from different angles to understand it better. A quantitative survey is testing the hypothesis of fragmentation and will lay bare different methods of documenting in different institutions, as well as providing some insight to what types of information is recorded. The survey will also assess the level of retrievability and potential for quantification of the data from the categories unstructured, semi-structured and structured data.

Print screen images from modules for conservation documentation in databases were collected to see how the records are structured at a general level in the database in a number of museums. This to provide further insight into the interface framing the recording of conservation documentation.

A qualitative interview complements the indications generated by the survey and lead to more knowledge revolving the organisations viewpoint and thoughts on the potential use of conservation records.

A literature review explores the potential use of information from conservation records for the research methods of epidemiology and data mining.

1.10.1 Survey

A survey was sent out to conservators in museums inquiring on documentation methods used. For types of information recurring in conservation documentation, the model by Andersson (2019) was explored, (see appendix I). The questions were mainly designed as tick box alternatives with a few free text answers, the book *Enkätboken* by Trost and Hultåker (2016) was used for guidance on formulating the question format. The survey was tested and evaluated by conservator Camilla Hällbrink and adjusted before distribution to respondents. The cover letter can be found in appendix II and survey questions in appendix III.

Survey questions 4-7 had pre-defined values set for the different tick-box alternatives from the categories of unstructured, semi-structured and structured data. File formats such as text (MS Word, Pages, etc) and pdf attached to a database or server as well as the use of free text was considered unstructured. Mapping tools such as D-inspector or artichek is considered semi-structured. Information in predefined fields in the database is considered structured as well as the use of controlled vocabulary. This to generally indicate the data structure and by extension the retrievability and possible quantification of the information. Documentation printed out and stored in an archive was labelled analogue, the retrievability of analogue information lies outside the scope of this study. Ticking box alternatives have been translated by the author as well as free text answers in the chapter 2 Material. Reference is given to respondent number for free text answers to ensure anonymity. Survey responses in Swedish can be found in appendix IV.

The survey tool Easy Quest was used to structure and distribute the survey. Easy Quest was chosen because the result data can be extracted either as RSV, excel or PDF, these formats are all compatible with Tableau Public which was used to visualize the results. Tableau Public is a visual analytics tool that can help identify and present general trends in the form of graphs.

One common problem with surveys is the degree of generalization, it is important that the group of respondents is large enough and representative for the whole sector of museums (Trost, Hultåker, 2016 pp. 25-30). Statistics over conservators in Sweden from the report *Konservering av föremål och inventarier* (Danielsson, 2006) and a chart over visitor statistics 2018 (Sveriges Museer, 2018) was used to generate a list of respondent museums. Museums with an employed conservator among the staff was chosen. The survey does not provide any information regarding documentation for institutions where conservators are employed short term or on project basis. A geographical spread of respondent museums was aimed for, but many museums in Sweden are situated in the larger cities and in the south. My respondent list consists of conservators from the central museums (state museums), regional museums, municipal museums, in total 28 respondents. The survey aimed at conservators will have an issue with anonymity, one can argue that in a small field it can be possible to derive who answered the survey. To ensure confidentiality the names and e-mail address have been blocked out from the respondent data in appendix IV.

1.10.2 Samples from conservation modules in databases

Five museums contributed with print screen images over the modules for conservation documentation in their databases. Images were received from the Museum of Artistic process and Public art in Lund, The Gothenburg Museum of Art in Gothenburg, Nationalmuseum, the National Historical Museums and Moderna museet in Stockholm. The samples provide insight into information types used and a general idea of level of structure. The material complements the survey material and illustrate the variety of templates used in different museums.

1.10.3 Interview

The result of the survey was used to inform what question to ask during the qualitative interview with the informant from the National Historical Museums (SHM). The book *Kvalitativ intervju* by Anne Ryan (2004) has been used for general guidance. SHM is a state agency that was formed in 2018 by merging six institutions and it is the largest museum agency in Sweden. The informant was chosen because SHM is currently in the process of adapting to and adjusting a new conservation module. Being in this process means they are actively discussing what tasks and purposes they want their system to perform and potentially the intended use of the information. The interview will provide insight into the reality and perspective of a conservator in a museum and to see if quantification of information for management is in focus or not. As well as is they consider their information could be of use for research or not.

The respondent had the opportunity to read the manuscript before publishing. This to have a chance to point to eventual misunderstandings or misinterpretations, since the interview is carried out in Swedish and the answers were translated to English. Letting the respondent read the result of the interview is a way to verify the information material presented (Ryen, 2004, p. 116). For interview questions see appendix V.

1.10.4 Literature review

A literature review focusing conservation records to map out if they are used as resource for epidemiological studies and data mining. And to problematize the required structure and quality of the information. This to provide insight into the potential use of records for research.

1.11 Critique on material and sources

1.11.1 Survey

Since the distribution of respondents was uneven the results will be more accurate for the situation in regional and municipal museums and not representative for central museums. The result is indicative but to say for sure how the documentation is organized in Swedish museums, more respondents and a broader spread of respondents is required. Combining the survey result with other material is a way to enhance the base for analysis to be able to draw general conclusions.

Creating a survey is an art in itself. There are potential problems with the design of the survey questions. Asking general questions that regard several different documentation types in the same question can be hard to answer properly. Adding the question why conservators save or not save the reports in a private archive would have enabled further interpretation such as if conservators rely on their database and server systems to keep information safe and retrievable or not, or if they keep record for other purposes.

The category of structured data should be seen as indicative. D-inspector was labelled semi-structured based on the integration of XML-files from D-inspector to MuseumPlus at Nationalmuseum (Glasmann and Franzon, 2017). Unstructured data is easier to label than structured from the survey result. How the field for recording in a database is designed when it comes to pre-defined values and controlled vocabulary contra free text affects if the data is unstructured or structured. To really map out the level of structure one would need to actually access the databases and run test searches and queries.

1.11.2 Samples from conservation modules

Image material on conservation modules can contribute with a little more information on interface and structure, direct access to databases was not possible due to the Covid-19 pandemic. Mainly the samples contribute with what information types are represented and

roughly where controlled vocabulary contra free text is used. But one should keep in mind that these are static images of a much more dynamic system, meaning they do not provide a total overview of the design or modules functionality but rather a snapshot that can clarify and illustrate the results from the survey plus give an idea of the variety of templates used in different museums.

1.11.3 Interview

The interview provided the perspective of a conservator and the organisational use and need of conservation documentation at the specific point in time of adjusting their system. The initial plan was to carry out a second interview with a conservator from another museum, unfortunately the work with building up their structure for conservation documentation lies further ahead in the future.

1.11.4 Literature review

A literature review is the overview of published works related to a subject and analysis of it. It is based on reading the relevant material on a specific subject or a representative selection thereof. For the scope of this study epidemiology the material reported was representative and sufficient. There are not many examples of data mining carried out specifically in conservation records therefore the references used were from further afield.

2. Literature review

Pattern is a key concept that link the research methods I chose to look into. Epidemiology aims to lay bare patterns of disease or poor health within a population. However, epidemiology is also used in other research fields, including conservation (see 2.4.1.). Data mining is laying bare patterns or relations between bits of information. A pattern is something that provides an overview, often refers to visual information – the big picture, that organizes information into a representation more comprehensible.

2.1 Epidemiology

Epidemiology comes from medical science and analyses disease within a population to assess health, probability of survival and evaluate treatments. A number of other fields make use of epidemiology methods, employing statistics to understand the consequences of contextual variables, identifying patterns and assisting in the interpretation of the results. Bhopal (2008) defines the central paradigm of epidemiology as producing knowledge about cause and prevention of disease by systematically analysing disease patterns. Variables like economic status, age and gender are used to analyse and interpret patterns within a population (Bhopal, 2008, pp. 3-8) Just like individuals in a population, objects can response differently on exposure to a degradative factor, meaning some objects are more likely to develop disease than others. The concept of *disease* can be translated to *degradation* in the conservation context. Epidemiological methods can be used to assess the current or predicted *health status* or *stability* of objects in a population or to evaluate the effect of interventions.

In the article *Data in conservation: the missing link in the process* Suenson-Taylor et al. (1999) suggested the application of epidemiology in conservation research and stressed the potential use of statistical analysis to evaluate past treatments and conservation processes. Conservation methods and materials need to be verified through research on real objects and real-life conditions. The authors list five types of clinical studies and their use in conservation research:

- The *cross-sectional study* that gives an overview of the condition of a group of objects, measured through a condition survey.
- The *prospective study* is similar to the first although the condition is monitored over time, on set intervals rather than at a single point in time.
- *The intervention study* to determine dosage of treatment chemicals.
- *The medical care study* to assess conservation need within a collection, data is collected through a collection management survey.
- A *retrospective study* may use data from conservation records to evaluate past treatments and is applicable when combined with a cross-sectional study.

The authors suggest data-mining techniques and statistical analysis for already collected data like conservation records (Suenson-Taylor et al., 1999, p. 184, 186).

In the report *Epidemiology: Basic Ideas Applied to Museum Collections*, Druzik and Foekje (2017) explore the application of epidemiology on climatic conditions for collections and explain the core principles and challenges of epidemiological methods. They also show how these cases can inform planning of storage of objects. Four applicable study designs are described where the retrospective cohort study use data from conservation records. A cohort study can be both retrospective and prospective and builds on comparing responses of groups exposed to a specific factor. When conducting a retrospective cohort study the challenge is the varying consistency of records. It is important to assess the quality of information in terms of accuracy, reliability and consistency and report any missing information or sources of error.

Museum objects cannot speak for themselves the way human patients can, the conservator acts as a mediator and interpret and record the relevant data (Druzik and Foekje, 2017, p.6). This means bias in process of recording of data is a factor to consider in all types of epidemiological study designs or surveys. Taylor and Stevenson (1999) have described the risk of bias inherent in condition surveying. Both in the construction of condition surveys as well as in the process of data collection.

When the quality of evidence is weak there is risk of experimental bias and it can be hard to prove causality. Causality means that evidence shows a high level of association between cause and effect (Druzik and Foekje, 2017, p. 9) The authors have constructed a model ranking the quality of evidence within epidemiological studies, this puts background information at the bottom and cohort studies are at the lower end of the scale defined as observational studies. Quality of evidence is central to epidemiology as well as comparative conditions and it can be hard to prove true representativeness in a retrospective study. For these reasons' cohort studies are at the lower end of the evidence scale (Druzik and Foekje, 2017, p. 12, 20).

Bylund-Melin and Legnér (2014) investigated cause and effect between indoor climate and degradation of painted wooden objects in 16 churches on Gotland in the article *The relationship between heating energy and cumulative damage to painted wood in historic churches*. The historical indoor climate was based on information found in historical records on amount of fuel used and type of heating system. This was compared with an assessment of damage to painted wooden pulpits carried out through a condition survey. By quantification of data the causality between heating history and degradation was approximated. The authors stated a bigger population was needed for statistical accuracy and problematized that not all relevant factors affecting degradation are possible to quantify.

To sum up, epidemiological studies rely mainly on gathering data from a set of statistically designed experiments or statistically selected data, since the method of data-collecting is crucial for the validity of the data. There are limitations due to quality of data in conservation records when it comes to consistency, accuracy and comparability. Retrospective methods can be used mainly to inform or complement other epidemiological research methods. As in Duran-Casablanca et al. (2017) study on the mechanical degradation of paper in the Amsterdam City Archives, where data on frequency of use of objects was retrieved from the collection

management system. The data was useful in combination with an additional experimental design of a cross sectional study.

2.2 Data mining

The term *data mining* makes one think of digging out precious gemstones from solid rock. The gems mined or explored in the data mining process are gems of knowledge. Knowledge in the form of patterns or relations are extracted from a set collection of data. Data mining is multidisciplinary combining techniques from statistics, machine learning, pattern recognition, information retrieval and data visualization. Data mining is analogue to Knowledge Discovery in Databases (KDD) but is also seen as an integral part. The KDD process consists of several steps:

- *data cleaning* to make the data consistent throughout;
- *data integration* where data from different sources are combined; -
- *data selection* where relevant data for the specific analysis is retrieved; -
- *data transformation* where data is reshaped into a form suitable for mining;
- *data mining* where patterns in the data is extracted;
- *pattern evaluation* to choose the relevant patterns from the ones extracted and
- *knowledge presentation* where patterns are presented or visualized (Han and Kamber, 2001, pp. 5-9).

Generally data from different sources and file formats can be used for data mining the only thing is how much work needs to be put into the preparation of the data. Unstructured data needs to be structured to enable data mining. Prepared structured data is stored in a data warehouse, flat file (RSV), database or a spreadsheet.

The term data mining functionality describes what types of patterns that can be mined. Data structured into classes can be used to lay bare the general properties, so called *descriptive mining* or to make predictions through inference, so called *predictive mining* (Han and Kamber, 2001, p. 21). Data where classes are unknown or non-existent can be *clustered*, which often results in generating classes. Clustering works through grouping based on similarity. Objects within the cluster formed have a high level of similarity and at the same time a high level of dissimilarity compared to the objects of other clusters (Han and Kamber, 2001, p. 25).

The article *Off the Record: Using Data Mining to Review Decision Making in Conservation Practice*, Golfomitsou et al. (2017) state the potential use of information from conservation records to inform decision-making. The article aims to formulate a methodology to analyse data from conservation records. This was achieved through a case study where data were retrieved from 1625 records from The National trust Collection Management System. It was analysed focusing cleaning practices, cleaning methods, what materials where cleaned, why and how. The information extraction was managed manually due to high level of heterogeneity within formats and information by extracting keywords from the records chosen. Many reports where stored as attachments linked to the database as PDF, Word MS or excel files, meaning they had to be opened one by one to extract the information, slowing down the process. The data extracted was

ordered and coded into categories and stored in an excel spreadsheet. Tableau Public was used to explore general trends in the material. That was then further analysed using statistical software IBM SPSS Statistics for analysis such as correlation, factor analysis and clustering. The method of data mining enabled laying bare trends, activity rates and what materials had been prioritized. Making it a potent method to review decision making processes within an organisation or institution. The authors point towards using text mining and natural language processing (NLP) for exploring justification for treatment. Further work is pending and the analysis will add to methods that could be used for conservation records.

Dawn Archer (2016) introduced methodologies from *corpus linguistics*, which is a group of data mining techniques applied on corpuses of text within digital humanities. One of the type of studies presented is used to lay bare the ideological stance of an author through mining of recurring phrases. This would probably be applicable when investigating treatment justifications, provided you gather a set of these type of texts into a corpus (Archer, 2016).

