The FAIR-est of them all: First steps towards digital preservation in Dutch museums

Razina, Viktoria

The FAIR-est of them all

First steps towards digital preservation in Dutch museums

Name: Viktória Ražina

Student number: s4072391

Email address:
v.razina@umail.leidenuniv.nl

First reader: Weixuan Li

Second reader: Arthur Crucq

MA Art & Culture: Museum studies

Faculty of Humanities

2023/2024

Table of Contents

Introduction

Cultural heritage is a well-known concept in the fields of art history and museology. However, its definition has undergone numerous revisions, particularly in recent decades, due to the increasing influence of digital technology and the widespread digitization in our contemporary era. This growing influence of digital media led to the differentiation of specific type of cultural heritage, labelled digital heritage.[1] The United Nations Educational, Scientific and Cultural Organization, also known as UNESCO, introduced and defined the concept of digital cultural heritage during the 32nd session of the General Conference of UNESCO in Paris in 2003.[2] The Conference lead to the publication of *Charter for the Preservation of Digital Heritage,* where digital cultural heritage was described as "resources of human knowledge and expression", either "created digitally, or converted into digital form from existing analogue sources".[3] *Charter* emphasised that digital material like "text, databases, still and moving images, audio, graphics, software and web pages" can be considered a cultural heritage.[4]

Besides defining digital cultural heritage, UNESCO's *Charter* also raised a concern about the preservation of such heritage, for digital objects have different needs than physical ones, and their preservation often faces unique challenges. The example of such challenges is mentioned in *Charter*'s article 3, which describes "rapid digital evolution", that is making the process of maintaining digital heritage in its original form extremely difficult, as some older records are no longer supported by the contemporary software.[5] Institutions managing digital heritage should therefore strive for "long term digital preservation" as highlighted by digital researcher Nicola Barbuti.[6] Furthermore, Barbuti also names FAIR principles as a convenient and useful starting point in dealing with the long term preservation.[7] The idea of FAIR, which is an acronym that stands for Findable, Accessible, Interoperable and Reusable, was published in *Scientific Data* journal in 2016 and was described as a way to make data management more easily feasible for machines and computers, which in turn facilitates human-led research.[8]

---

[1] UNESCO, *Charter*
[2] Ibid.
[3] Ibid., art. 1.
[4] Ibid.
[5] Ibid., art. 3.
[6] Barbuti, "Thinking Digital Libraries for Preservation as Digital Cultural Heritage", 309.
[7] Ibid., 310.
[8] Wilkinson et al., "The FAIR Guiding Principles for Scientific Data Management and Stewardship".

While FAIR are seen as deliberately vague suggestions, it is because they seek to improve, and not to purposely confuse the institutions that are implementing them.[9] Those institutions are free to make their own choices regarding the application of the principles, as long as they participate in the shared goal of facilitating "the reuse of scholarly data".[10] Moreover, FAIR principles deal with data as well as with metadata, which is a great point of interest for many online museum collections. As was mentioned by museum studies researcher Lara Corona the value of the online collections "depends on the value of their metadata", which in majority of the cases concerns the information about the stored and exhibited object.[11] Lastly, the main benefit of the implementation of FAIR is a general improvement of data management, and scientific researches, as according to the paper *FAIRness Literacy*, the principles facilitate optimization of data sharing, thus the use and re-use of data, which in a circular way improves the original data and metadata by providing more context or clarity.[12] The institution that applies FAIR ensures that it stays relevant and right in the centre of possible discoveries or scholarly conversations.[13]

This thesis will therefore explore the FAIR principles as possible guidelines for digital preservation focusing on the digisited online collections of Dutch museums. To fully highlight the importance of digisited heritage, the presented case study will focus on Dutch museums with digitally accessible Delftware collections. Delftware pottery was chosen due to its importance as one of the main landmarks of Dutch culture and history. This position means that there should be a particular focus on Delftware as digisited heritage, and how exactly is it represented in the digital realm, be it through cataloguing or actual visual representation. The list of all museums who store Delftware pottery is accessible through *Aronson Antiquairs* website, a leading force behind the research and cataloguing of existing Delftware.[14] While there are twenty museums in the Netherlands that physically store items of Delft pottery, only nine of them have an available online collection.[15] The list along with varying sizes of the items per collection can be found in the Table 1.

[9] Ibid.
[10] Wilkinson et al., "The FAIR Guiding Principles for Scientific Data Management and Stewardship".
[11] Corona, "Digitization: An Overview of the Advantages and Disadvantages", 3.
[12] David et al., "FAIRness Literacy", 6; 2.
[13] Koster and Woutersen-Windhouwer, "FAIR Principles for Library, Archive and Museum Collections".
[14] Aronson Antiquairs, "Delftware in Museum Collections".
[15] Ibid.

Museum	Location	General collection size	Delftware collection size
Museum Boijmans van Beuningen	Rotterdam	More or equal to 154 000	unknown
Edam Museum	Edam	More than 4 300	unknown
Museum Arnhem	Arnhem	More or equal to 25 000	More or equal to 800
Rijksmuseum Twenthe	Enschede	Approximately 8 000	unknown
Keramiekmuseum Princessehof	Leeuwarden	Approximately 35 000	Approximately 440
Kunstmuseum den Haag	the Hague	More or equal to 160 000	More or equal to 1 000
Groninger Museum	Groningen	More or equal to 60 000	unknown
Rijksmuseum	Amsterdam	More or equal to 1 000 000	Approximately 1 600
Centraal Museum	Utrecht	Approximately 50 000	unknown

Table 1. The list of museums with digital Delftware collection. The collection size is describing the number of physically stored items. All the data was taken from associated museum sites.

The aim of this thesis is to observe and determine how Dutch museums approach the topic of digital collections, and the preservation practices that come with that. The comparison will be made between their approaches, but this thesis does not seek to admonish or even overly praise the individual museums, as they all have different methods of preservation, influenced above all by the economic standing of the institution. The process of digital preservation is not uniform and represents many challenges for the institutions that are in its charge. There are no strict guidelines to follow, yet the final goal of keeping the digital heritage accessible and present has to be fulfilled.[16]

While this topic is quite technical, the actual research will be more focused on the understanding of an average user, or rather a visitor of the online museum collection. Digital preservation is a subject of world-wide importance, and requires time, resources, and expertise for its achievement. But it is important to remember why is it necessary in the first place: to keep digital material accessible to public. In that sense, the tools that make the preservation possible and facilitate the use of digital records, should also be easily used by people without scraping skills, otherwise it excludes the vast majority of the Inernet users.

The general outline of the following thesis will start with defining the theoretical framework within which this research operates. This will be divided into four subchapters: in

[16] UNESCO, *Charter*, art. 2.

the first one, the concepts of digital and digisited heritage, along with the concept of the online web collection will be explored and defined thoroughly. The second subchapter will provide a more profound explanation of FAIR principles, and the way in which they will be applied in the following research. The history of Delftware and its position and representation in the museums' collection will be explained in the third subchapter. Lastly, in the fourth subchapter, the presented museums will be contextualised by their own statements about their goals, plans, visions and approaches towards digital preservation. The second chapter of this thesis will focus on the metadata and controlled vocabulary that is used in each museum collection. This will seek to show the importance of correct cataloguing that is prerequisite for successful implementation of FAIR principles. The third chapter will then focus on the application of FAIR principles in the museums' collections according to the merits set in the first chapter. In the final conclusion, the findings of the thesis will be summarised, and further research will be suggested.

1. Theoretical framework

1.1. Digital heritage and online museum collections

The concepts of digital and digitised heritage were already mentioned in the introduction of this thesis, yet there is a need to characterise them further, as within this research, they will be understood as two separate terms. That is not always the case, as the notion of digital heritage seems to be an all-encompassing term, as seen in the UNESCO's *Charter*, which only mentions digital heritage material, referring simultaneously to the "resources (…) created digitally, or converted into digital form from existing analogue sources".[17] In this instance, the former is clearly being born digital heritage, while the latter is something that can be understood as digitised heritage, even though it is never named as such. To effectively protect and preserve different types of digital heritage, a more specific categorization is needed, which is something Nicola Barbuti expanded upon in one of his articles.[18]

Barbuti differentiates three kinds of digital cultural heritage: the first type is "Born digital heritage", which ecompasses all digitally created resource.[19] The second type, titled "Digital for Cultural Heritage", refers to the means by which digital objects can be accessed.[20] Examples of this type would be digital libraries and digital museum collections. The third and the last type is named "Digital as Cultural Heritage", and includes physical objects that were digitized.[21] It is the last two types of Barbuti's classifications that will be the points of focus of this thesis. Digitized Delftware is understood as digital as cultural heritage, while the online collections of Dutch museums who store and make the said Delftware accessible, are the second type of digital for cultural heritage.[22]

Subsequently, there is quite a specific perception of the concept of preservation within the third type of Barbuti's classification. It can be best explained by the article of the archivist and associate professor at the University of Michigan Paul Conway, in which he defined two distinct notions of "digital preservation" and "digitization for preservation".[23] The latter notion of digitization for preservation leads to creation of so-called "new digital products", known as Barbuti's digital as cultural heritage or simply digitised heritage.[24] This creation serves as a form of the preservation of the physical object as it significantly lowers the

[17] UNESCO, *Charter*, art. 1.
[18] Barbuti, "Thinking Digital Libraries for Preservation as Digital Cultural Heritage".
[19] Ibid., 311.
[20] Ibid.
[21] Ibid.
[22] Ibid.
[23] Conway, "Preservation in the Age of Google", 65.
[24] Ibid.

chances that the object and its records will cease to exist in a case of any physical harm or accident during object's handling and storage.[25] Lara Corona also named such products "digital surrogates", because they serve as substitutes for the physical artifacts.[26] The former Conway's notion of digital preservation, then protects and preserves these digital surrogates, so they do not disappear from the virtual sphere.[27] Moreover, digital preservation also encompasses Barbuti' second classification of digital repositories. Therefore, both concept as presented by Conway need to co-exist, as it makes little sense to create digitised versions of physical objects as a form of their preservation, and then not protect these digital creations and repositories where they are stored.[28]

The specific type of repositories this thesis will be dealing with are online museum collections. To define them more broadly, they are understood as collections accessible from the museum website, containing selected records that the museum chose to digitise and show from its physical collection. In this sense, they are similar to what Jane Zhang defined as "digital archival collections", which are said to make digitised material publically accessible online in ways to show the digital surrogate and to provide its "archival context".[29] The archival context should be understood as the metadata of the object, containing information not only about the item itself but ideally also about the way it was archived and stored. The digital surrogate is then a photograph or 3D-scan of the item, in a case of the Delftware.

The creation of the online collection is said to have great advantages for the cultural institution that manages it.[30] The presence of the online collection creates an image of the museum as a modern and progressive institution, while indirectly promoting the collection as well. As it is online, it is practically accessible to everyone with Internet connection, which expands the museum's audience from the visitors of the physical location of the museum to potentially all Internet users.[31] But creating such a collection is an endeavour that is ultimately most beneficial for the curators of the museum.[32] When creating the digital version of the museum's depot, the curators will familiarise themselves with what their museum is actually storing, making the entire physical and digital collection better organised and documented.[33]

---

[25] Ibid.; Corona, "Digitization: An Overview of the Advantages and Disadvantages", 4.
[26] Ibid., 2.
[27] Conway, "Preservation in the Age of Google", 65.
[28] Ibid.
[29] Zhang and Mauney, "When Archival Description Meets Digital Object Metadata", 183.
[30] Müller, "Deciding on Digital Archives", 60.
[31] UNESCO, *Charter*, art. 9.
[32] Bertacchini and Morando, "The Future of Museums in the Digital Age", 65.
[33] Müller, "Deciding on Digital Archives", 88.

There are even more benefits that come with digitization and the creation of online collections, especially concerning ceramics, including state of objects' metadata, and the issue of the objects' display. The metadata in the online museum collection can be broadly defined as the information about the digital object; be it provenance, maker, type of object etc.[34] When the physical object is on display in the museum, usually only the name, the year and place of making are mentioned. However, the online catalogue gives space to more information, which makes the online collection more research-orientated than the physical one. Similar thing happens with the actual display of the item. In the physical space of the museum, the ceramics are at the disadvantage of only being seen from one angle, especially if they are not displayed as a freestanding object. This raises a question of what to display, especially for objects that contain numerous scenes depicted on their surface. But the choice is also complicated with items that only have two sides, such as plates, as they are often marked on the back, as proof of their authenticity.[35] Usually, certain plates are turned around so the mark can be visible, but this then hides the front decoration. In contrast, the online collection provides the possibility of showing images of the item from every angle and side, or even in the 3D scan providing a close-to real-life experience of holding the object.

Yet, the same benefits also come with certain disadvantages. More varied online display comes with additional costs that are unfeasible for certain institutions. In a certain sense, it is actually the revenue and budget of the museum that make this type of display possible, and not the digital nature of the collection. As for the metadata, there is a lack of universally applied metadata schema that could be used across the collections.[36] This can create information gaps during the research as museums do not provide the same kind of information, or the information is represented differently. This also connects to the controlled vocabularies used by the museums. The controlled vocabulary is set to help with the search or retrieval of the objects connected in a certain way. For example, all Delftware within the museum collection should be connected on some levels as it is a specific type of pottery. When retrieving Delftware, it is necessary to know what terms can be used, and how those terms relate to each other for the most efficient retrieval. Yet, almost every museum has its own controlled vocabulary in use, and the information about it is seldom made public. This can lead to the possible exclusion of some items of Delft pottery during the retrieval.

[34] Koster and Woutersen-Windhouwer, "FAIR Principles for Library, Archive and Museum Collections".
[35] Delfts Aardewerk, "Factory marks".
[36] Corona, "Digitization: An Overview of the Advantages and Disadvantages", 3.

Nevertheless, the importance of online museum collections as well as digitising Delftware pottery, cannot be overstated, as it ultimately conveys more benefits than disadvantages. As such, certain safeguards need to be put in place for this kind of digitised heritage. This is a necessity for objects that were digitised to be preserved, as the absence of the tools for digital preservation renders the "digitization for preservation" process as was described by Conway.[37] Part of what such digital preservation entails will be explained in the following subchapter.