In the poster *Data Harvesting for art materials research: A case study using the Trove newspaper collection* Alice Cannon (2017) exemplify the use of data harvesting to extract information on objects types and materials and their context. This case study retrieved information on the notebook *Metallic memorandum books* from digitized newspaper that was made machine readable with OCR (optical character recognition). Cannon state the benefit of data science and digital humanities for conservation.

In the paper *Documenting and data mining museum big data* (2018) Georgios Papaioannou describes a research-project of big data and data mining methods carried out in museums in Qatar. Papaioannou predicts that data mining and big data methods will be integrated practices in museums as information recording increase. The methods make it possible to detect new patterns and information in museum data to evaluate actions and outputs and visitor experiences. The need of an ethical framework and policy is stated.

The project of Golfomitsou et al (2017) proves that data mining in fragmented records can be a laborious manual task. Data mining benefits from more structure in conservation records and standardised data input. The potential of data mining lies in exploring patterns and reviewing decisions made and get insight into how the profession and practice evolve. Data mining methods that can be used and the coming-clean project and application of data harvesting for contextualizing an object type to large scale quantification of big museum data are all examples of how multidisciplinary collaboration can benefit conservation and museum professionals. This study aims to add to this line of working with documents from Swedish museums.

3. Material

3.1 Survey result

In total 15 respondents out of 28 answered the survey. The representation of administrative level among respondent museums was uneven: 6 regional museums, 5 municipal museums, 2 central museums and 2 labelled other participated. One of the regional museums is in part a foundation. I have included [länsmuseum] to the category of regional museum because it represents the same political level in the Swedish administration. Two of the respondents work with private clients. For survey data see appendix IV.

Question 10 aimed to map out time spent on documentation tasks, answer distribution varied between 5% to 80% of total working time. The average was 22% and the median 20% out of 13 replies. Databases used in the museums were mapped out in question 2. MuseumPlus, Primus and Carlotta were the most commonly used databases, see figure 1. References to specific versions of databases have been removed for clarity. Respondent 7 indicate that Primus is used for the collection but not used specifically for conservation documentation, instead Access is used and documentation is created in Word MS and Excel. Respondent 5 writes that archaeological information is being migrated from Sofie to Primus. And respondent 10 wrote that they are working on developing the conservation documentation module of their database. Respondent 1 wrote under question 4 that a special module for conservation documentation is being developed in Carlotta for conservation treatments and reports.

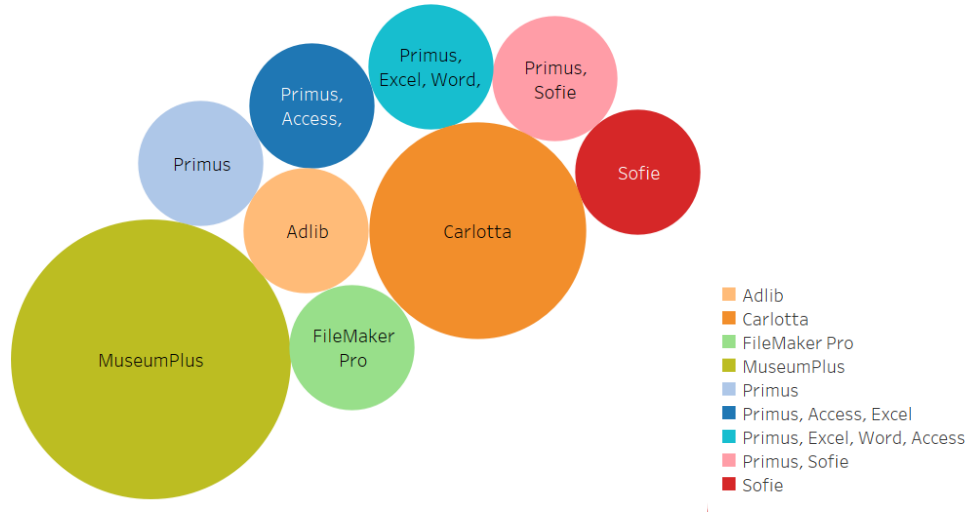


Figure 1. Distribution of databases used

Question 3 aimed to map out the frequency of sections recorded, see figure 2. Most common were the conservator's name, date, treatment description, material description, condition description and conservation materials used (14/15). Less frequent but common were treatment proposal and conservation methods used (12/15). Treatment goal, priority scale, justification, time spent, analysis results and mapping were less frequently recorded sections. Respondent 7 points out that what sections are included depends on what type of documentation is produced,

it differs between conservation planning documents and conservation reports etc depending on the client.

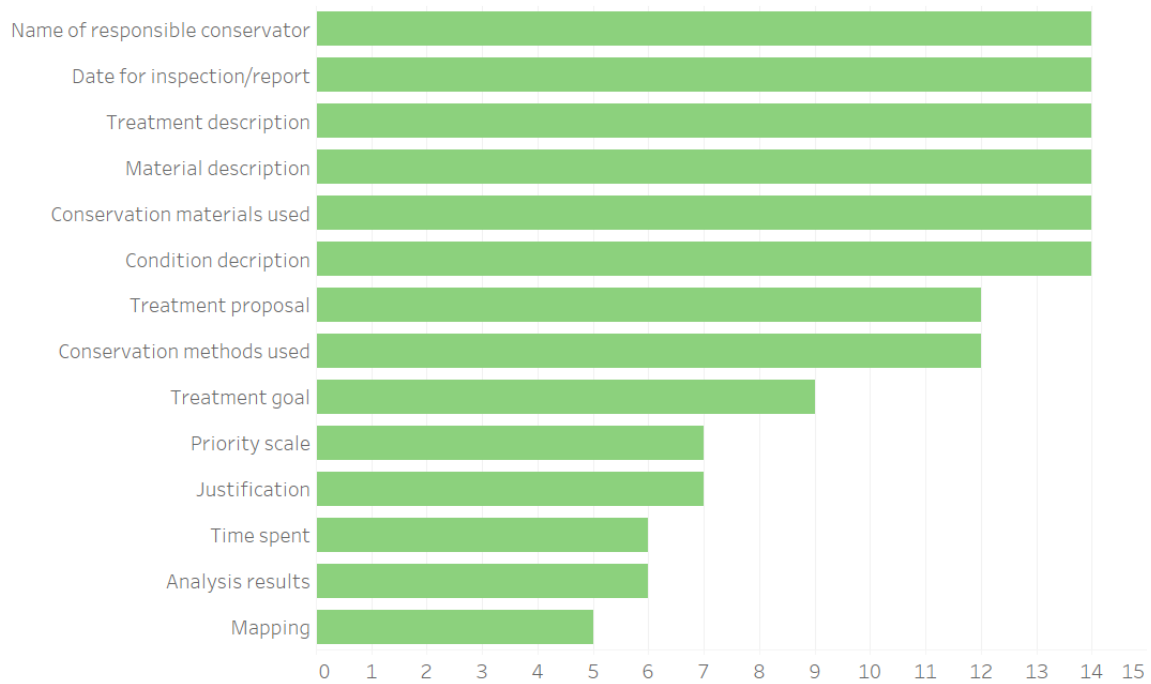


Figure 2. Sections recurring in conservation records

Question 6 and 7 aimed to map out the use of free text and controlled vocabulary for 6 common sections recurring in conservation documentation, see figure 3. Free text was dominant in all sections. Controlled vocabulary was most common for condition rating.

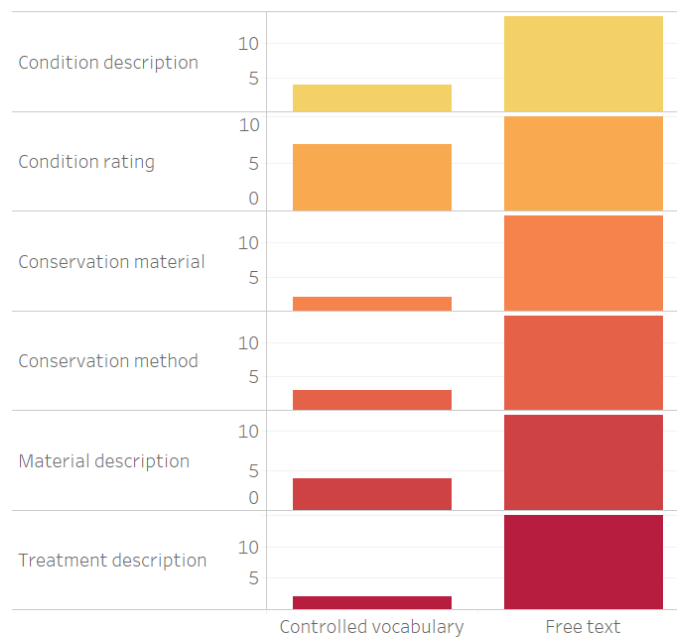


Figure 3. Distribution of controlled vocabulary and free text used

Question 4 focused on the methods used for recording documentation, see figure 4. The majority use Word MS (10/15) and record directly into fields in the database (9/15). Using both methods in combination was common (6/15). Respondent 12 wrote that smaller treatments are registered directly into fields in the database but more extensive treatment are documented in Word MS and then linked as a pdf to the database. Two respondents use D- inspector and one InDesign. When applying the values of the categories on data structure it is clear that the majority is unstructured (12/15) but that there is also a big amount of structured information (8/15), see figure 5. The combination of both unstructured and structured methods was common (7/15). Respondent 1 wrote that very little active conservation treatments are preformed, they work mainly with preventive conservation.



Figure 4. Methods of recording conservation documentation

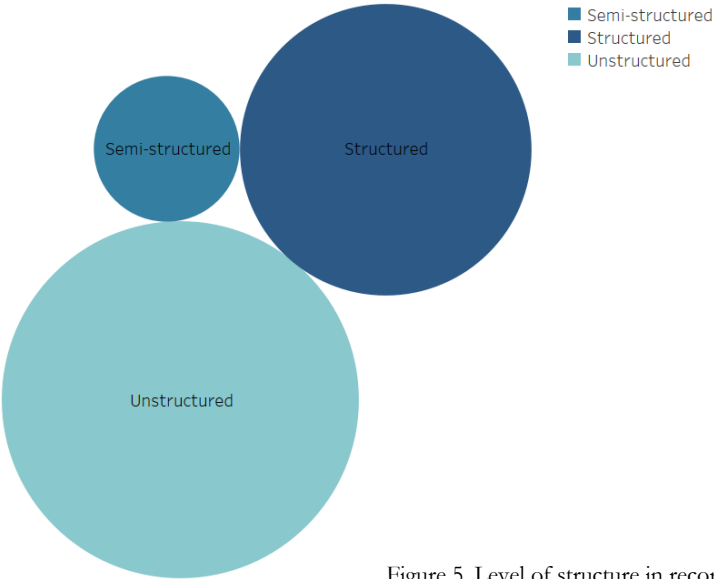


Figure 5. Level of structure in recording conservation

Question 5 focused on methods for storing conservation records. Most respondents used a combination of methods, see figure 6 for the complex structure. Many stored the information in the database fields (12/15), pdf-files attached to a post in the database is also common (8/15), pdf-file in server (7/15) and word-file in server (7/15). The level of structure of the stored information is a combination of unstructured and structured methods, see figure 7. 50% of the stored data was labelled unstructured, 30% structured and the rest analogue. Analogue means a printed copy stored in an archive, one respondent replied that printed reports was stored in a binder, this was also labelled analogue.

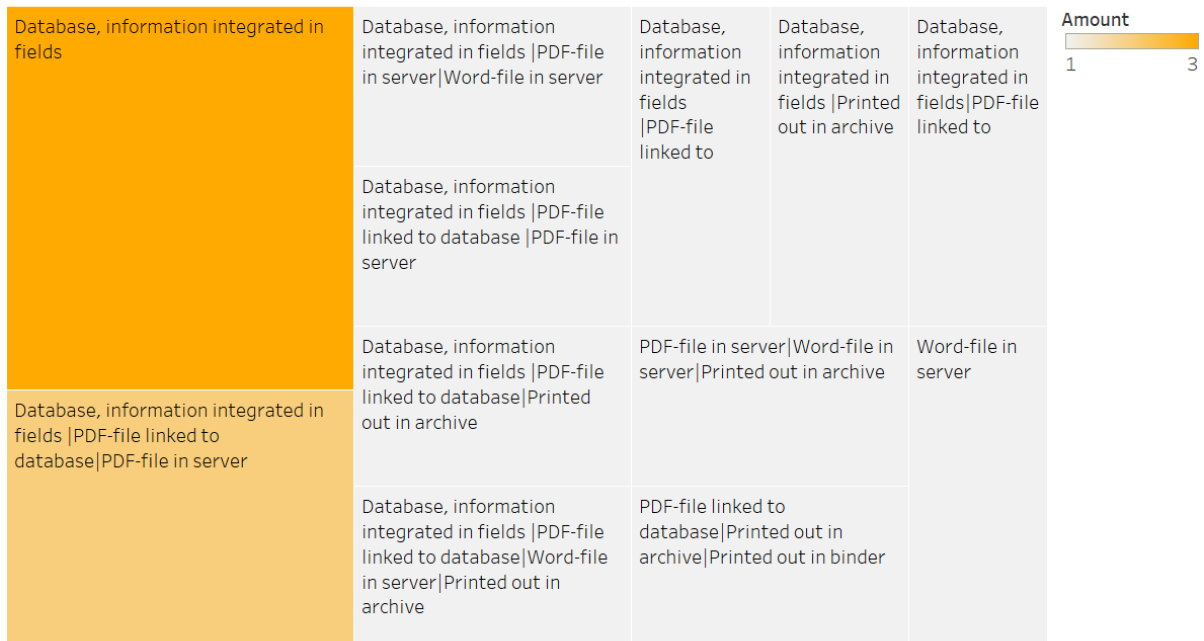


Figure 6. Methods of storing conservation documentation

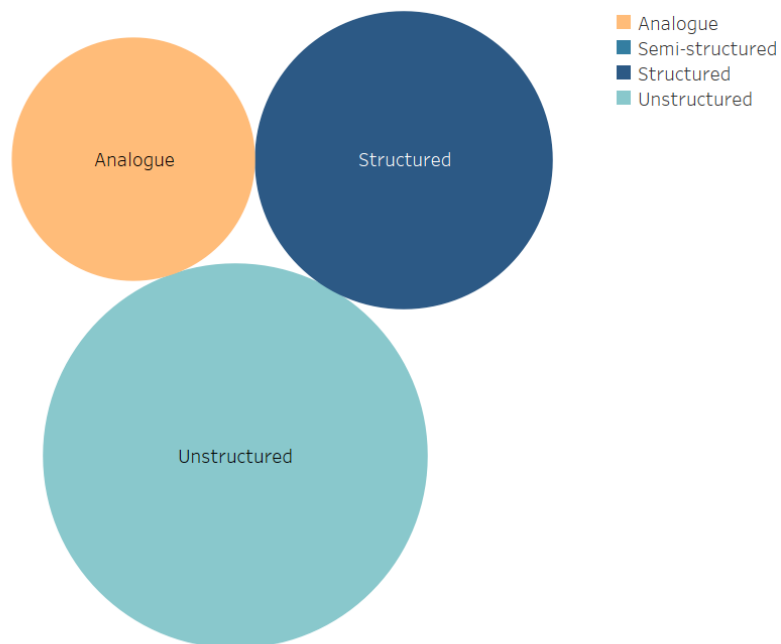


Figure 7. Level of structure in storing conservation documentation

Question 9 inquired how often conservators kept a copy of a report in a private archive. The answers rate in %: No, never 33,3%, Yes always 26,6%, Rarely 20%, Sometimes 13,3% and often not always 6,6%.

Question 8 map out the most common ways to retrieve an old report. The most common way is via the object- id or object-number and via the conservator’s name, see figure 8. Respondent 7 found the question hard to answer since the museum use several different systems. Respondent 12 use a combination search of the term conservation report and date. Respondent 1 replied that an old report could not be retrieved at all.

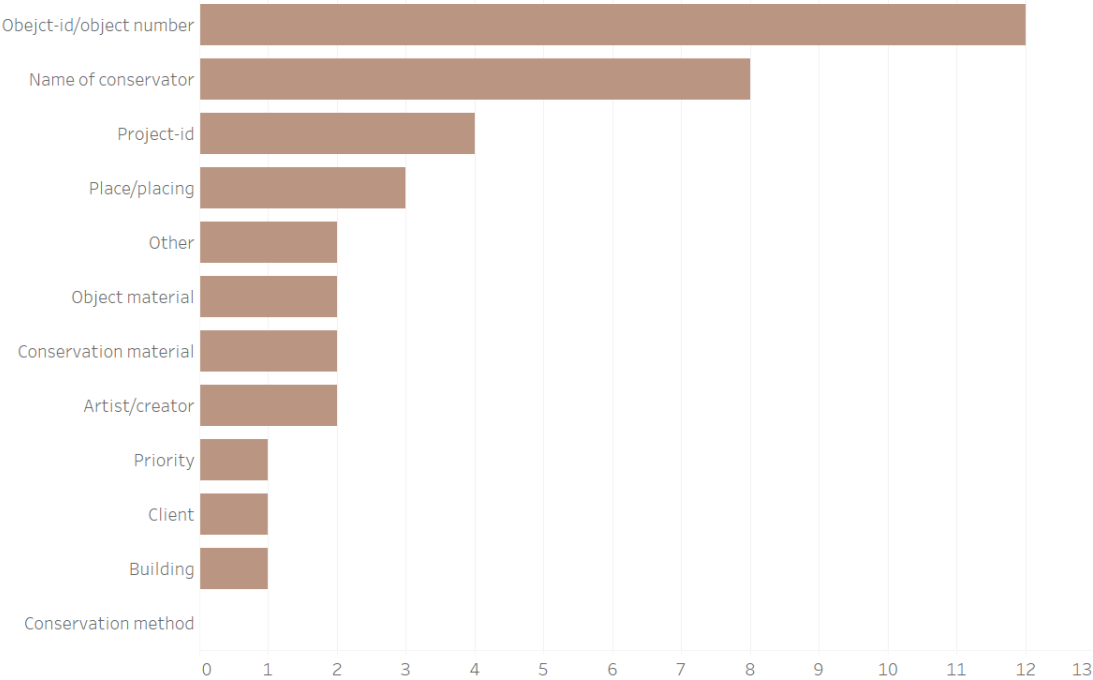


Figure 8. Ways to retrieve a report

3.2 Samples from conservation modules in databases

The Museum of Artistic process and Public art use FileMaker Pro for the collection and for conservation documentation, see figure 9. The conservation field is adapted for conservation treatments on art on paper and 2D artworks, hence [verso] and [recto] fields. Most fields use free text but the prioritizing buttons [Prio 1; Prio 2] and demount button [Demonteras] can be used to retrieve objects via priority for treatment and need for demounting. Post types are damage [Skada] or measure [Åtgärd], and this can be retrieved as well as date, enabling for instance the possibility to evaluate the number of conservation measures carried out during a year by a combined search. The control-list function [Kontrollista] allows for scheduling monitoring. The text recorded in the field [hanteras varsamt] handle with care appears in the object post to inform handling of the object.

The screenshot displays a FileMaker Pro database window titled "Skiss (Konstservern)". The interface is organized into a grid of fields and buttons. At the top, there are navigation and search tools, including a search bar with "Sök" and a "Sök" button. Below this, there are tabs for "SKISS", "KONSTNÄR", "KONSTVERK", "KONSERVERING", "FOTO", and "HISTORIK". The main content area is divided into two sections, each representing a record dated "2020-04-17". Each record has a "Posttyp" field and a "Datum" field. The "Primärt material" and "Sekundärt material" fields are present in both sections. The "Allmänt" field is divided into "Recto" and "Verso" sub-fields. There are also checkboxes for "Färglager", "Montering / ram", "Ovriga upplysningar", "Foto före konservering", and "Foto efter konservering". At the bottom of the form, there are buttons for "Sätt in", "Påminn", "M", "H", "Å", "Ny rad", "Kontrollista", and "Nytt protokoll". The status bar at the very bottom shows "Skapad Andrad MN 2015-10-28" and "Katalogsign JR 07 Uppdaterad".

Figure 9. FileMaker, The Museum of Artistic process and Public art, Lund

Nationalmuseum use MuseumPlus for both documenting the collection and conservation records, see figure 10 and 11. Individual D-inspector reports can be accessed from MuseumPlus but the information is not integrated in the fields. Arrows generally indicate a drop-down list of terms. Controlled vocabulary was developed for damage, conservation material and treatments.

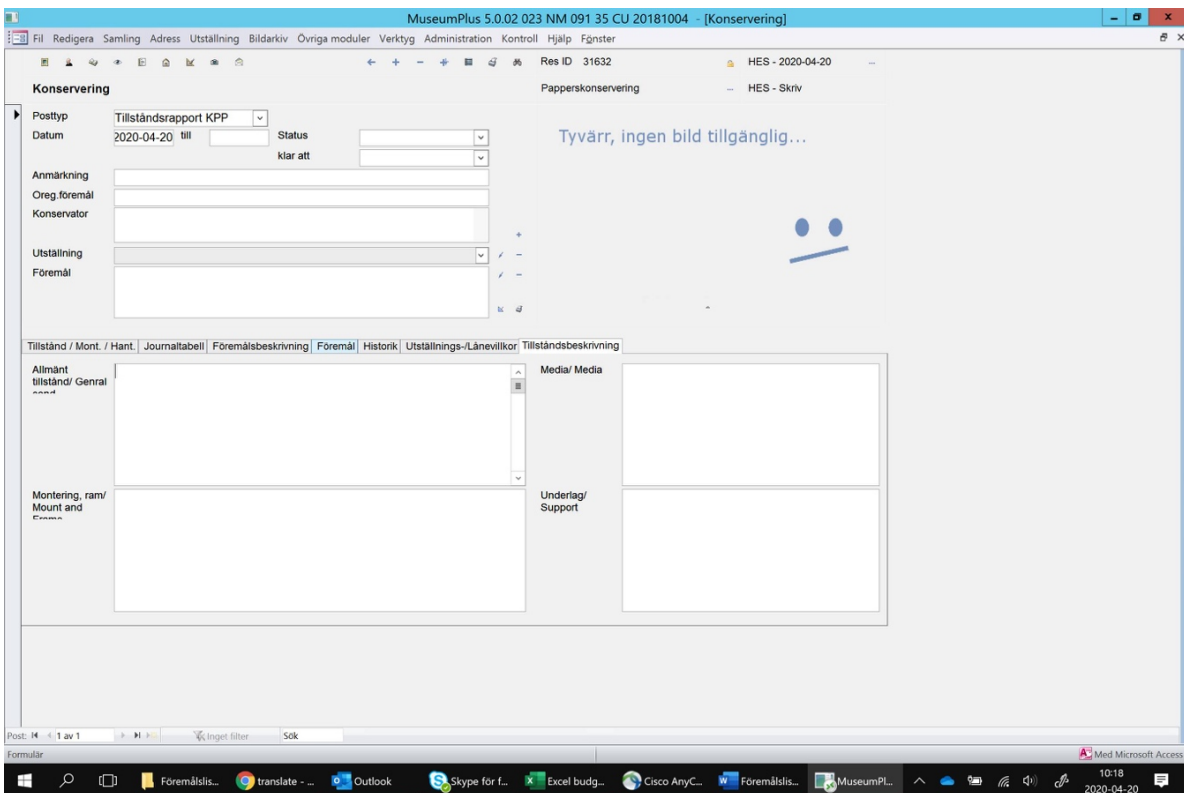
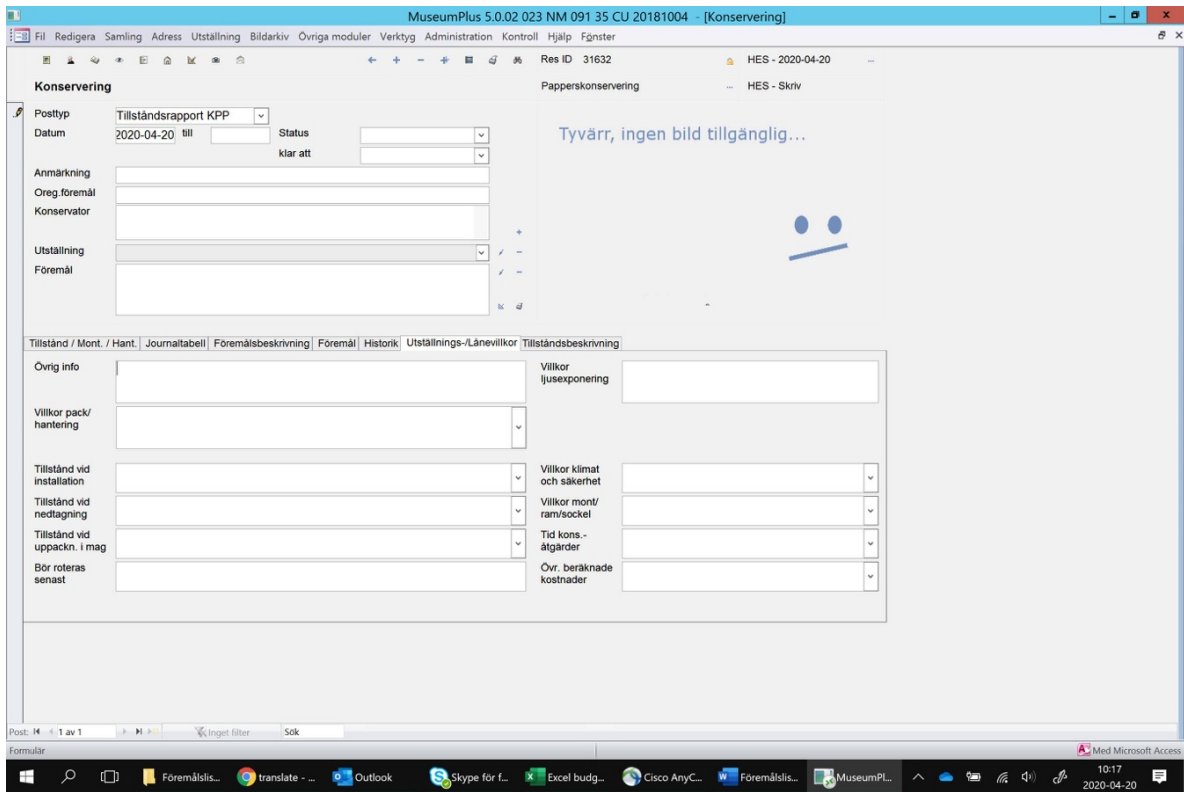


Figure 10.11. MuseumPlus, Nationalmuseum, Stockholm

The Gothenburg Museum of Art use MuseumPlus for both documenting the collection and conservation records, see figure 12. The arrow symbol indicates a drop-down list of terms but free text can also be used. A set terminology is used for condition reports and visual mapping of damages.

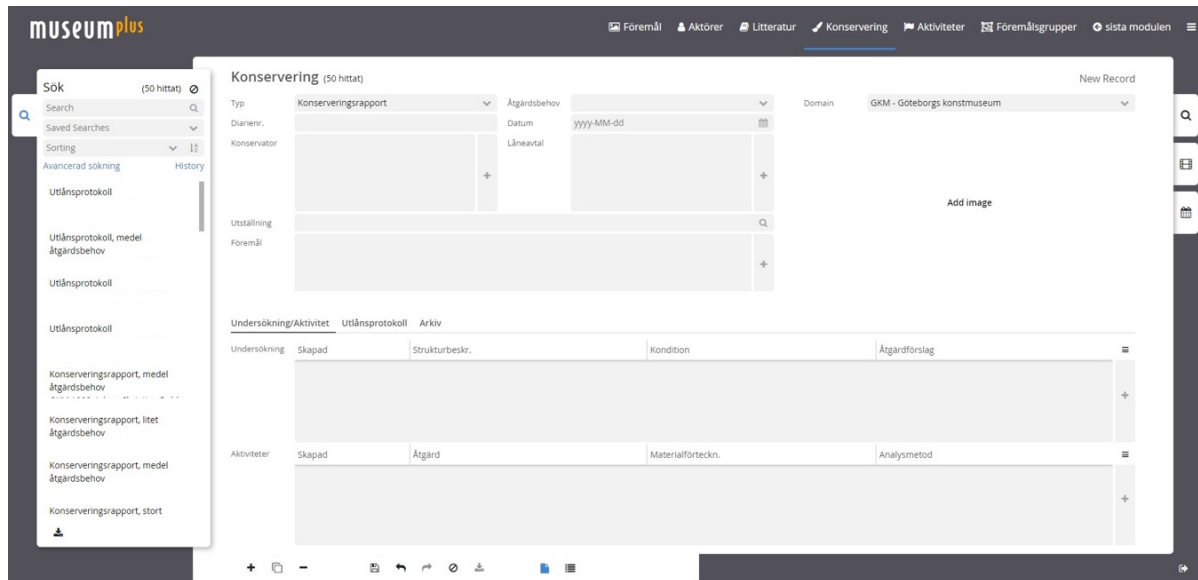


Figure 12. MuseumPlus, The Gothenburg Museum of Art, Gothenburg

Moderna museet use TMS from gallery systems and record conservation data in fields in the database, for condition reporting D-inspector is used. Fields with arrows indicate drop-down lists of terms, some fields also have names of personnel, which can be searched, see figure 13.