1.2. FAIR principles

The FAIR stands for Findability, Accessibility, Interoperability, and Reusability principles, that are described as tools for good data management.[38] While this might seem to have no relation to digital preservation, it would be an inaccurate assumption to make. Although it is not widely considered as such, the cultural heritage sector is a "data driven discipline", and is therefore in need of managing its data, which goes together with a need to preserve it as a way to keep the data in existence.[39] The article that introduced FAIR in 2016, defined them as "related, but independent and separable", meaning, that each principles works towards the same goal, but also functions in its own right, and operates individually.[40] This explains the overlaps that sometimes occur between the principles, while still maintaining separate function of each letter. Even though the letters are put in that specific order, it is more to form an acronym than to make a hierarchy of their importance.

While no principle goes above any else, there is a special focus put on Reusability. The very first sentence of the article that presents FAIR is: "There is an urgent need to improve the infrastructure supporting the reuse of scholarly data.", and the main target audience for the article is set to be "those wishing to enhance the reusability of their data holdings."[41] But within digital preservation, this focus seems to shift towards the letter A. This could be because the wide-ranged accessibility is being seen as the main benefit of digital collections, as well as that digital preservation is indeed mostly understood as the long-time access to the digital object.[42]

---

[37] Conway, "Preservation in the Age of Google", 65.
[38] Wilkinson et al., "The FAIR Guiding Principles for Scientific Data Management and Stewardship", 1.
[39] Hermon and Niccolucci, "FAIR Data and Cultural Heritage", 251.
[40] Wilkinson et al., "The FAIR Guiding Principles for Scientific Data Management and Stewardship", 4.
[41] Ibid., 1.
[42] UNESCO, *Charter*, art. 2.; European Commission, "Commision Recommendation on a Common European data space for cultural heritage", para. 12.

That is not to diminish the other principles, after all, the European Commission defined digital preservation as "a set of activities necessary to make sure digital objects can be located, rendered, used and understood in the future."[43] This definition makes it quite clear that the importance of FAIR cannot be overstated, yet the principles need to be used as guidelines that will lead towards the desired results.[44] Although it is important to implement them, this implementation in itself should not be a goal, as FAIR's main role is to aid – usually towards the more advanced research and data sharing, but in this case also towards the digital preservation.[45]

Even in the nineties, when digital preservation was still in its beginnings, there was already an unease about the progressing nature of technology, and the lack of necessary knowledge about maintaining digital material. A report of 1996 given by the Task Force On Archiving of Digital Information, suggested that "long-time preservation (…) will require a deep infrastructure capable of supporting a distributed system of digital archives."[46] Almost thirty years later, this type of infrastructure is still considered to be a main goal for many data publishers, achievable in part through the guide of the FAIR principles. Moreover, FAIR principles are deliberately kept vague, to allow for the most convenient implementation method according to the best judgement of data holders.[47]

There are also shortcomings to FAIR, which need to be understood and acknowledged. The first would be the lack of the actual focus on digital preservation as a means of ensuring that the digital heritage will remain on the Web. Instead, FAIR principles are mostly focused on the most effective use and reuse of the available information.[48] In a roundabout way, there is a certain correlation as for the most efficient use of data, that data needs to stay on the Internet. But this connection is not in the foreground of FAIR application or digital preservation discourse. Another shortcoming is the excessive amount of focus that is being put on the metadata. FAIR seems to consider the importance of metadata above that of data, which does not work with cultural heritage, as both are uniquely important in their own rights.[49]

---

[43] Ibid., art. 3.7.
[44] Mons et al., "The FAIR Principles: First Generation Implementation Choices and Challenges", 1; Koster and Woutersen-Windhouwer, "FAIR Principles for Library, Archive and Museum Collections".
[45] Wilkinson et al., "The FAIR Guiding Principles for Scientific Data Management and Stewardship", 5; European Commission, "Commision Recommendation on a Common European data space for cultural heritage", art. 18.
[46] Task Force On Archiving of Digital Information, *Preserving Digital Information*, 40.
[47] Wilkinson et al., "The FAIR Guiding Principles for Scientific Data Management and Stewardship", 4.
[48] Koster and Woutersen-Windhouwer, "FAIR Principles for Library, Archive and Museum Collections".
[49] Ibid.

It is important to define each principle separately, as their functions will be applied and explored in following research. While there is an official definition made by the GO FAIR initiative, the principles need to be seen in the context of digital heritage. The official definitions will be taken as a starting base, but they will be adjusted to become relevant to the presented issue of digital preservation. Additionally, technical limitations and scraping skills of an average user will be taken as a primary perspective.

Findable
F1. (Meta)data are assigned a globally unique and persistent identifier
F2. Data are described with rich metadata (defined by R1 below)
F3. Metadata clearly and explicitly include the identifier of the data they describe
F4. (Meta)data are registered or indexed in a searchable resource
Accessible
A1. (Meta)data are retrievable by their identifier using a standardised communications protocol
A1.1 The protocol is open, free, and universally implementable
A1.2 The protocol allows for an authentication and authorisation procedure, where necessary
A2. Metadata are accessible, even when the data are no longer available
Interoperable
I1. (Meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.
I2. (Meta)data use vocabularies that follow FAIR principles
I3. (Meta)data include qualified references to other (meta)data
Reusable
R1. (Meta)data are richly described with a plurality of accurate and relevant attributes
R1.1. (Meta)data are released with a clear and accessible data usage licence
R1.2. (Meta)data are associated with detailed provenance
R1.3. (Meta)data meet domain-relevant community standards

Table 2. The definition of FAIR principles[50]

1.2.1. Findability principle

Findability is a quality that essentially describes data as being “machine-readable”.[51] This means that if someone is looking for a specific object on the Internet and uses correct requirements, it should be easy to find it. Considering the quantity of data that is available within the online museum collections, finding the most relevant source and object is key towards the most effective research.[52] Ideally, this findability extends towards the whole web and is not only restrained by the museum website.

[50] GO FAIR, "FAIR Principles".
[51] Essen, "Building Historical Knowledge Byte by Byte", 90.
[52] Ibid.

Findability principle has four separate requirements that need to co-exist for data to be considered findable, as seen in Table 2. Starting with the F2 requirement in Table 2, which mentions “rich metadata”; a term that is quite hard to define in the presented context. The metadata information depends on how much is known about the object, and as some objects are better documented and have a richer history then the rest, this information can vary. Certain metadata schemas that are in use also provide space for more information than others. As such, it is hard to determine whether the lack of metadata lays in the fault of the museum, who does not fill the public records accordingly, or whether it is simply a lack of known facts about the object.

As for the F3 of Table 2, it requires an identifier in the metadata, that refers to the dataset from which the object originates.[53] In this context, this identifier is also the same persistent identifier that is described in F1 of Table 2. It refers both to the item itself and the collection it is a part of. Therefore, the unique identifier that is presented in F1 facilitates the search of the specific object by search engines.[54] This identifier can for example come in the form of DOI, or Digital Object Identifier, which describes the specific object, or a permanent URL address, that describes the location of said object. Every item of the Delftware should have its own identifier, which also refers to the collection it comes from. This is connected to the F4 requirement of Table 2 which should be interpreted in a more general way, as the Delftware collection is not stored separately, but in the overall museum collection.

Thus, the aim in the further assessment that will come in the chapter three of this thesis, will be to see whether the museum collections are indexed websites. The indexed websites are web pages that were indexed, or marked, by the search engines. They are marked and classified based on how relevant their displayed content is to a certain topic. If we are to search a particular museum, for most of the time, the very first result is the website of said museum. This is because the search engine mechanics relate the webpage with the keywords used for the retrieval. For the museum collection to be easily discoverable, it needs to be indexed. As Google search is the most used search engine, the indexing on Google will be one of the prerequisites to fulfil the F4 requirement.