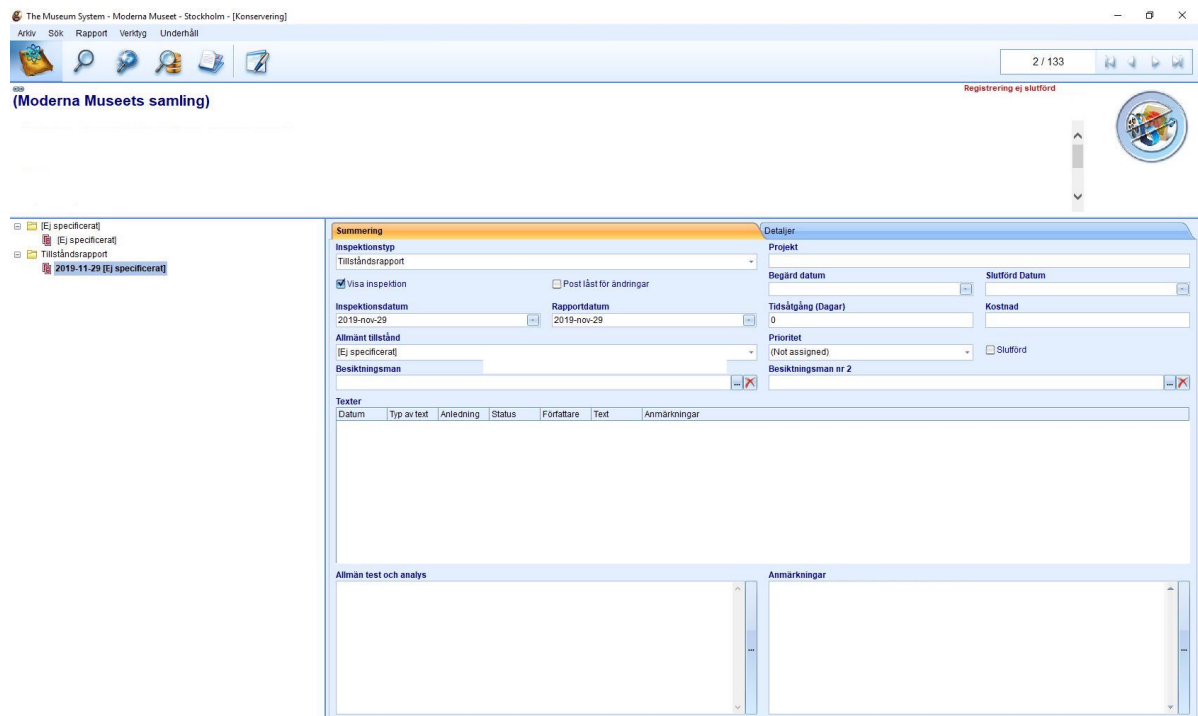


Figure 13. TMS, Moderna museet, Stockholm

SHM are currently adjusting and adapting to their conservation module in Adlib, see figure 14 and 15. The module uses fields with pre-defined values or controlled vocabularies and free text fields. Under digital references images and files can be linked. Some of the fields are under construction at the moment. Being able to visually map damages and record mounting materials and conservation materials used, are on the wish list. The module is further described under section 2.3 Summary of interview.

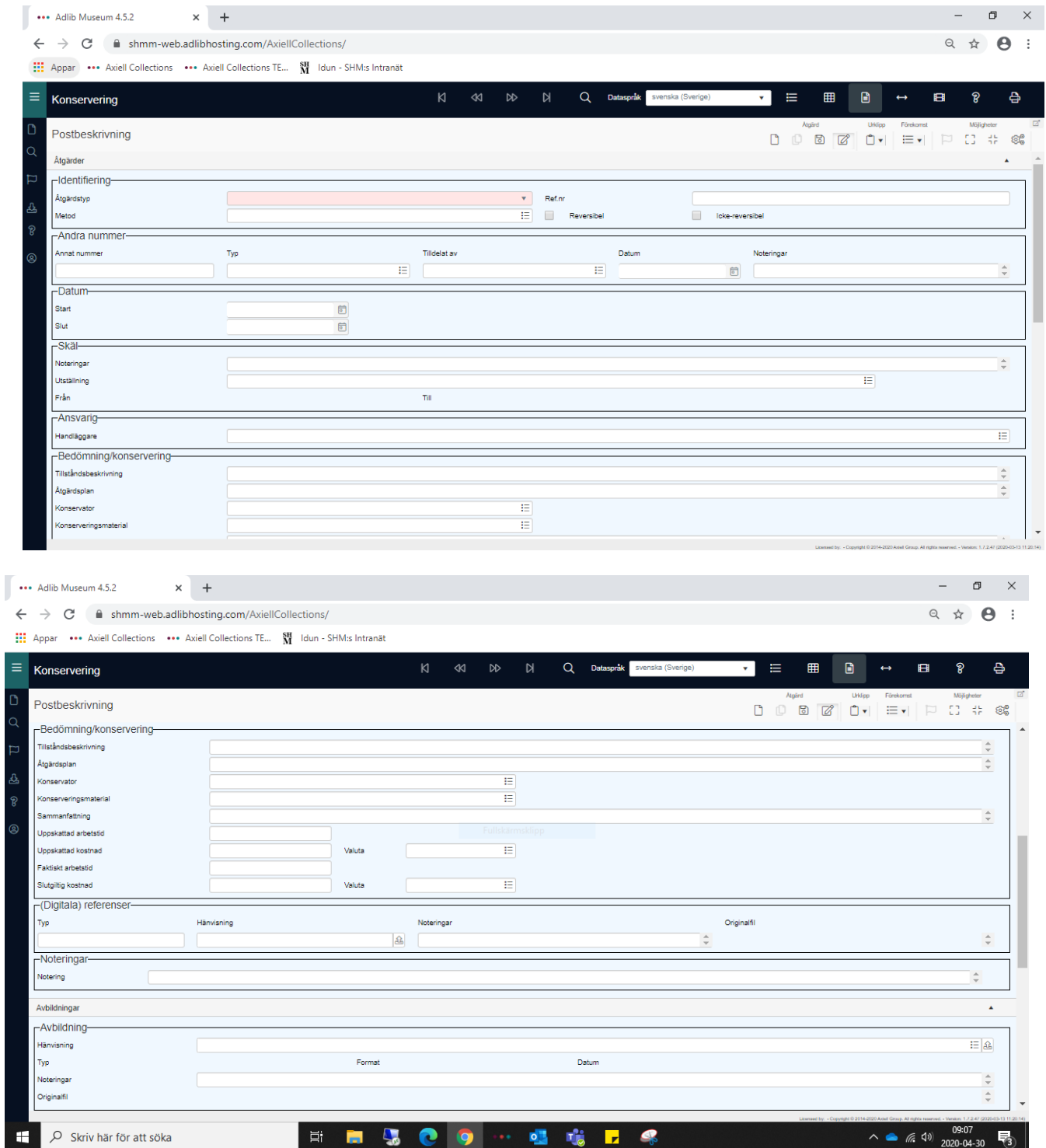


Figure 14, 15. Adlib, The National Historical Museums, Stockholm

3.3 Summary of interview with Informant 1 SHM, the 5th May 2020.

SHM (National Historical Museums) consist of the six museums: the Royal Armoury, Skokloster Castle, the Hallwyl Museum, the Royal Coin Cabinet, Tumba Papermill Museum and the Swedish History museum. LSH was a museum agency that consisted of the Royal Armoury, Skokloster Castle and the Hallwyl museum. LSH was incorporated into the museum agency SHM in 2018.

LSH has a long tradition of digitization, starting with the database set up for the collection at Skokloster Castle in the 1970s. The Royal Armoury established an Access database at an early stage. And all three museums of LSH later conformed to using the database FileMaker, but the databases were not integrated between the museums. The conclusion that a collection management system was needed arose during the work with the project “bildprojektet” initiated in 2006. The project to integrate the three databases started in 2008 and resulted in the shared MuseumPlus database that was launched in 2010/2011. In the process conservation data was migrated from the conservation module from the three separate FileMaker databases. The templates were not entirely compatible, the information had to be reorganized and adjusted to fit the conservation module in MuseumPlus.

In connection with the merge of the museums within SHM in 2018, the implementation of the SPECTRUM standard as a core for the management policy and the SPECTRUM compatible database Adlib for SHM, took place. Adlib is linked to the collection database under the umbrella of Axiell Collections. Information from conservation records in MuseumPlus has been migrated to fields in Adlib based on recommendations of SPECTRUM. At this point the configuration of the system is under development.

One general need identified is better functionality for managing images in the conservation module. The function of visual mapping of damages is on the wish list. How image-files and image metadata are managed will probably be affected by the DAM-system that will be implemented in the fall of 2020. Another function on the wish list is the possibility to record mounting and conservation materials. The conservators of SHM are currently in a learning and exploring process where they look into the use of the different fields in the conservation module and evaluate different recording practices to set new routines for the process of recording conservation data. Although the main template is already developed, adjustments can be made such as concealing fields that are not used or changing the headings for certain fields. Already migrated information can be moved to a different field. This work is being done parallel to big exhibition projects and time for this process is unfortunately limited at the moment.

The tradition of recording conservation data digitally varies between the different museums within SHM. The Swedish Historical Museum had previously worked with recording in MS Word. At this point records by the Historical Museum are stored as PDF-files linked to a post together with some metadata. If analogue records should be kept or not is currently under discussion, and it represents the clash of different documentation practices within the different museums of SHM. The informant lifts the benefits of the possibility of grouping information in digital records that is not possible for analogue records.

The template of the conservation module is modelled according to the standard SPECTRUM and have been developed with outsourced conservation in mind, meaning when a museum lacks inhouse conservators, conservation is executed by conservators in private practice. This is the predominant situation also in Swedish museums. As an example the Swedish Historical Museum of SHM have worked mainly this way. They have one inhouse conservator managing the collection of ecclesiastical art and two employed conservators that mainly work with condition reporting and creating the framework for projects to be outsourced and competitively bid for by private practice conservators and conservation studios such as Stiftelsen för Föremålsvård in Kiruna. The fields referring to cost [uppskattad kostnad; faktisk kostnad] and time spent [uppskattad arbetstid; faktisk arbetstid] in the module is due to the context of the use of outsourced conservation and not really used by SHM unless a conservation treatment is financed by another institution in connection to a loan.

Generally the conservation module is built up by several fields with rolling lists with predefined terms or categories, such as the type of measure [åtgärdstyp], exhibition [utställning] and conservator [konservator]. The information on conservation material [konserveringsmaterial] have been migrated into another field but will hopefully be transferred to this field if possible. A rolling list with conservation material terms would be the ideal. The field method [metod] is under discussion, this originally referred to analytical methods. There are also some free text fields like notes [noteringar], condition description [tillståndsbeskrivning] and treatment plan [åtgärdsplan]. The free text structure enables a flexibility in how objects are described within different object material categories and the word limit is unlimited. The fields under digital references [digitala referenser] is where external documents, pdf-files or images can be linked. A new system is being developed to achieve this function. The two buttons for reversible or non-reversible [reversibel; icke-reversibel] was developed during the migration of conservation data from the Swedish Historical Museum and refers to if analysis is non-destructive or destructive. The treatments carried out are currently organized under the heading summary [sammanfattning] this is something that will be organized or labelled differently. A link to the post of one object or several objects in the collections database can be created in the conservation module.

Since SHM have three historical houses, Tumba Papermill Museum, Skokloster Castle and the Hallwyl museum, the documentation of preventive conservation measures is very important.

LSH did not have the opportunity to document preventive measures in a satisfactory way in MuseumPlus. The main problem being that the measures are usually performed room by room resulting in a general report for measures carried out for all of the objects situated in one room. And for some individual objects requiring more information to be documented, individual reports have been recorded. Inventory databases within MuseumPlus was used as a tool, as well as a classification scale for recording the condition. The issue being that three parallel systems for classification was used within LSH. A common classification scale will be developed, it needs to be compatible both historically and for future recording. How the historical records of preventive conservation are organized and where the information can be found is yet to be explored.

When it comes to retrievability of information there are possibilities of searching for information regarding specific types of damages, analyses carried out etc. Previously at LSH the number of conserved objects were reported for each year, this is not the case in the new organisation of SHM. The informant mentioned the risk of quantitative goals within conservation, that it might lead to prioritizing less time-consuming treatments to achieve a higher total number of conserved objects at the end of the year. And comparing different treatments carried out might not reveal the level of importance or complexity of the work carried out. This might be misleading for management. The main focus for the conservation currently carried out is linked either to exhibitions or loans, meaning the main documentation recorded are produced in connection to these two situations. From a conservator's point of view long term preservation planning is not prioritized enough, according to the informant.

The main focus when it comes to retrievability of conservation information is to enable access to the records of a single object to inform decisions when retreating the object. The most common search path is via the name of the conservator or by the single museum object. This is in line with the result of the survey. Situations occur when search across records are used, for example to access all the treatment records for the objects exhibited in a specific exhibition. Since searching in detail in records previously was not possible, the new module might enable retrieval from on a more detailed level. Previously the problem has been that one could not fully trust that all the relevant information was retrieved when searching across records. In MuseumPlus searchable codes for condition was recorded that now has been migrated to the conservation module. In Adlib more aspects can now be recorded and mirrored in the conservation module, by zoom-screens and retrievability is possible to achieve in related information. At this point what information is of relevance for retrieval has to be defined.

When it comes to the use of technologies like linked open data or using an ontology for the purpose of enabling information retrieval across institutions for research purposes, SHM are taking steps towards implementing linked open data for the terminology used in Adlib as well as information integration towards external platforms such as Europeana and K-samsök. Being a state agency the information recorded is available for research in line with the principle of public access, except for classified information.

4. Discussion and conclusion

In the process of exploring the problem of retrievability and use of information in conservation records important aspects has surfaced. This chapter aims to connect the dots and discuss the issue from a range of viewpoints.