In summary, Findability can also be described as the discoverability of the object on the Internet.[55] As was presented above, this discoverability can be defined by the presence of a globally unique identifier and the indexing on the Web. Although this is a very simplified

[53] GO FAIR, "FAIR Principles".
[54] Corona, "Digitization: An Overview of the Advantages and Disadvantages”, 3.
[55] Bonino da Silva Santos et al., "FAIR Data Points Supporting Big Data Interoperability", 3.

outlook on Findability, it still works, as it conveys the core of what this principle represents and means. The presence of metadata is also demanded as insinuated in the F2 requirement, as the more information there is on the item, the more easily it is to find it on the Internet.

Yet, there are also problems tied to these definitions. For one, the unique identifier is indeed unique, and refers to one object only. When searching for all Delftware items, the knowledge of one identifier will not be of much help. This means that as a group, Delftware pottery is not easily findable, as there is no unique identifier that would refer to it as such.
The opposite, yet still similar, is the issue with the indexing. It would be very difficult and time-consuming to check whether detail pages of every Delftware item within a museum is an indexed website. It is much easier to simply check whether the general museum collection is indexed site or not. While this gives the perspective on the collection where Delftware is stored, it does not help with the findability of the unique items. Ultimately, there is a difference between findability on the Internet and within the online collection website. Within this thesis framework, discoverability on the World Wide Web classifies under Findability principle, and the retrieval of Delftware from the specific museum collection is defined by the Accessibility principle.

1.2.2. Accessibility principle

The second principle of Accessibility seems to be a crucial one for the digital realm, as the widespread public access ensures the accessibility of every item, whether it is stored in the depot or is directly on display in the physical museum.[56] The Accessibility requirement is often associated with open data, yet this connection is not as simple as it might seem. The requirement that puts this connection in question is A1.2 of Table 2: “The protocol allows for an authentication and authorisation procedure, where necessary”. Firstly, it needs to be said, that open data is data that is openly accessible and freely reusable.[57] Yet, not every data can be publicly open, due to the privacy or security concerns.[58] In those cases, there needs to be provided a way to access this data by the above-mentioned “authorisation procedure”. A person accessing such data, needs to be notified about the requirements for the access or be automatically authenticated if they fulfil said requirements. As such, the open access to the digital collection does not automatically equal the Accessibility principle.

As for the other requirements, they are all inapplicable in this research. A2 of Table 2 is not relevant as the collective importance of data and metadata for digital heritage was

[56] Corona, "Digitization: An Overview of the Advantages and Disadvantages", 3; UNESCO, *Charter*, art. 2.
[57] Wessels et al., "Visions of Open Data", 45–46.
[58] GO FAIR, "FAIR Principles"; Koster and Woutersen-Windhouwer, "FAIR Principles for Library, Archive and Museum Collections".

already described. The goal should be an availability of both, especially if the data in question is the 3D scans of the object. As for A1 and its sub-requirement A1.1 of Table , they both built upon each other, stating that data should be available to "anyone with a computer and an internet connection", using standardised protocols, like HTTP, or Hypertext Transfer Protocol, which is the most common one and the first part of the URL address.[59] As such, this requirement is automatically fulfilled.

Instead, there are other ways to check the Accessibility, one of them would be the available backups. Although this might seem more related to Reusability, backups ensure permanent or long-term access, which is key for the preservation of digital objects.[60] Usually, the specific collection management system (CMS) of the museum provides this type of security, yet not every museum publishes the information about which system they use. Nevertheless, it is still possible to check whether the collection was saved on the Wayback Machine of the Internet Archive, a tool that enables the old appearances of the websites, which will testify to some level of preservation as well.

Another possibility for checking the Accessibility is publicly available APIs that retrieve the necessary and desired information.[61] API stands for Application Programming Interference, and it is a way of processing requests without the need to use a search engine.[62] In the online collection, API could retrieve and make accessible all Delftware items that would meet the specified criteria. It is in a way, a more advanced search that is ideally more accurate than the ordinary search option on the website.[63] Although API could be related to more principles than just Accessibility, they both are connected through the condition of retrievability, as instead of simply finding the objects, all information about every item is automatically available as well. As such, the presence of API, CMS, and of screen recordings on the Wayback Machine will determine the Accessibility of museum collections.

1.2.3. Interoperability principle

Continuing with Interoperability, which in a more simplistic way is about "how data relates to other data".[64] This principle seems to be the most difficult one to abide by, mainly because almost every museum collection has a widely different approach towards it. Yet, in its core, it is mostly about the connection and understanding between different software systems, and how to facilitate their cooperation.

[59] GO FAIR, "FAIR Principles".
[60] Koster and Woutersen-Windhouwer, "FAIR Principles for Library, Archive and Museum Collections".
[61] Europeana, "Europeana and the FAIR Principles for Research Data".
[62] Rijksdata. "API".
[63] Ibid.
[64] Essen, "Building Historical Knowledge Byte by Byte", 91.

The first I1 requirement of Table 2 is the most technical one, as it directly refers to the use of a coherent data model that would enable communication between different datasets.[65] As not all museums provide information about their data model, this requirement cannot be fully analysed. However, it is still important to present at least some data models, as to comprehend the interoperability of the collection better. The Rijksmuseum provides some insight in this regard, stating that their "dataset is modelled in Dublin Core, the Europeana Data Model and in the LIDO standard".[66] As one of the most prestigious museums in the Netherlands, that sets itself at the fore of good and transparent data management, Rijksmuseum and its data models will be further described in the analysis chapter. A similar matter is with I2 of Table 2, which describes controlled vocabularies, whose implementation and usage are not publically available either. Nevertheless, a small sample of the controlled vocabulary of each museum will be taken and observed, to determine what kinds of connections exist in between the objects of the Delftware within the same museum.

Lastly, the I3 of Table 2, describes interrelations between different objects. The objects that share the content of their descriptive metadata should be placed into the same category, according to the controlled vocabulary of the site. Descriptive metadata, as the name suggests, describes the object, giving it the necessary historical context. This would be information about the maker, provenance etc. It is through this metadata that the software systems communicate, exchanging information and grouping similar content together. The connection in descriptive metadata needs to be highlighted by the presence of the hyperlinks in the metadata section of the item.[67] Those hyperlinks should lead to a separate page, where all the items that share this specific descriptive metadata will be present. Based on the presence of those links, the interoperability within the collection will be concluded in the third chapter of the thesis.

It is important to note that descriptive metadata also serves during the retrieval of the item from the museum collection, as well as making it easier to discover the object on the Internet. As such, it could also be described in the context of the two previous principles. However, the presence of descriptive metadata in this section illustrates the role such metadata plays in the collection, as it connects various Delftware objects together.

[65] GO FAIR, "FAIR Principles".
[66] Rijksmuseum, "Our data in the nutshell".
[67] Koster and Woutersen-Windhouwer, "FAIR Principles for Library, Archive and Museum Collections".