4.1 Discussion

4.1.1 Process perspective

The survey shows clearly that there is fragmentation in conservation documentation in Swedish museums. Records are integrated in the museum collection database but often also documented in parallel databases or systems. A few of the respondents testified they are currently changing systems used, by migrating information or developing modules for conservation documentation. The interview highlighted the digital development of the LSH and the current situation for the conservation module at SHM. It proves the point that working with an information system is not a simple static task but an ongoing one, meaning systems need to be updated, adjusted to fit new needs, changed for new systems or merged with other systems. This highlights the advantage of ensuring metadata quality and using persistent identifiers as advised by Digisam (2014) since it might prevent disassociation as systems evolve.

The process perspective on conservation documentation is evident in the Swedish standard *Conservation of Cultural heritage* (SS-EN 16853:2017), in SPECTRUM 5.0 as well as exemplified by Glasemann and Franzon (2017). The organization of documentation around events is part of this process perspective and can enable temporal aspects to be more thoroughly recorded which is one advantage of using the ontology CIDOC CRM (Velios and Pickwoad 2019). The ontology can be expanded to include relationships for new functions and categories needed, combining information stability with room for development and change (Bruseker et al., 2017).

4.1.2 User perspective

Responses on the percentage dedicated to documentation varied between 5 and 80% (averaging to 22%). The large distribution of percentages shows that documentation is not valued the same way by different professionals in different museums. Time dedicated to documentation is an important aspect. The level of detail in the documentation has to be weighed against how much time can be spent on the task. Documentation is an invaluable part of a conservator's work. The interview highlighted that the conservators see documentation as an important tool, mainly to inform re-treatment of objects but also for preventive conservation. Information in conservation records should also inform the work of other professionals for the purpose of handling, art historical investigation, for loans and exhibition planning etc.

SHM is in a process of mainly getting the operability of information to function after the merge of the six institutions, to migrate and streamline information and to make the user level work by adjusting the module and agree on shared routines for documentation. Similar to the process at Nationalmuseum described by Franzon and Glasemann (2017) this highlights that the user perspective is of key importance. Reaching a consistency in recording of records is valued at SHM, achieving consistency will enable retrievability. The benefit of using a schema and

controlled vocabulary is to streamline information and prevent parallel individual recording practices.

The habit of recording minor conservation measures in the conservation module fields and at the same time storing more detailed reports as attached files was pointed out by respondent 12 in the survey. This is a clear example of fragmentation of information that affects what information can be quantified and indicate a strict template obstructing recording of detailed information. Ensuring the usefulness of a tool is the best way to enable quality and secure documentation practices. Seeing the potential use of the data recorded for conservators and other professionals both at the institution level as well as at sector level will motivate performing the task and conforming to standards (Golfomitsou et al., 2017; Lindsay, 2018).

4.1.3 Structure

The survey revealed that mainly free text is used from the 6 categories of information types included in the survey question. Controlled vocabulary was most common in condition rating, as this section is often built up by a set scale of 3-5 categories or values and easier to implement as a controlled list. According to the survey results, using Word MS to document in combination with integrated recording in fields of the database were the most common methods used to record information. The method chosen probably depends on what type of documentation and what extent of information recorded.

The samples of conservation modules reviewed all use a mix of structured and unstructured sections. Meaning some fields are structured using controlled vocabulary and some unstructured, using free text. Some information types can make use of a controlled vocabulary or list of predefined values, such as condition ratings or priority scale for treatment, object materials, methods and conservation materials, provided there is a thesaurus to use. Other more descriptive information types are harder to structure, such as justification, goals or treatment description. The methods of recording and methods for storing conservation documentation clearly indicate fragmentation. But it is not realistic to think that all fields can be entirely structured with drop down lists, since a minimalist perspective with a very strict schema may exclude important information and lead to parallel documentation practices. When retrieving a single record to retreat an object, the detailed information found in these free text fields might be crucial for decision-making. Text mining and information extraction of information in free text fields, cross disciplinary collaboration with information scientist can enable quantification of information and inform questions on justification and ethical consideration in conservation.

Recording information directly into the database in specific fields where controlled vocabulary or predefined values in the form of drop-down-list are used when applicable and free-text when not, the information would be less fragmented and easier to access and retrieve than when documents are attached as word or PDF-files to the database post or stored in servers. Using a schema and controlled vocabulary will ensure consistency in recorded information, preventing discrepancy in data input. A structured schema can enable obscuring fields containing sensitive and confidential information such as value or location when providing public access to the information in line with the principle of public access.

Structuring a conservation module according to the SPECTRUM standard is advisable, the main benefit being that following the processes will make sure that relevant information is documented in connection to activities carried out. It is a way of securing content and continuity of information recorded. A thesaurus like the ones from Getty vocabularies has URIs and can be implemented to work towards linked data inter-operability, this is something that Digisam (2014) recommend. SHM is working towards linked data for the thesaurus in Adlib.

4.1.4 Object-centred modules and preventive conservation

The main use of the information recorded at SHM at this point in time is to retrieve information on the treatment history of a single object in the situation of retreating an object. The preventive conservation information structure is under review. This is in line with Lindsay's (2018) point that the functionality of systems is mainly object-centred which affects the recording and retrieval of information on preventive measures.

The samples of conservation modules show that some preventive conservation functions have been built in. In MuseumPlus used by Nationalmuseum, rotation interval can be specified in a specific field, this is a preservation planning tool. FileMaker have a function where the monitoring of an object can be planned out. Using a condition rating scale or priority scale for treatment is common. Adlib has several fields in the conservation module that are structured and use controlled vocabulary and enable searches to generate an overview. But as has been commonly stated (see interview 3.3) there is not enough time dedicated to preservation planning.

The use of condition surveying integrated in the database was exemplified by Bylund-Melin and Franzon (2019) highlighting the advantages of being able to quantify the level of degradation of the objects surveyed to assess preventive and active conservation need. In addition, it enables monitoring and communicating with other members of staff such as those handling the objects during relocation. The 5 stages of crizzling by Koob (2006) was transferred to the 1-4 status scale in MuseumPlus, this is an example of adjusting to, instead of changing a schema. Conservators will adjust the schema to fit the information need. How condition survey data is quantified and used for collection management at Nationalmuseum was something Suenson-Taylor et al., (1999) envisioned.

4.1.5 Information types

Looking at Andersons model over information types, see appendix I, the most frequently recorded information types in Swedish museums belongs to categories *condition documentation*, *conservation documentation* and *technical documentation*. According to the survey result, information sections such as conservator's name, date, treatment description, material description, condition description, conservation materials used, treatment proposal and conservation methods used were frequently included or seen as obligatory. Looking at the samples from conservation modules, one can conclude that the more common information sections recurring is the name of conservator, date, time spent, priority and description of condition and treatment.

The commonality of recorded information types and sections indicates where the bigger quantity of information can be found for research or quantification purposes. The sample material and the survey show that some information sections are not being recorded frequently such as treatment goals and justification. The standard (SS-EN 16853:2017) clearly address the importance of documenting justification and the thoughts behind a decision made. This information may inform decision regarding future analysis and treatment and for monitoring the object. For research purposes the goal and justification sections may inform questions on ethics and the development of the profession over time.

The information type *environmental data* was not covered in the survey or interview. But the sample of the MuseumPlus module used by Nationalmuseum specifies recommendations for LUX-hours and climatic conditions as well as security and packing. This mirrors how the module was used during the storage relocation of the collection 2013-2018. The potential to use environmental data for quantification was brought up at the documentation conference held at Nationalmuseum in 2018. Andersson stated that environmental data can be hard to access and many museums lack the proper structure to quantify the information (Andersson, 2019, p 44). Environmental data could probably be organized as structured data and exported directly by the climate control system. Structured digital environmental data could provide a useful tool for museums when it comes to collection management and in-loans and to validate environmental factors for evidence-basing the practice. It would potentially enable research on objects stored in real-life conditions to be applied in a retrospective or prospective epidemiological study design.

Technical documentation such as photographs is generally linked to the database post. Analytical results have specific fields in TMS and MuseumPlus used by Gothenburg Art Museum and would probably be linked as a digital file in Adlib. This category of information can consist of many different formats such as images, graphs, tabular data etc. Disparate unstructured formats would benefit the structuring of an ontology, such as the draft of relations organising documentation of non-destructive testing in CIDOC-CRM (Kouis and Giannakopoulos, 2014). Accessing test result across institutions would potentially inform research as well as improve retrievability for museums and provide the possibility to compare results.

Anderson (2019) stated that conservation treatment reports are incomplete and hard to retrieve, and that a problem is a lack of standardized terminologies (Andersson, 2019, pp. 39-44). This statement refers to the situation in the Cultural Heritage sector at large. The survey indicated that reports in the Swedish museums could be retrieved. The indication was based on the object-centred construction of conservation modules and the fact that the survey results stated that the main method of accessing an old report was via object-id or the conservators name, categories that are also the most frequently recorded. The only exception being respondent 1 who replied that old reports could not be retrieved at all. The retrievability of documentation of preventive conservation measures is probably a bigger issue when it comes to the museums in Sweden.

4.1.6 Quantification and research

Time spent on conservation projects is important for resource management at a museum. The point that evaluating performance or resources solely based on number of objects treated is a

blunt tool for management planning - that risk being misleading rather than informative, came up in the interview. The critique of quantification relates to the complexity of measuring. Concepts such as quality or best practice are also important parameters to consider for management planning. However, enabling search across records is a powerful tool when it comes to planning collection management proactively and manage risks and distribute resources. In order to achieve cost efficiency this is a powerful tool. Quantifying treatments carried out may lay bare hidden patterns of priority of a specific material category over others and display that some objects are constantly being re-treated. Useful information to evaluate measures carried out and plan ahead. One problem mentioned by the informant was the inconsistency of recording, the consequence being that one could not be sure that a search generated all the relevant responses, this is a clear obstruction for retrievability for quantification as well as research.

Information in conservation records are not primarily recorded for research purposes, but mainly for object-centred retrieval and partly for preservation planning and collection management. Conservation documentation is not purely data collecting the way data is collected in a set experimental design. The level of subjectivity and inconsistency of information is greater. Both inconsistency of information and fragmentation is a factor that slow down the data mining process. Quality of evidence can be hard to prove for a retrospective study design within epidemiology. Standardisation of data entry could possibly enhance the consistency, quality and validity of data, as exemplified with the possible quantification of environmental data.

4.1.7 Intra- and inter-operability.

There is a gap between the reality of information management in museums and the need for consistency of information recorded and access to large quantities of data for research purposes. One should ask why inter-operability at the sector level would be relevant for the institution level? Where is the benefit? The potential benefit of research into methods and materials exposed to real-life factors as well as reviewing justification and decision-making practices would lead to developing and further evidence-basing of the profession.

The million-dollar question is on what level to unify or standardise information. The level of intra-operability of information that a museum strive for might be very different from the needs of the researcher. The report from The Public Art agency (2019) is an example of an inter-operability issue, when managing cultural heritage requires harmonizing several disparate systems harboured by different institutions and actors. Although, for museums in Sweden focus is to harmonise records within the organisation collection system to be able to retrieve information within the institution. Such as collection surveying, preservation planning, management planning and evaluation of resources. This might lead to a focus on controlled vocabularies and schemas within the database locally. For research methods that need big quantities of information, data access across institutions are a necessity. Technologies such as linked open data, semantic technologies and unification through an ontology is needed to enable retrieval.

At SHM focus lies on implementing the SPECTRUM standard, as Velios (2016) and Bruseker et al. (2017) both pointed out SPECTRUM does not regulate how data should be structured or stored. When solving the intra-operability at the institution level the inter-operability issues at the

sector level lies further ahead. The implementation of linked open data at the SHM indicate an institution moving towards establishing better inter-operability. The best way to implement the CIDOC-CRM would probably be to include it in the SPECTRUM standard.

4.2 Conclusion

Conservation records are increasingly digital in Swedish museums. But information is fragmented due to parallel recording and due to the different levels of structure of the data recorded and stored. Digital templates or modules both use structured fields with controlled vocabulary and free text fields and the documentation is mainly object-centred. Unstructured data stored as PDFs or word-files attached to the database post or stored in a server is hard to retrieve and quantify.

Making sure the schema used is well matched with the processes of documentation is key and the tasks at hand is the best way to ensure consistency of information and structure of data. Many of the museums use some form of controlled vocabulary or local terminology in some of the fields of the digital records. This points towards an increased standardisation of data input which will increase the retrievability and use of the information for quantification and research.

Using fields with both levels of structure makes sense, since all information types cannot be meaningfully recorded with controlled vocabulary. Structured fields will enable quantification, the most important one for preservation planning being the condition rating or priority scale for treatment need. For research purposes free text fields can be text mined, although information on justification and treatment goals seems not to be recorded frequently. Overall for the local level to ensure intra-operability within the museum the most important goal is to record all information integrated in the database and avoid attached files, to enable quantification.

The implementation of controlled vocabulary is key but a nationally standardised terminology for the relevant conservation terms in Swedish is needed. Conservation records can be used for quantification at the institution level and are being used to some extent. With more structured information quantification can be a powerful tool both for the conservator and/or collection manager for management planning of resources and preservation planning. But as with all measuring one needs also to be aware also of the qualitative aspects of conservation and that not all aspects are suitable to compare.

For research methods such as epidemiology and data mining the fragmented structure and inconsistent recording obstructs the use of records. For epidemiological studies conservation records can be used in retrospective studies to inform or complement other methods. But the use is limited due to the validity of the data, since epidemiological studies rely of a set experimental design. Data mining can be used provided there is a large enough set of data and would benefit from more structured data but is not restricted by structure. To provide access and effective extraction of data across institutions the answer is using semantic technologies such as national conservation terminology, linked open data and/or implementation of the formal ontology CIDOC CRM and its extensions. This would increase access despite local differences in schemas

and databases. There is a conflict of objectives separating the use of the information in conservation records for the institution level and the sector level. The institution level focus intra-operability to improve and enable use of information within the museum. For research purposes the inter-operability is an issue to access enough data.

The information found in conservation records is a resource. The research community and the museums would benefit from an enhanced ability to scale up information recorded by a less fragmented structure, more standardised data input and higher level of retrievability of information in records. Enabling quantification of information from conservation records will benefit management and preservation planning and lead to further evidence-basing of the profession by evaluating methods, materials and processes.

5. Summary

Documenting is an integral part of the conservators work and an ethical obligation stated in numerous charters, guidelines and standards. Documenting our work is the best way to help future conservators and heritage professionals understand both how we treated the object and why. Norms and justifications that seem self-evident today will be revised later and knowledge about conservation methods and materials evolve. The information recorded in museum databases are public records and is a resource for quantification and research.

This study addresses the retrievability and use of information from digital conservation records in Swedish museums to inform management and preservation planning and as a resource for research, specifically for research methods epidemiology and data mining. The aim of this study is to map out the information types and documentation methods in Swedish museum databases. And to explain how the structure and the quality of data entry enable or obstruct quantification and research.

Quantitative and qualitative methods have been applied in combination to triangulate the subject and provide answers to the research questions:

- How are conservation records structured in a museum context in Sweden?
- Can information from conservation records from museums be retrieved and used for research and quantification?
- Can conservation records be used as resource for research using epidemiology and data mining methods?

A survey distributed to conservators in Swedish museums aimed to map out methods of recording and storing conservation records as well as identify the type of information recorded. The categories of unstructured, semi-structured and structured data were applied to assess the level of structure and retrievability of the information recorded. Alissa Andersson's (2019) model of information types was used to frame what information could be found in records. An overview of relevant concepts and technologies was used to understand and frame retrieval and access. Samples from conservation modules in the databases of five museums were collected to provide insight on information types recurring and to compare the general structure. The interview with the informant from the National Historical Museums (SHM) provided insight into the conservator- and organisational perspective on the use of conservation records. A literature review was used to explore the potential use of conservation records for research methods epidemiology and data mining.

When connecting the dots it is clear that information in conservation records is fragmented due to parallel recording and the level of structure of the data recorded and stored. Issues such as heterogeneity, inter- and intra-operability of information, object-centred systems and a lack of standardized terminology obstruct the potential use of records for quantification and research. Using controlled vocabulary when applicable and integrating data more into the database and

avoid attaching files would increase access and retrievability. Modules for conservation documentation tend to be object-centred and not always well adjusted to record preventive measures. The user perspective is key, using a schema and matching it to the requirements at hand is the best way to ensure consistency of information and structure of data. Information in conservation records are being quantified for management and conservation planning but can be further developed and would benefit from increased retrievability. Information in conservation records is not primarily recorded for research purposes but would have more consistency, quality and validity by standardisation of data input, the possible quantification of environmental data is one example.

There is a gap between the reality of information management in museums and the need for consistency of information recorded and access to large quantities of data for research purposes. The institution level focus mainly intra-operability but for research purposes the inter-operability is an issue. To achieve inter-operability the implementation of a nationally standardised terminology is needed the answer is using semantic technologies such as linked open data and/or implementation of the formal ontology CIDOC CRM.

Conservation records is a resource and both the institution level and the sector level would benefit from a less fragmented structure, more standardised data input and higher level of retrievability of information. Information from conservation records can inform management and preservation planning and enable further research to evidence-base the profession by evaluating methods, materials and processes.

List of references

- Anderson, A. (2019). *Riktlinjer för utvärdering av tidigare konserveringar; Guidelines for the evaluation of previous conservation treatments*. Master's thesis, the Department of conservation, Gothenburg University. Gothenburg
- Archer, D. (2016). Data Mining and Word Frequency Analysis In Gabriele Griffin & Matt Hayler *Research Methods for Reading Digital Data in the Digital Humanities*, Edinburgh University Press. pp. 72-92
- Baeza-Yates, R. & Ribeiro, B.de A.N. (2011). *Modern information retrieval: the concepts and technology behind search* 2. ed., Harlow: Addison-Wesley.
- Bannour, I. et al., (2018). CRMCR - a CIDOC-CRM extension for supporting semantic interoperability in the conservation and restoration domain. *2018 3rd Digital Heritage International Congress (DigitalHERITAGE) held jointly with 2018 24th International Conference on Virtual Systems & Multimedia (VSMM 2018)*, pp.1–8.
- Bhopal, R.S.(2008). *Concepts of epidemiology : integrating the ideas, theories, principles, and methods of epidemiology* 2nd ed., Oxford ; New York: Oxford University Press.
- Blake, T; Prescott, A. (2016). Dealing with Big Data In Gabriele Griffin & Matt Hayler *Research Methods for Reading Digital Data in the Digital Humanities*, Edinburgh University Press. pp. 184-208
- Bruseker, G; Carboni, N; Guillem, A. (2017). Cultural Heritage Data Management: The Role of Formal Ontology and CIDOC CRM. In Vincent, M.L., López-Menchero Bendicho, V.M., Ioannides, M., **Levy**, Th.E. (Eds.) *Heritage and archaeology in the digital age: acquisition, curation, and dissemination of spatial cultural heritage data*. New York. pp 93-132.
- Bylund Melin, C and Legnér, M. (2014). The relationship between heating energy and cumulative damage to painted wood in historic churches. *Journal Of The Institute Of Conservation*, 2014, Vol. 37, Iss. 2, pp. 94-109, 37(2), pp.94–109
- Bylund-Melin, C and Franzon, M. (2019). Classification of deteriorated glass objects in a collection management system. *Newsletter of the ICOM-CC Glass and Ceramics Working Group*, 2019, Iss. 27, pp.9-12
- Cannon, A. (2017). *Data Harvesting for art materials research: A case study using the Trove newspaper collection* [POSTER] ICOM-CC 18th Triennial Meeting Copenhagen, available at: <https://www.icom-cc-publications-online.org/PublicationDetail.aspx?cid=3d7c4da0-2027-4f5e-a681-bb3a49253197> [200514]
- Caple, C. (2012). *Conservation Skills: Judgement, Method and Decision Making*, Taylor and Francis.
- Danielsson, AL (ed). (2006). *Konservering av föremål och inventarier* (Dnr: 101-4709-2004) Riksantikvarieämbetet [PDF] Available at: https://www.raa.se/publicerat/rapp2006_2.pdf [200119]

- Digisam. (n.d.). *Checklista: metadatastatus* [PDF] Available at: http://www.digisam.se/wp-content/uploads/2015/06/Checklista_metadatastatus.pdf [2020-05-06]
- Digisam. (2015). *Vägledande principer för arbetet med digitala kulturarv* [PDF] Available at: http://www.digisam.se/images/docs/rapporter/Vagledande_principer_for_arbetet_med_digitala_kulturarv.pdf [2020-05-03]
- Druzik, J R., and Foekje, B. (2017). *Epidemiology: Basic Ideas Applied to Museum Collections: A Report from an Experts Meeting Organized by the Getty Conservation Institute, June 15-16, 2015*. Los Angeles: Getty Conservation Institute. Available at: http://hdl.handle.net/10020/gci_pubs/epidemiology. [200112]
- European Confederation of Conservator-Restorers' Organisations (E.C.C.O). (2002). *E.C.C.O. Professional Guidelines I* [PDF] Available at: <http://www.ecco-eu.org/documents/> [2020-02-18]
- Franzon, M; Glasemann, K. (2017). *Layers upon layers -Integrating an image-based tool for object condition documentation with a collections management system*. In ICOM-CC 18th Triennial Meeting Copenhagen Preprints, edited by J. Bridgland, article 0202. Paris: ICOM.
- Golfomitsou, S., F. Ravaioli, C. Tully, G. McArthur, and K. Lithgow. (2017). "Off the Record: Using Data Mining to Review Decision Making in Conservation Practice." In *ICOM-CC 18th Triennial Meeting Copenhagen Preprints*, edited by J. Bridgland, article 0202. Paris: ICOM.
- Han, J. & Kamber, M. (2001). *Data mining: concepts and techniques*, San Francisco, Calif.: Morgan Kaufmann.
- Harpring, P. (2018). Linking the Getty Vocabularies: The Content Perspective, Including an Update on CONA. *2018 Pacific Neighborhood Consortium Annual Conference and Joint Meetings (PNC)*, pp.1–8.
- Incorporated International Council on Monuments and Sites (ICOMOS). (1964). *The Venice charter* [PDF] Available at: https://www.icomos.org/charters/venice_e.pdf [2020-02-17]
- Institute of Conservation (ICON). (2014). *ICON Code of conduct* [PDF] Available at: https://icon.org.uk/system/files/documents/icon_code_of_conduct.pdf [2020-02-15]
- International Council of Museums (ICOM). (2007, 2019). *Museum definition* [Online] Available at: <https://icom.museum/en/resources/standards-guidelines/museum-definition/> [2020-04-05]
- Kouis, D. & Giannakopoulos, G. (2014). Incorporate Cultural Artifacts Conservation Documentation to Information Exchange Standards – The DOC-CULTURE Case. *Procedia - Social and Behavioral Sciences*, 147(C), pp.495–504.
- Linked Conservation data. (2019). *Introductory webinar: Why Linked Data?* [Webinar] Available at: <https://www.ligatus.org.uk/lcd/meeting/webinar-1> [200410]

- Lindsay, H. (2018). Evidencing the Case for Preventive Conservation: the Role of Collections Care Documentation. *Studies in Conservation: IIC 2018 Turin Congress preprints*, 63(1), pp.175–180.
- Mayer-Schönberger, V; Cukier, K. (2013). *Big data: a revolution that will transform how we live, work, and think*, Boston, Mass.: Eamon Dolan/Houghton Mifflin Harcourt.
- Papaioannou, G. (2018). *Documenting and data mining museum big data* [POSTER] CIDOC conference, 2018 Heraklion, Crete Available at: http://network.icom.museum/fileadmin/user_upload/minisites/cidoc/images/CIDOC2018_paper_161.pdf [200515]
- Rusu, O et al. (2013). Converting unstructured and semi-structured data into knowledge. *2013 11th RoEduNet International Conference*, pp.1–4.
- Ryen, A. & Torhell, S.-E. (2004). *Kvalitativ intervju : från vetenskapsteori till fältstudier* 1. eds., Riksantikvarieämbetet (2019) *SPECTRUM 5.0: Standard för samlingsförvaltning på museer* [PDF] Available at: <http://raa.diva-portal.org/smash/record.jsf?pid=diva2%3A1412226&dswid=-4818> [200415]
- SFS 1949:105. *Tryckfrihetsförordningen*. Stockholm: Justitiedepartementet
- Statens konstråd. (2019). *Slutrapport- Byggnadsanknuten offentlig konst* (Dnr 1.1.1/2018:87) [PDF] Accessed at: https://statenskonstrad.se/app/uploads/2019/06/Slutrapport-Byggnadsanknuten-offentlig-konst_mindre.pdf [20200110]
- Suenson-Taylor, K., Sully, D. och Orton, C. (1999). Data in Conservation: The Missing Link in the Process. *Studies in Conservation*, Vol. 44, No. 3 (1999), pp. 184-194.
- Sveriges Museer. (2018) Visitor statistics available at: <https://www.sverigemuseer.se/besokstabell-2018/> [200215]
- Swedish Standards Institute (2017) *SS-EN 16853:2017 Conservation of cultural heritage – Conservation process- Decision making, planning and implementation*
- Taylor, J. & Stevenson, S., 1999. Investigation Subjectivity within Collection Condition Surveys. *Museum Management and Curatorship*, 18(1), pp.19–42.
- Trost, J. och Hultåker, O. 2016. *Enkätboken*. Lund: Studentlitteratur.
- Velios, A. (2014). Beyond databases: Linked open data for bookbinding descriptions Proceedings *Men and Books*, Austria, St Pölten
- Velios, A. (2016). "Online event-based conservation documentation: A case study from the IIC website". *Studies in Conservation*, 61(1), pp.13–25.

Velios, A; Pickwood, N. (2019). “Versioning materiality. Documenting Evidence of Past Binding Structures”. In Bleier, R and Winslow, SM (eds) *Versioning cultural objects: Digital approaches* pp. 103-126

Waller, R and Cato, P., (n.d.) Canadian Conservation Institute (CCI) *10 Agents of deterioration*, [Online] Available at: <https://www.canada.ca/en/conservation-institute/services/agents-deterioration/dissociation.html> [2020-04-02]

Wang, J. (2005). *Encyclopedia of Data Warehousing and Mining*,

Interview informant:

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Appendix I

Informationstyp	Exempel på dokumenttyp
Mätningar av miljöfaktorer	<ul style="list-style-type: none"> • Tabell eller graf med uppmätt temperatur och relativ luftfuktighet • Tabell med uppmätt antal luxtimmar • Rapport av luftkvalitetmätning från insidan av montrar • Karta över lokaler med zoner för estimerad risk för skadedjursangrepp
Teknisk dokumentation	<p>Ingår ofta i olika typer av rapporter och planer men kan också utgöras av egna dokument.</p> <ul style="list-style-type: none"> • Fotografier • Analysresultat • Textbeskrivningar • Karteringar
Tillståndsdokumentation	<ul style="list-style-type: none"> • Notering av en enkel kontroll av det aktuella tillståndet • Tillståndsrapport • Gemensam tillståndsrapport för flera objekt • Rapport av en samlingsöversyn
Konserveringsplanering	<ul style="list-style-type: none"> • VoU-plan • Åtgärdsprogram • Åtgärdsförslag • Förvaltningsplan • Förundersökningsrapport
Konserverings-dokumentation	<ul style="list-style-type: none"> • Åtgärdshistorik i objektposter i databaser • Konserveringsrapporter • Äldre fotografier
Övrig bevaranderelaterad dokumentation	<ul style="list-style-type: none"> • Nyförvärvsdokumentation • Packprotokoll • Transporthistorik • Försäkringsärenden
<p>Tabell 2. Olika typer av information som kan vara relevant vid utvärderingar av tidigare konserveringar och exempel på vilka slags dokument den kan utgöras av.</p>	

Chart by Alissa Andersson, 2019, *Guidelines for the evaluation of previous conservation treatments* p. 39.

Appendix II: Cover letter

Hej

Mitt namn är Maria Norefors och jag skriver just nu min C-uppsats om konserveringsdokumentation och dess tillgänglighet och användbarhet för forskning.

Därför undrar jag om du har möjlighet att bidra med information genom att svara på en enkät? Enkäten består av 10 frågor som tar ca 10 minuter att fylla i.

Enkäten syftar till att kartlägga hur konserveringsdokumentation produceras, lagras och hur sökbar den är i databaser på svenska museer. Med konserveringsdokumentation syftar jag på information som registreras inför och i samband med konserveringsåtgärder, både aktiva och preventiva samt tillståndsbedömningar.

Materialet kommer analyseras statistiskt för att generera en överblick av hur konserveringsdokumentationen är strukturerad och hur sökbar den är. Enkätsvaren kommer att hanteras konfidentiellt och du som informant har rätt att vara anonym.

Om du har frågor eller vill bidra med mer information kring konserveringsdokumentation på ditt museum, så hör gärna av dig till mig! Skärmbilder på dokumentationsfält eller mallar som används i din verksamhet tas tacksamt emot.