1.2.4. Reusability principle

The last Reusability principle is connected to "data usage licences".[68] In general, it describes how should the data by handled by the person who is reusing it.[69] In the contrast to the previous principle, Reusability concerns administrative metadata, which are specific metadata that discuss copyrights, licensing, and right holders.[70] These concepts will be observed in regard to the digital preservation of Delftware, particularly the copyrights as described in R1.1 of Table 2, and records of ownership or provenance as mentioned in R1.2. of Table 2. It is assumed that the community standards as related to R1.3 of Table 2 are fulfilled as all objects within the same collection are described according to the same standards.

The Reusability principle offers much more than just the required presence of administrative metadata. Or rather, it has the potential to offer more, if its definition will evolve in a way as proposed by Barbuti, to encompass reusability, relevancy, reliability, and resiliency. [71] In this way, the R principle, or R4 principle as Barbuti titles it, would involve the descriptive metadata as well. The proposed idea reflects on the quality of the metadata, specifically by judging how relevant it is to particular research, which can be determined by the documented history of data and metadata's reuse.[72] To further improve the quality, the presented information needs to be vetted as reliable, something that can also be checked by documenting the life cycle of the data and metadata in the collection.[73] Lastly, in trying to ensure that data would be resilient, we will put much more attention on the preservation aspect, that is otherwise not explicitly mentioned in the FAIR principles.

This re-definition of R might be harder to apply, which further proves its importance and necessity for data management. Similar practice needs to be applied and the issue of the quality of administrative and descriptive metadata needs to be explored, as their mere presence is not enough. In this way, the Reusability requirement will not be understood exactly as Barbuti's R4, but certain characteristics of the metadata should be commented upon. If the reusability is in part about the correct citation of the source, the source needs to be recognized as relevant to the research, as well as reliably proven to be true.

The connection between FAIR principles and digital preservation that was made in this and previous subchapters, was to make clearer understanding of FAIR as a guiding light towards good data management. FAIR is not a prerequisite for digital preservation, but it

[68] Corona, "Digitization: An Overview of the Advantages and Disadvantages", 3.
[69] Essen, "Building Historical Knowledge Byte by Byte", 91.
[70] Koster and Woutersen-Windhouwer, "FAIR Principles for Library, Archive and Museum Collections".
[71] Barbuti, "Thinking Digital Libraries for Preservation as Digital Cultural Heritage", 310.
[72] Ibid.
[73] Ibid.

certainly makes this endeavour easier as good data management makes long-term perseverance possible. In this way, the absence of compliance with FAIR will not automatically hinder the preservation strategies, yet it will make their implementation harder in the long run.[74]

1.3. Delftware

What makes Delftware so special is its unique position within the Dutch culture of its time. The discussion is about so-called antique Delftware, thus the one made between the years 1620 and 1850, a period spanning two centuries.[75] In the beginning of the seventeenth century, the Dutch East India Company started importing Chinese porcelain to the Netherlands, which soon became one of the most prominent imported goods.[76] Many ceramic makers tried to match the quality of the porcelain, but this endeavour was proven to be in vain.[77] The closest the makers got was they used a special type of clay called marl.[78] Although this was merely a beige clay, the final product resembled porcelain in terms of its thinness and finery. But to get to that, the item needed to be fired twice: after the first firing, the item was glazed in white tin glaze and fired again, after which blue decoration was applied. Those two colours – blue and white – were taken from the Chinese porcelain, but even though it was by far the most popular combination, other colours were also sporadically used.

Although Delftware resembled porcelain, the proper term for this ceramic is earthenware.[79] Because it is fired twice and then glazed, it is also known more specifically as glazed, or even tin-glazed earthenware.[80] There are also other terms that could describe Delftware, like majolica and faience. Both terms refer to glazed earthenware, yet there is a slight difference between them, depending on geographical context and the time period of the object's making. Moreover, there is also a difference between how Dutch museums refer to Delftware, in comparison to museums based in English-speaking countries. In the Netherlands, Delftware is usually classified as faience, *keramiek*, or *aardewerk*.[81] Museums of English-speaking countries tend to categorise it specifically as Delftware, or tin-glazed

[74] European Commission, *Cost-Benefit Analysis for FAIR Research Data*, 5.
[75] This timespan seems to be agreed upon: see Dam, *Delffse Porceleyne: Delfts aardewerk 1620-1850*.
[76] Dam, *Delffse Porceleyne*, 11.
[77] Ibid., 12.
[78] Ibid., 13.
[79] Ibid., 12.
[80] Ibid., 9.
[81] Translated from Dutch as ceramics and pottery. This and all the other translations in this paper are generated by the author, if not specifically stated otherwise.

earthenware from the Netherlands, as is the case for the online collections of the Metropolitan Museum of Art and the Cooper Hewitt Smithsonian Design Museum in New York, or The British Museum and the Victoria & Albert Museum in London.[82] To avoid confusion, for this thesis Delftware will be understood as tin-glazed earthenware made in Delft between 1620 and 1850. These will be the requirements used in the search of Delftware in the museum collections.

Delftware forms an important part of Dutch cultural heritage, and it is something that to this day represents Dutch culture all around the world, which justifies its selection as a case study for this thesis. The heritage institutions must often make a choice about what items are in immediate need of preservation. Ideally, all items are given an equal focus, but due to the economic restrictions of the specific museum, this is not always possible. Museums must then choose, and the selection is often based on certain criteria or values that the object possesses.

Delftware has an intrinsic value as an object, meaning that is value lays in the "combination of such aspects as socio-historical, cultural, aesthetic or scientific meaning, production processes, public interest, formal language or technology".[83] This is certainly true for Delftware, as it is emblematic of the period of the Dutch republic and the so-called "Dutch Golden Age", hiding in itself the economic situation of the country, the commerce, the craze for Chinese items that in that time swept the whole Europe, as well as the history of the city Delft, its factories and the process of making this type of pottery.[84]

1.3.1. Delftware display in online Dutch museum collections

There are more than eighty museums all around the globe that preserve Delftware in their collections, twenty of which are in the Netherlands.[85] Yet only nine of them have an accessible online collection. From the remaining eleven, the majority of the museums are more oriented towards showing the living conditions of the past, rather than exhibiting the

[82] The Metropolitan Museum of Art, "The Collection"; Cooper Hewitt, Smithsonian Design Museum. "The Collection"; British Museum, "The Collection"; Victoria & Albert, "Explore the Collections".
[83] Ooghe and Moreels, "Analysing Selection for Digitisation".
[84] The term "Dutch Golden Age" is certainly troubled due to its direct link to the colonialism and commercial trade, that made the prosperity of the 17th and 18th century Netherlands possible. Many objects that were representing this sort of prosperity, including Delftware, nautilus cups, or Japanese lacquerware, did become symbols of its time, and in turn also of the Dutch colonial practices. For more information about Dutch commercial trade see: Weststeijn, "Empire of Riches". For more information about how this history is oftentimes represented by the material objects, see Kehoe, "The Nautilus Cup Between Foreign and Domestic in the Dutch Golden Age".
[85] Aronson Antiquairs, "Delftware in Museum Collections"

objects, as there are four palaces, two houses and one open-air museum included in that list.[86] This would explain the reluctance to create a digital inventory as their focus is providing a real-life field experience for the visitors, not a digital on. The remaining four are all rather smaller museums that are perhaps restricted economically or have different goals than digitisation in mind. However, it is important to mention that Museum Prinsenhof in Delft is currently working towards making its collection available online, but at the time of writing this thesis, it is sadly not yet accessible.

As for the remaining nine museums that show their Delftware collection online, it would be important to mention how they display it. The benefits of digital display were already noted, but whether the selected museums use those benefits to their advantage was not yet discussed. In terms of the display of the object, all of them rely on photographic images, usually showing the image from the top view or front side, depending on the particular object, but always displayed to show the decorative elements (fig. 1., fig. 2). Museum Boijmans, Edams Museum, Rijksmuseum Twenthe, Rijksmuseum, and Centraal Museum all provide an option of zooming in and out of the image, thus observing it from up close. Only Groninger Museum is showing an item from various angles, a display that usually consists of at least three photographs. This is certainly a missed opportunity for the rest of the museums, who could perhaps also show more variety and different perspectives in their display photography.

Dutch museums could also employ other types of display, namely 3D scans of the objects, which already works for some items in the online collection of the Smithsonian Institution. As the 3D scans are showing the object from every possible angle, it would be one of the best ways of exhibiting digital Delftware, and ceramics in general. This practice is also recommended by the European Commission, which highlights the importance of 3D digitization, not only for its value in the visual display, but also for the role it can play role in the restoration processes of the physical object.[87] Certain damages can become known when scanning and converting the item into digital form, making 3D scans an incredibly useful tool in the preservation strategy. Furthermore, this gives such scans further value due to their detailed nature.[88]

There are also downsides to digital scans, the major one being the economic costs. The digitization projects are indeed costly, both in technology and in labour: the tools

[86] Ibid.
[87] European Commission, "Commision Recommendation on a Common European data space for cultural heritage", art. 10.
[88] Ibid.

themselves are expensive, but the museum staff also needs to be trained to properly use the scanners and other tools. Only when museums are funded specifically for 3D digitisation, can many museums afford to have a specific team selected for this endeavour. Otherwise, museums operate with limitations, which then requires a longer time for realisation of the process, which even further increases the costs of the whole project. Moreover, Delftware might not be the most needed objects to digitise this way, and other cultural heritage can take priority in this preservation and digitisation. Considering the issues of budget and prioritisation of more volatile objects, 3D scanning is perhaps not necessary for every item of Delftware. The second-best solution would then indeed be providing numerous photographs, made from various angles, which can actually allow for later photogrammetric reconstruction in 3D.[89] This type of reconstrucstion is listed as more affordable, and is based on using the detailed photographs of the object instead of the object itself.[90] Another possibility is making detailed descriptions of the object, that would be available through metadata. Yet even the written description is present only in the Edam Museum, Arnhem Museum, Groninger Museum, and Rijksmuseum, with the first two museums having quite brief descriptions.

All in all, although the online collections that are observed in this thesis do not yet use the opportunity of digital display to its fullest, it is still an important matter that carries almost as much weight as the descriptive metadata about the object. As the collections get updated, there is still a possibility and opportunity for detailed 3D scans of certain items, perhaps in the cases of more damaged pottery that would profit from this digitization for preservation's sake.

1.4. The stances of the museums about digitisation

It was already implied that every museum approaches its digital collection, as well as the methods of its preservation, differently. This might be due to numerous reasons, including, but not limited to the limitations of resources, the skills of their workforce, the size of the collection and museum, or there is some individual and more pressing issue that is currently prohibiting museums from prioritising the preservation of their online collection. Nevertheless, the museums do acknowledge this topic usually in their multi-year policy or activity plans, or in their annual reports. This chapter is then intended to make note of different stances from various museums that are addressing the digitization and the preservation that comes with it.

[89] De Paolis, "Photogrammetric 3D Reconstruction of Small Objects for a Real-Time Fruition".
[90] Ibid.

The majority of the museums presented here do not comment much on the state of their online collection. The Centraal Museum lists that 99% of their collection is accessible online, with 87% of this number having an accompanying picture.[91] On the other hand, the Boijmans Museum does not include a specific number or percentage that would tell us more about the current state of their digitization process. According to their website, "more than a quarter of the entire museum collection is currently accessible online", but this information seems to be outdated.[92]

Several museums mention digitization in their policies. The Rijksmuseum Twenthe mentions digitization only marginally, but the Princesshof lists digitization along with digital sustainability as one of their goals.[93] Kunstmuseum highlights the role of digitization, especially in their smart strategy, mentioning the importance of the "online presentation of the collection".[94] They also mention forty subcollections they created to "provide a broader overview", and directly mention Delft pottery as a part of this endeavour.[95] Yet, their current goal is to capture and make accessible something they title "the moving objects", so it can be assumed that for the near future, Delftware will not be a main point of focus anymore.[96]

For the majority of the museums, digitization is not really seen as a form of digital preservation for physical objects, but rather as a possible way to acquire new audiences. This means that the access of the online sphere, and certain marketing strategies are the main reasons for the continuous digitization of many collections. In the Groninger Museum's policy plan, digitization is seen as a tool to make their collection "accessible to a wide audience".[97] Arnhem Museums also discusses its continuous path towards digitization as a way to access different and broader audiences.[98] They also mention the financial difficulties that come with it and list the lack of necessary resources as a main issue that slows down the whole process.

---

[91] The Centraal Museum, *Collectie Beleidsplan 2021-2024*, 21.
[92] Museum Boijmans van Beuningen, "Digitization"; Museum Boijmans van Beuningen "Collection".
[93] Rijksmuseum Twenthe, *Activiteiten Plan 2021-2024*; Keramiekmuseum Princesshof, *Activiteiten plan 2021-2024*, 28.
[94] O*nline presentative van de collectie*, translated as "Online presentation of the collection" from Kunstmuseum den Haag, *Meerjarenbeleidsplan 2021-2024*, 31-33.
[95] *Er is veel geïnvesteerd om een breed overzicht te tonen,* translated as "A lot has been invested to provide a broader overview", from Kunstmuseum den Haag, *Meerjarenbeleidsplan 2021-2024*, 33.
[96] *'Bewegende' objecten* translated as "Moving objects", from Kunstmuseum den Haag, *Meerjarenbeleidsplan 2021-2024*, 31.
[97] *Om het beheer te optimaliseren en de collectie toegankelijk te maken voor een breed publiek, is een groot digitaliseringsproject opgestart*, transalted as "To optimize management and make collection accessible to wide audience, a major digitisation project started.", from Groninger Museum, *Beleidsplan 2021-2028*, 7.
[98] Museum Arnhem, *Meerjarenbeleidsplan 2022-2027*, 9.

There is also an interesting case of the online collection of Edam Museum that falls under the so-called Zuiderzee Collection, which is a "partnership of twenty-six institutions around the IJsselmeer area".[99] This means that the museum is not directly responsible for its own online collection, and rather leaves this particular task to the aforementioned Collection. For small museums like the Edam Museum, this type of collaboration is incredibly useful. Due to the limitations of resources, it is unlikely that they would be able to establish their own collection. But when partnering with other museums, digitization suddenly seems more achievable. Yet, it also comes with the loss of control over the collection and how it is represented online.