Mejl: gusenopema@student.gu.se

Telefon: 076-0642448

Appendix III: Survey questions

1. Jag arbetar inom/vid:

- Centralt museum
- Regionalt museum
- Kommunalt museum
- Annat _____

2. Vilken databas/databaser används i din verksamhet?

3. Vilka delar ingår vanligtvis i konserveringsdokumentation i din verksamhet?

- namn på utförande konservator
- datum för inspektion/rapport
- tidsåtgång för konservering
- materialbeskrivning
- tillståndsbeskrivning
- åtgärdsförslag
- åtgärdsbeskrivning
- prioriteringsskala
- konserveringsmaterial som använts
- konserveringsmetod som använts
- legitimering av beslut
- mål med konserveringen

4. Hur skapas konserveringsdokumentation i nuläget?

Du kan välja flera alternativ.

- I ett wordprogram
- D-inspector
- Horus

- Articheck
- KD-tools
- Direkt i mall/fält i databas
- Annat _____

5. Hur sparas/lagras konserveringsdokumentation i nuläget?

Du kan välja flera alternativ.

- Databas, information integrerad i fält
- Som pdf- fil länkad till databaspost
- Som word- fil länkad till databaspost
- Som word fil i server
- Som PDF fil i server
- I excel
- Som utskrift på papper i ett arkiv
- Annat: _____

6. När används kontrollerad vokabulär utifrån en tesaurus i konserveringsdokumentation?

Med kontrollerad vokabulär menas fasta sökbara termer som kan väljas i en rullista

- För tillståndsbeskrivning
- För materialbeskrivning
- För åtgärdsbeskrivning
- För tillståndsgradering
- För konserveringsmaterial
- För konserveringsmetod

7. När används fritext i konserveringsdokumentation?

- För tillståndsbeskrivning
- För materialbeskrivning
- För åtgärdsbeskrivning
- För tillståndsgradering
- För konserveringsmaterial
- För konserveringsmetod

8. Via vilka sökvägar kan du i nuläget söka fram en befintlig rapport i databasen?

- Via objekt-id eller objektnummer

- Via projekt-id
- Via plats/placering
- Via byggnad
- Via konstnär/upphovsperson
- Via utförande konservator
- Via beställare
- Via materialkategori
- Via prioriteringsskala
- Via konserveringsmetod
- Via konserveringsmaterial
- Annat _____

9. Sparar du en kopia av dina egna konserveringsrapporter i ett privat arkiv?

- ja, alltid
- ofta, men inte alltid
- ibland
- sällan
- nej, aldrig

10. Hur stor del av din arbetstid går till dokumentation av konserveringsdata i form av konserveringsrapporter, tillståndsrapporter, samlingsöversyner, vård- och underhållsplaner, klimatdata och dylikt?

Ange i procent _____

Stort tack för din medverkan!

Appendix IV: Survey answers

1

Status	Submitted
Date	2020-03-19 10:05:46
FirstName	
LastName	
Email	
CustomKey	
1. Jag arbetar vid ett	Stiftelse Regionalt museum
2. Vilken databas/databaser används i din verksamhet?	Carlotta
3. Vilka delar ingår vanligtvis i konserveringsdokumentation i din verksamhet?	
4. Hur skapas konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	Vi utför i väldigt liten utsträckning praktiska konserveringsåtgärder utan jobbar främst preventivt. Vi håller på att utveckla en "bevara"-flik i Carlotta i vilken vi kan föra in konserveringsåtgärder/rapporter i ett wordprogram
5. Hur sparas/lagras konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	Som word-fili server
6. När används kontrollerad vokabulär utifrån en tesaurs i konserveringsdokumentation? Med kontrollerad vokabulär menas fasta sökbara termer som kan väljas i en rullista.	
7. När används fritext i konserveringsdokumentation?	För tillståndsbeskrivning För materialbeskrivning För åtgärdsbeskrivning För konserveringsmaterial För konserveringsmetod För tillståndsgradering
8. Via vilka sökvägar kan du i nuläget söka fram en befintlig rapport i databasen?	inte alls.
9. Sparar du en kopia av dina egna konserveringsrapporter i ett privat arkiv?	Ja, alltid
10. Hur stor del av din arbetstid går till dokumentation av konserveringsdata i form av konserveringsrapporter, tillståndsrapporter, samlingsöversyner, vård- och underhållsplaner, klimatdata och dylikt? Svara i procent.	5

2

Status	Submitted
Date	2020-03-20 07:25:54
FirstName	
LastName	
Email	
CustomKey	
1. Jag arbetar vid ett	Regionalt museum
2. Vilken databas/databaser används i din verksamhet?	Primus, access, excell,
3. Vilka delar ingår vanligtvis i konserveringsdokumentation i din verksamhet?	Namn på utförande konservator Datum för inspektion/rapport Materialbeskrivning Tillståndsbeskrivning Kartering Åtgärds som använts Konserveringsmetod som använts Mål med konserveringen
4. Hur skapas konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	I ett wordprogram
5. Hur sparas/lagras konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	som utskrift på papper i pärm på kontoret Som PDF-fil länkad till databaspost Som utskrift på papper i arkiv
6. När används kontrollerad vokabulär utifrån en tesaurus i konserveringsdokumentation? Med kontrollerad vokabulär menas fasta sökbara termer som kan väljas i en rullista.	
7. När används fritext i konserveringsdokumentation?	För tillståndsbeskrivning För materialbeskrivning För åtgärdsbeskrivning För konserveringsmaterial För konserveringsmetod För tillståndsgradering
8. Via vilka sökvägar kan du i nuläget söka fram en befintlig rapport i databasen?	Via objekt-id eller objektnummer
9. Sparar du en kopia av dina egna konserveringsrapporter i ett privat arkiv?	Ja, alltid
10. Hur stor del av din arbetstid går till dokumentation av konserveringsdata i form av konserveringsrapporter, tillståndsrapporter, samlingsöversyner, vård- och underhållsplaner, klimatdata och dylikt? Svara i procent.	20

3

Status	Submitted
Date	2020-03-19 10:13:03
FirstName	
LastName	
Email	
CustomKey	
1. Jag arbetar vid ett	Kommunalt museum
2. Vilken databas/databaser används i din verksamhet?	MuseumPlus
3. Vilka delar ingår vanligtvis i konserveringsdokumentation i din verksamhet?	Namn på utförande konservator Datum för inspektion/rapport Tidsåtgång för konservering Materialbeskrivning Tillståndsbeskrivning Åtgärdsbeskrivning Konserveringsmetod som använts Legitimering av beslut
4. Hur skapas konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	I ett wordprogram
5. Hur sparas/lagras konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	Databas, information integrerad i fält Som PDF-fil länkad till databaspost Som word-fil i server Som utskrift på papper i arkiv
6. När används kontrollerad vokabulär utifrån en tesaurus i konserveringsdokumentation? Med kontrollerad vokabulär menas fasta sökbara termer som kan väljas i en rullista.	
7. När används fritext i konserveringsdokumentation?	För tillståndsbeskrivning För materialbeskrivning För åtgärdsbeskrivning För konserveringsmaterial För konserveringsmetod
8. Via vilka sökvägar kan du i nuläget söka fram en befintlig rapport i databasen?	Via objekt-id eller objektnummer Via utförande konservator Via materialkategori Via konserveringsmaterial
9. Sparar du en kopia av dina egna konserveringsrapporter i ett privat arkiv?	Nej, aldrig
10. Hur stor del av din arbetstid går till dokumentation av konserveringsdata i form av konserveringsrapporter, tillståndsrapporter, samlingsöversyner, vård- och underhållsplaner, klimatdata och dylikt? Svara i procent.	5

4

Status	Submitted
Date	2020-03-19 10:35:32
FirstName	
LastName	
Email	
CustomKey	
1. Jag arbetar vid ett	Kommunalt museum
2. Vilken databas/databaser används i din verksamhet?	Museum plus - Ria
3. Vilka delar ingår vanligtvis i konserveringsdokumentation i din verksamhet?	Namn på utförande konservator Datum för inspektion/rapport Materialbeskrivning Tillståndsbeskrivning Analysresultat Åtgärdsom använts Konserveringsmetod som använts Legitimering av beslut
4. Hur skapas konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	I ett wordprogram Direkt i mall/fält i databas
5. Hur sparas/lagras konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	Databas, information integrerad i fält
6. När används kontrollerad vokabulär utifrån en tesaurus i konserveringsdokumentation? Med kontrollerad vokabulär menas fasta sökbara termer som kan väljas i en rullista.	För materialbeskrivning För tillståndsgradering
7. När används fritext i konserveringsdokumentation?	För tillståndsbeskrivning För åtgärdsbeskrivning För konserveringsmaterial För konserveringsmetod För tillståndsgradering
8. Via vilka sökvägar kan du i nuläget söka fram en befintlig rapport i databasen?	Via objekt-id eller objektnummer Via utförande konservator
9. Sparar du en kopia av dina egna konserveringsrapporter i ett privat arkiv?	Nej, aldrig
10. Hur stor del av din arbetstid går till dokumentation av konserveringsdata i form av konserveringsrapporter, tillståndsrapporter, samlingsöversyner, vård- och underhållsplaner, klimatdata och dylikt? Svara i procent.	25

5

Status	Submitted
Date	2020-03-19 10:34:54
FirstName	
LastName	
Email	
CustomKey	
1. Jag arbetar vid ett	Länsmuseum
2. Vilken databas/databaser används i din verksamhet?	Primus, web och win. Sofie används fortfarande i den arkeologiska verksamheten men överföring till Primus pågår.
3. Vilka delar ingår vanligtvis i konserveringsdokumentation i din verksamhet?	Namn på utförande konservator Datum för inspektion/rapport Tidsåtgång för konservering Materialbeskrivning Tillståndsbeskrivning Åtgärdsförslag Åtgärdsom använts Mål med konserveringen
4. Hur skapas konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	I ett wordprogram Direkt i mall/fält i databas
5. Hur sparas/lagras konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	Databas, information integrerad i fält Som PDF-fil länkad till databaspost Som utskrift på papper i arkiv
6. När används kontrollerad vokabulär utifrån en tesaurus i konserveringsdokumentation? Med kontrollerad vokabulär menas fasta sökbara termer som kan väljas i en rullista.	För tillståndsbeskrivning För tillståndsgradering
7. När används fritext i konserveringsdokumentation?	För tillståndsbeskrivning För materialbeskrivning För åtgärdsbeskrivning För konserveringsmaterial
8. Via vilka sökvägar kan du i nuläget söka fram en befintlig rapport i databasen?	Via objekt-id eller objektnummer Via utförande konservator
9. Sparar du en kopia av dina egna konserveringsrapporter i ett privat arkiv?	Sällan
10. Hur stor del av din arbetstid går till dokumentation av konserveringsdata i form av konserveringsrapporter, tillståndsrapporter, samlingsöversyner, vård- och underhållsplaner, klimatdata och dylikt? Svara i procent.	5

6

Status	Submitted
Date	2020-03-19 12:54:57
FirstName	
LastName	
Email	
CustomKey	
1. Jag arbetar vid ett	Regionalt museum
2. Vilken databas/databaser används i din verksamhet?	Sofie
3. Vilka delar ingår vanligtvis i konserveringsdokumentation i din verksamhet?	Namn på utförande konservator Datum för inspektion/rapport Materialbeskrivning Tillståndsbeskrivning Kartering Analysn som använts Konserveringsmetod som använts Legitimering av beslut Mål med konserveringen
4. Hur skapas konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	I ett wordprogram Direkt i mall/fält i databas
5. Hur sparas/lagras konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	Databas, information integrerad i fält Som PDF-fil länkad till databaspost Som PDF-fil i server
6. När används kontrollerad vokabulär utifrån en tesaurus i konserveringsdokumentation? Med kontrollerad vokabulär menas fasta sökbara termer som kan väljas i en rullista.	För tillståndsgradering
7. När används fritext i konserveringsdokumentation?	För tillståndsbeskrivning För materialbeskrivning För åtgärdsbeskrivning För konserveringsmaterial För konserveringsmetod
8. Via vilka sökvägar kan du i nuläget söka fram en befintlig rapport i databasen?	Via objekt-id eller objektnummer Via plats/placering Via konstnär/upphovsperson Via utförande konservator Via prioriteringsskala
9. Sparar du en kopia av dina egna konserveringsrapporter i ett privat arkiv?	Sällan
10. Hur stor del av din arbetstid går till dokumentation av konserveringsdata i form av konserveringsrapporter, tillståndsrapporter, samlingsöversyner, vård- och underhållsplaner, klimatdata och dylikt? Svara i procent.	10

7

Status	Submitted
Date	2020-03-19 13:22:29
FirstName	
LastName	
Email	
CustomKey	
1. Jag arbetar vid ett	Regionalt museum
2. Vilken databas/databaser används i din verksamhet?	Samlingar använder Primus, jag använder dock inte den för konservering. Konservering använder word, excel dokument samt access för vissa föremål. På frågan nedan (fråga 3): svaret beror på vilken typ av konserveringsdokumentation du avser. Vi skriver ofta både åtgärdsprogram, konserveringsrapporter mm olika beroende på beställaren.
3. Vilka delar ingår vanligtvis i konserveringsdokumentation i din verksamhet?	Namn på utförande konservator Datum för inspektion/rapport Tidsåtgång för konservering Materialbeskrivning Tillståndsbeskrivning Åtgärdsförslag Åtgärdsb som använts Konserveringsmetod som använts Legitimering av beslut Mål med konserveringen
4. Hur skapas konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	I ett wordprogram Direkt i mall/fält i databas
5. Hur sparas/lagras konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	Databas, information integrerad i fält Som PDF-fil i server Som word-fil i server
6. När används kontrollerad vokabulär utifrån en tesaurus i konserveringsdokumentation? Med kontrollerad vokabulär menas fasta sökbara termer som kan väljas i en rullista.	För tillståndsbeskrivning För materialbeskrivning För åtgärdsbeskrivning För konserveringsmaterial För konserveringsmetod För tillståndsgradering
7. När används fritext i konserveringsdokumentation?	För tillståndsbeskrivning För materialbeskrivning För åtgärdsbeskrivning För konserveringsmaterial För konserveringsmetod För tillståndsgradering
8. Via vilka sökvägar kan du i nuläget söka fram en befintlig rapport i databasen?	Svårt att svara på då vi använder olika system.
9. Sparar du en kopia av dina egna konserveringsrapporter i ett privat arkiv?	Nej, aldrig
10. Hur stor del av din arbetstid går till dokumentation av konserveringsdata i form av konserveringsrapporter, tillståndsrapporter, samlingsöversyner, vård- och underhållsplaner, klimatdata och dylikt? Svara i procent.	