There are also museums that put a lot of importance on their digital presence. For Boijmans Museum, digitization of their depot seems to be a priority that they dedicated many years to. Their policy plan for the years 2021 and 2024, mentions that the digital strategy will be continuously implemented through this timeframe.[100] Rijksmuseum is also prioritising their data management, and data in general. The museum complies with the Open Data Policy, and FAIR principles.[101] Although it is not explicitly written how exactly it is happening, the Rijksmuseum focuses on describing important mechanisms through which FAIR manifests, like metadata, API, and controlled vocabulary.[102]

It also seems like the COVID19 pandemic influenced digitization, as it represented a way to make collections accessible even when the museums themselves were closed. If we take the example of Rijksmuseum, they partnered with DELL Technologies to support the digitization process.[103] DELL Technologies provided technological equipment and necessary facilities for Rijksmuseum employees, which managed to speed up the process of digitization, even considering the disadvantageous conditions at the time of the pandemic outbreak.[104] It would make sense that the digital presence of museums took unprecedented priority during that time, which shifted the outlook on digital collections. That is perhaps also why some museums do not priorite digitisation anymore, as with the re-opening of the physical locations, the priority shifted once again to the material cultural heritage.

While almost every museum mentions digitization to some degree, the conversation about the protection and safeguards that should come with it, is often omitted. This is perhaps

[99] Zuiderzeecollectie, "About Zuiderzee collection".
[100] Museum Boijmans Van Beuningen, *Meerjarenbeleidsplan 2021-2024*, 26.
[101] Rijksmuseum, "Our data in the nutshell".
[102] Ibid.
[103] Rijksmuseum, "Rijksmuseum and DELL Technologies are joining forces to digitally share the entire collection with the world".
[104] Ibid.

because most of the museums rely on their management system to ensure the safety of their collection.This brings us to the question of collection management systems (CMSs), that serve to help museums in managing their digital presence. It would be quite a task to build your online collection from zero, without relying on any tools that facilitate digitization. That is why many museums use some sort of collection system that manages and displays the collection that was uploaded and registered on it, and oftentimes released online, although it is possible to simply store the collection without making it public. The CMS is also what determines the state of the metadata, as there are particular ways the registered information about the object can be structured and catalogued. Of course, these systems also ensure the safety of the stored information, which is at the core of data protection and preservation.

Four of the museums discussed here have their CMS as publicly available information. Firstly, Museum Boijmans uses The Museum Systems (TMS), which is also used by museums like The National Gallery in London and the Seattle Art Museum in the US.[105] This system is known for its adaptability to different data models, like Europeana or LIDO, as well as providing data backups, that safeguard the collection.[106] Then there is Kunstmuseum, the Groninger Museum and Rijksmuseum, which were once using the same system called Adlib, but Rijksmuseum decide to upgrade to the newer version of the system called Axiell Collections.[107] This is because the older version started to experience bugs, that could not be resolved anymore. It is possible that the Kunstmuseum and the Groninger Museum will follow the same decision in the following years, as the newer version of the system is deemed more "future-proof" and way more reliable.[108] Ultimately, it is important to remember that the choice of the collection management system depends not only on the nature of the collection, but also on the budget the museum assigned for this expense. The application of a more reliable, but expensive system, is not always possible, no matter how useful such a system can be.

[105] Gallery Systems, "Collections Management with TMS Collections"
[106] Ibid,
[107] Kunstmuseum den Haag, *Meerjarenbeleidsplan 2021-2024*, 160; The Art of Information, "Rijksmuseum migrates from Adlib to Axiell Collections"; Groninger Museum, "Collection".
[108] Kunstmuseum den Haag, *Meerjarenbeleidsplan 2021-2024*, 160; The Art of Information, "Rijksmuseum migrates from Adlib to Axiell Collections".

2. The Sampling of metadata

It is perhaps important to justify the focus that is being put on the metadata and the controlled vocabularies regarding the analysis and use of the FAIR principles. The metadata is an important part of FAIR and is oftentimes used interchangeably with data in the definition of each principle.[109] While in the museum collections', there is almost equal importance put on data and metadata, FAIR puts more value in objects' metadata. This is because metadata contains information which directly contributes towards discoverability and accessibility of the items on the Web and on the museum site, as well as towards interoperability and reusability of the information it contains. Directly tied to the metadata is the vocabulary that facilitates the findability, retrieval and interoperability of the data and metadata on the museum's website. In this way, controlled vocabulary describes how the metadata operates, which is important to understand for improving the state of the collection. Thus, both metadata and controlled vocabulary, are linked topics that lay the foundation of analysing FAIR. That is why it is important to establish and discuss how they are used by each museum, as the correctly used metadata facilitates many aspects of FAIR.

To fully analyse metadata of each museum, it would be useful to know which data models they use, to compare the ways in which they format their data. But out of all nine museums, only the Rijksmuseum publishes this kind of information.[110] Nevertheless, the comparison between museums' metadata will still be made, but it will be quite less technical. The main goal will be to see what kind of metadata information is available under the objects, both descriptive and administrative. It was already explained that varied and extensive metadata facilitates FAIR and should unite all the items of Delftware across the whole collection. This also ties to the controlled vocabulary, and how Delftware items relate to each other based on the information present in their metadata.

[109] See Table 2 in the 1. 2. FAIR principles
[110] Rijksmuseum, "Our data in the nutshell".

It is necessary to establish an observation pool specifically for this thesis, that will consist of fifteen different objects of Delftware per every museum. Based on this sample, the general structure of metadata will be determined and then compared across museums. The goal is to see what are the general metadata that are representing the object, and what kinds of metadata are mostly and least used. Those metadata will be divided into two types that are quite important in the following analysis of the FAIR in the third chapter: administrative and descriptive metadata. The former is focused more on the legal, or technical side of the object, in a sense that it describes its acquisition history, credits and rights.[111] The latter, as the name suggests, provides description of the digital object, and includes information such as title, subject, type of object, time period, maker, or material and technique.[112]

The content of the metadata is also of interest, especially to see whether there is some connection between the items in their metadata section, that would unite and identify them as Delftware and make their retrieval easier. This sort of grouping is important, as it positions Delftware as a special category with its own needs and demands. That could lead to determining the most successful preservation method for Delftware pottery specifically.

2.1. Sampling: retrieving objects and collecting metadata information

To create a sample of the Delftware from each museum, the objects needed to be retrieved and some of them had to be chosen. Each museum had a specific system for search and retrieval of the items from their collection, but by the trial-and-error method of searching, the most accurate method was determined. But with almost every museum, it is still questionable whether all items of Delft pottery were retrieved. It is worth noting that this selection is small and represents only a portion of the Delftware collection that is stored in each museum. As shall also be seen, there are certain differences between the metadata of the objects within the same museum. Although these differences will be noted, it can be assumed that there are more differences that went unnoticed, as they could only be observed from the bigger selection than the one presented here.

The sampling started with retrieval, which was different in every museum. Two most popular methods were the use of filters, and the advanced search, which mainly differed in the fact that the filters were more changeable, and every new choice depended on the previous one. For example, in the Boijmans museum, it was necessary to first select the collection through which you want to search, and the time period of objects' manufacture.

[111] Gilliland, "Introduction to Metadata".
[112] Zhang and Mauney, "When Archival Description Meets Digital Object Metadata", 190; 185.