8

Status	Submitted
Date	2020-03-20 15:22:16
FirstName	
LastName	
Email	
CustomKey	
1. Jag arbetar vid ett	Kommunalt museum
2. Vilken databas/databaser används i din verksamhet?	Museumplus
3. Vilka delar ingår vanligtvis i konserveringsdokumentation i din verksamhet?	Namn på utförande konservator Datum för inspektion/rapport Materialbeskrivning Tillståndsbeskrivning Kartering Åtgärdsfö som använts
4. Hur skapas konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	D-Inspector
5. Hur sparas/lagras konserveringsdokumentation i nuläget? I vilka flera alternativ.	Databas, information integrerad i fält Som PDF-fil länkad till
6. När används kontrollerad vokabulär utifrån en tesaurus i konserveringsdokumentation? Med kontrollerad vokabulär menas fasta sökbara termer som kan väljas i en rullista.	
7. När används fritext i konserveringsdokumentation?	För tillståndsbeskrivning För materialbeskrivning För åtgärdsbeskrivning För konserveringsmaterial För konserveringsmetod För tillståndsgradering
8. Via vilka sökvägar kan du i nuläget söka fram en befintlig rapport i databasen?	Via objekt-id eller objektnummer
9. Sparar du en kopia av dina egna konserveringsrapporter i ett privat arkiv?	Ja, alltid
10. Hur stor del av din arbetstid går till dokumentation av konserveringsdata i form av konserveringsrapporter, tillståndsrapporter, samlingsöversyner, vård- och underhållsplaner, klimatdata och dylikt? Svara i procent.	80

9

Status	Submitted
Date	2020-03-22 18:14:41
FirstName	
LastName	
Email	
CustomKey	
1. Jag arbetar vid ett	Regionalt museum
2. Vilken databas/databaser används i din verksamhet?	Primus (Digitalt museum)
3. Vilka delar ingår vanligtvis i konserveringsdokumentation i din verksamhet?	Namn på utförande konservator Datum för inspektion/rapport Materialbeskrivning Tillståndsbeskrivning Kartering Analysre: som använts Konserveringsmetod som använts Legitimering av beslut Mål med konserveringen
4. Hur skapas konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	InDesign
5. Hur sparas/lagras konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	Som PDF-fil i server Som word-fili server Som utskrift på papper i arkiv
6. När används kontrollerad vokabulär utifrån en tesaurus i konserveringsdokumentation? Med kontrollerad vokabulär menas fasta sökbara termer som kan väljas i en rullista.	
7. När används fritext i konserveringsdokumentation?	För tillståndsbeskrivning För åtgärdsbeskrivning För konserveringsmetod För tillståndsgradering
8. Via vilka sökvägar kan du i nuläget söka fram en befintlig rapport i databasen?	
9. Sparar du en kopia av dina egna konserveringsrapporter i ett privat arkiv?	Ja, alltid
10. Hur stor del av din arbetstid går till dokumentation av konserveringsdata i form av konserveringsrapporter, tillståndsrapporter, samlingsöversyner, vård- och underhållsplaner, klimatdata och dylikt? Svara i procent.	25

10

Status	Submitted
Date	2020-03-30 09:20:52
FirstName	
LastName	
Email	
CustomKey	
1. Jag arbetar vid ett	Centralmuseum
2. Vilken databas/databaser används i din verksamhet?	Adlib. Den är under utarbetande så vår modul för konserverings- och tillståndsrapporter är ej klar men svarar utifrån det jag vet och hur vi pratat. Dock kanske det inte kommer stämma med slutresultatet.
3. Vilka delar ingår vanligtvis i konserveringsdokumentation i din verksamhet?	Namn på utförande konservator Datum för inspektion/rapport Tidsåtgång för konservering Materialbeskrivning Tillståndsbeskrivning Analyseresultat Åtgärdsföreläggelse Material som använts Konserveringsmetod som använts Mål med konserveringen
4. Hur skapas konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	Bilder som kopplas till databasen Direkt i mall/fält i databas
5. Hur sparas/lagras konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	Databas, information integrerad i fält
6. När används kontrollerad vokabulär utifrån en tesaurus i konserveringsdokumentation? Med kontrollerad vokabulär menas fasta sökbara termer som kan väljas i en rullista.	För materialbeskrivning För konserveringsmetod För tillståndsgradering
7. När används fritext i konserveringsdokumentation?	För tillståndsbeskrivning För åtgärdsbeskrivning För konserveringsmaterial För konserveringsmetod
8. Via vilka sökvägar kan du i nuläget söka fram en befintlig rapport i databasen?	Via objekt-id eller objektnummer Via projekt-id Via utförande konservator
9. Sparar du en kopia av dina egna konserveringsrapporter i ett privat arkiv?	Sällan
10. Hur stor del av din arbetstid går till dokumentation av konserveringsdata i form av konserveringsrapporter, tillståndsrapporter, samlingsöversyner, vård- och underhållsplaner, klimatdata och dylikt? Svara i procent.	15

11

Status	Submitted
Date	2020-03-25 09:43:55
FirstName	
LastName	
Email	
CustomKey	
1. Jag arbetar vid ett	Universitetsmuseum
2. Vilken databas/databaser används i din verksamhet?	FileMaker Pro
3. Vilka delar ingår vanligtvis i konserveringsdokumentation i din verksamhet?	Namn på utförande konservator Datum för inspektion/rapport Materialbeskrivning Tillståndsbeskrivning Åtgärdsföreläggelse Material som använts Konserveringsmetod som använts
4. Hur skapas konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	Direkt i mall/fält i databas
5. Hur sparas/lagras konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	Databas, information integrerad i fält Som utskrift på papper i arkiv
6. När används kontrollerad vokabulär utifrån en tesaurus i konserveringsdokumentation? Med kontrollerad vokabulär menas fasta sökbara termer som kan väljas i en rullista.	
7. När används fritext i konserveringsdokumentation?	För tillståndsbeskrivning För materialbeskrivning För åtgärdsbeskrivning För konserveringsmaterial För konserveringsmetod För tillståndsgradering
8. Via vilka sökvägar kan du i nuläget söka fram en befintlig rapport i databasen?	Via objekt-id eller objektnummer Via projekt-id Via plats/placering Via byggnad Via konstnär/upphovsperson Via utförande konservator Via konserveringsmaterial
9. Sparar du en kopia av dina egna konserveringsrapporter i ett privat arkiv?	Nej, aldrig
10. Hur stor del av din arbetstid går till dokumentation av konserveringsdata i form av konserveringsrapporter, tillståndsrapporter, samlingsöversyner, vård- och underhållsplaner, klimatdata och dylikt? Svara i procent.	

12

Status	Submitted
Date	2020-03-27 09:03:21
FirstName	
LastName	
Email	
CustomKey	
1. Jag arbetar vid ett	Kommunalt museum
2. Vilken databas/databaser används i din verksamhet?	Carlotta
3. Vilka delar ingår vanligtvis i konserveringsdokumentation i din verksamhet?	Namn på utförande konservator Datum för inspektion/rapport Materialbeskrivning Tillståndsbeskrivning Åtgärdsbeskrivning som använts Konserveringsmetod som använts Legitimering av beslut Mål med konserveringen
4. Hur skapas konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	Dokumentationen beror på hur omfattande konserveringsåtgärden är. Mindre åtgärder antecknas direkt i ett konserveringsfält i databasen. Vid mer omfattande konservering görs en separat rapport i word som länkas som en pdf till databasen. I ett wordprogram Direkt i mall/fält i databas
5. Hur sparas/lagras konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	Databas, information integrerad i fält Som PDF-fil länkad till databaspost Som word-fil i server Som utskrift på papper i arkiv
6. När används kontrollerad vokabulär utifrån en tesaurus i konserveringsdokumentation? Med kontrollerad vokabulär menas fasta sökbara termer som kan väljas i en rullista.	För tillståndsgradering
7. När används fritext i konserveringsdokumentation?	För tillståndsbeskrivning För materialbeskrivning För åtgärdsbeskrivning För konserveringsmaterial För konserveringsmetod För tillståndsgradering
8. Via vilka sökvägar kan du i nuläget söka fram en befintlig rapport i databasen?	Offa söker jag på konserveringsrapport och datum Via objekt-id eller objektnummer Via utförande konservator Via materialkategori
9. Sparar du en kopia av dina egna konserveringsrapporter i ett privat arkiv?	Ibland
10. Hur stor del av din arbetstid går till dokumentation av konserveringsdata i form av konserveringsrapporter, tillståndsrapporter, samlingsöversyner, vård- och underhållsplaner, klimatdata och dylikt? Svara i procent.	5

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Status	Submitted
Date	2020-03-30 09:06:21
FirstName	
LastName	
Email	
CustomKey	
1. Jag arbetar vid ett	Kommunalt museum
2. Vilken databas/databaser används i din verksamhet?	MuseumPlus
3. Vilka delar ingår vanligtvis i konserveringsdokumentation i din verksamhet?	Namn på utförande konservator Datum för inspektion/rapport Materialbeskrivning Tillståndsbeskrivning Åtgärdsförslag Åtgärdsbeskrivning som använts Konserveringsmetod som använts
4. Hur skapas konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	I ett wordprogram
5. Hur sparas/lagras konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	Databas, information integrerad i fält
6. När används kontrollerad vokabulär utifrån en tesaurus i konserveringsdokumentation? Med kontrollerad vokabulär menas fasta sökbara termer som kan väljas i en rullista.	För tillståndsbeskrivning
7. När används fritext i konserveringsdokumentation?	För materialbeskrivning För åtgärdsbeskrivning För konserveringsmaterial För konserveringsmetod För tillståndsgradering
8. Via vilka sökvägar kan du i nuläget söka fram en befintlig rapport i databasen?	Via objekt-id eller objektnummer Via plats/placering
9. Sparar du en kopia av dina egna konserveringsrapporter i ett privat arkiv?	Ibland
10. Hur stor del av din arbetstid går till dokumentation av konserveringsdata i form av konserveringsrapporter, tillståndsrapporter, samlingsöversyner, vård- och underhållsplaner, klimatdata och dylikt? Svara i procent.	20

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Status	Submitted
Date	2020-03-31 07:00:57
FirstName	
LastName	
Email	
CustomKey	
1. Jag arbetar vid ett	Centralmuseum
2. Vilken databas/databaser används i din verksamhet?	MuseumPlus
3. Vilka delar ingår vanligtvis i konserveringsdokumentation i din verksamhet?	Namn på utförande konservator Datum för inspektion/rapport Tidsåtgång för konservering Materialbeskrivning Tillståndsbeskrivning Kartering Analysresultat som använts Konserveringsmetod som använts Legitimering av beslut Mål med konserveringen
4. Hur skapas konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	D-Inspector Direkt i mall/fält i databas
5. Hur sparas/lagras konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	Databas, information integrerad i fält Som PDF-fil länkad till databaspost Som word-fil länkad till databaspost Som PDF-fil i server Som word-fil i server Som utskrift på papper i arkiv
6. När används kontrollerad vokabulär utifrån en tesaurus i konserveringsdokumentation? Med kontrollerad vokabulär menas fasta sökbara termer som kan väljas i en rullista.	För tillståndsbeskrivning För materialbeskrivning För åtgärdsbeskrivning För konserveringsmaterial För konserveringsmetod För tillståndsgradering
7. När används fritext i konserveringsdokumentation?	För tillståndsbeskrivning För materialbeskrivning För åtgärdsbeskrivning För konserveringsmaterial För konserveringsmetod För tillståndsgradering
8. Via vilka sökvägar kan du i nuläget söka fram en befintlig rapport i databasen?	Via objekt-id eller objektnummer Via projekt-id Via utförande konservator
9. Sparar du en kopia av dina egna konserveringsrapporter i ett privat arkiv?	Ofta, men inte alltid
10. Hur stor del av din arbetstid går till dokumentation av konserveringsdata i form av konserveringsrapporter, tillståndsrapporter, samlingsöversyner, vård- och underhållsplaner, klimatdata och dylikt? Svara i procent.	40

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Status	Submitted
Date	2020-04-02 16:15:08
FirstName	
LastName	
Email	
CustomKey	
1. Jag arbetar vid ett	Specialmuseum + uppdrag
2. Vilken databas/databaser används i din verksamhet?	Carlotta
3. Vilka delar ingår vanligtvis i konserveringsdokumentation i din verksamhet?	Namn på utförande konservator Datum för inspektion/rapport Tidsåtgång för konservering Materialbeskrivning Tillståndsbeskrivning Analysresultat Åtgärdsfr som använts Konserveringsmetod som använts Mål med konserveringen
4. Hur skapas konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	I ett wordprogram Direkt i mall/fält i databas
5. Hur sparas/lagras konserveringsdokumentation i nuläget? Du kan välja flera alternativ.	Databas, information integrerad i fält Som PDF-fil länkad till databaspost Som PDF-fil i server
6. När används kontrollerad vokabulär utifrån en tesaurus i konserveringsdokumentation? Med kontrollerad vokabulär menas fasta sökbara termer som kan väljas i en rullista.	
7. När används fritext i konserveringsdokumentation?	För tillståndsbeskrivning För materialbeskrivning För åtgärdsbeskrivning För konserveringsmaterial För konserveringsmetod
8. Via vilka sökvägar kan du i nuläget söka fram en befintlig rapport i databasen?	Via objekt-id eller objektnummer Via projekt-id Via beställare
9. Sparar du en kopia av dina egna konserveringsrapporter i ett privat arkiv?	Nej, aldrig
10. Hur stor del av din arbetstid går till dokumentation av konserveringsdata i form av konserveringsrapporter, tillståndsrapporter, samlingsöversyner, vård- och underhållsplaner, klimatdata och dylikt? Svara i procent.	35

Appendix V: Interview questions

1. Firstly, this interview is not anonymous, it will be recorded and used as material in my bachelor essay, are you willing to participate under these conditions?
2. Would you like the opportunity to see the text before it goes to print?
3. Where in the process are your institution at the moment, when it comes to working on conservation documentation systems?
4. Do you use an integrated or separate conservation database?
5. Where there any limitations in the previous system used? If so, what have you learned from it?
6. When reconstructing your system/planning a new conservation documentation system – what has been the most important functions to achieve?
7. What are your thoughts on the documentation of preventive conservation?
8. How do you plan to use the documentation recorded?
9. What do you see as the potential use of conservation documentation?
10. What are your thoughts on retrievability?
11. What are your thoughts on controlled vocabulary?
12. What are your thoughts on technologies like linked open data and the ontology CIDOC-CRM