Only after establishing those two properties, it was possible to select Delft as a place of manufacture. Before that, this choice was not displayed as possible. Another thing about filters was that they did not usually overlap. On the Princesshof website, it was necessary to select every available time range for the year of production: for example, the ranges of 1775-1800 and 1750-1800 were not considered as overlapping time periods, and they both needed to be selected. As such, in total there were forty-one selected timeframes for the period of Delftware production between 1620 and 1850. This makes the search through the filters useful when looking for one item, but inconvenient when trying to retrieve all Delftware. On the other hand, advanced search requires certain previous knowledge about the retrieved items. While the filters can direct users towards approximate material of the item by providing numerous choices, with the advanced search, the user has to know it themselves as there are no options to choose from. The museums that offered this type of search were the Rijksmuseum, the Groninger Museum, and the Centraal museum, the rest of museum collections were using filters.

It was hard to determine whether all Delftware was retrieved, and if all non-Delftware objects were filtered out. The only museum that did not encounter this issue was the Kunstmuseum. It later offers Delftware as a part of one of its specific subcollections, which separates true Delftware from other types of ceramics. Yet, there is not a further option to determine the time period of their manufacture, meaning that some objects might have been made after 1820. That is why every item that was selected into the final observation pool, still needed to be checked if all the criteria are met.

As for the actual selection of the items, the sampling technique differed based on the amount of the retrieved results. For the collections with high number of results, like the Boijmans, the Princesshof, the Kunstmuseum, the Groninger Museum, and Rijksmuseum, three objects every three pages were selected. When the number of displayed results was smaller, as was the case for all the other museums, the number of objects per page that were selected, was adjusted accordingly. The aim was to provide a variety in the selection, so at least three different types of objects were selected per page" for example, one plate, one vase, and one butter dish. The items with known maker were preferred, as there was a certainty about them being a Delftware. In the similar way, non-Delftware items were avoided. This led to the sample of 135 objects in total, that can be found in Appendix B. The explanation of their metadata can be found in Appendix A.

The last thing that needs to be touched upon before the actual analysis and comparison of the metadata, is the language of the collections. Naturally, the main language for all

museums is Dutch. But some museums offered the option to explore their collection in English, or even German as well, including the Boijmans, Arnhem Museum, Kunstmuseum, Groninger Museum, and Rijksmuseum. To have a choice of multiple languages, particularly English, opens the site or the collection to the non-Dutch speaking audience. As was already discussed in the previous chapter, the main reason for digitisation is indeed to reach a new audience, especially for Arnhem and Groninger Museums. It is then sensible to assume that there should be a certain level of language accessibility for the new audience, by offering a choice of more possible translations of the collection page.

2.2. Results: observation and analysis

Based on the collected sample, descriptive metadata is the most common type of metadata within the museum in every case but the Edam Museum, which has three descriptive but five administrative metadata present, as is seen in the Table 3. The Boijmans and Rijksmuseum have the most kinds of descriptive metadata – 11 and 10 respectively – while Edam and Arnhem Museum have the least amount, which is 3. For the administrative metadata, it is Rijksmuseum again, which has the most (7), and Princesshof, Arnhem Museum and Kunstmuseum have the least amount of administrative metadata sections (3). This is reasonable, as Rijksmuseum has the most metadata sections out of all museums (17), closely followed by Boijmans (16). On the other hand, Arnhem Museum (5) and Kunstmuseum (6) have the least amount of metadata sections. This means that museums tend to focus more on providing additional information about the object, which is more interesting to users who are visiting the collection. On the other hand, the lack of administrative metadata makes it seems like the museums do not really care how is their data credited and whether is it used in further research.

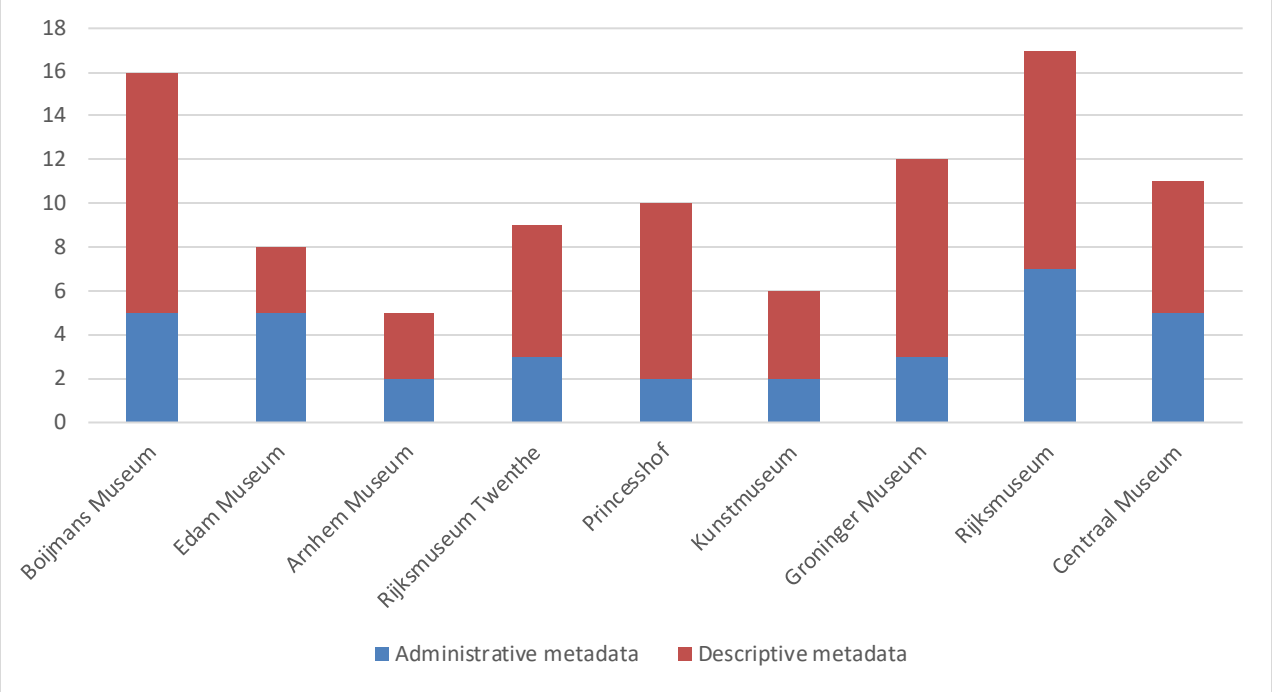

Table 3. Chart representing the number of administrative and descriptive metadata within museum collections.

The specific descriptive metadata, that is present for every museum is dating, as can be seen in the Table 4. Dating describes a year of the object's production. The second most common descriptive metadata is title, or the name of the artwork, and it is only missing in the Rijksmuseum Twenthe. For the administrative metadata, it is an inventory number, which is also present in every case. Inscription, documentation, and subject are the least represented descriptive metadata, as they are present only in two museums. The least represented administrative metadata of URL address is present in three museums. Most of these sections are quite general, providing a standard information about the object. For a specific Delftware retrieval, the most important metadata would be artist, collection, dating, description, material, place of manufacture, and technique. Particularly, collection, and material could facilitate the search of Delftware, although they do not really help as much as they perhaps could. Except for Kunstmuseum, no other museum has a collection dedicated solely to Delftware, as the other collections usually reference much bigger department, for example of Applied Arts, as it is the case for Boijmans and Arnhem Museum. As for the material, there is no consensus, even within one museum, on how to define Delftware. For example, in Arnhem Museum some Delftware items were described as pottery and tin glaze under the material section, but for others it was faience and tin glaze.[113]

[113] For more comparisons, see Appendix B, Table 1, 3, and 5

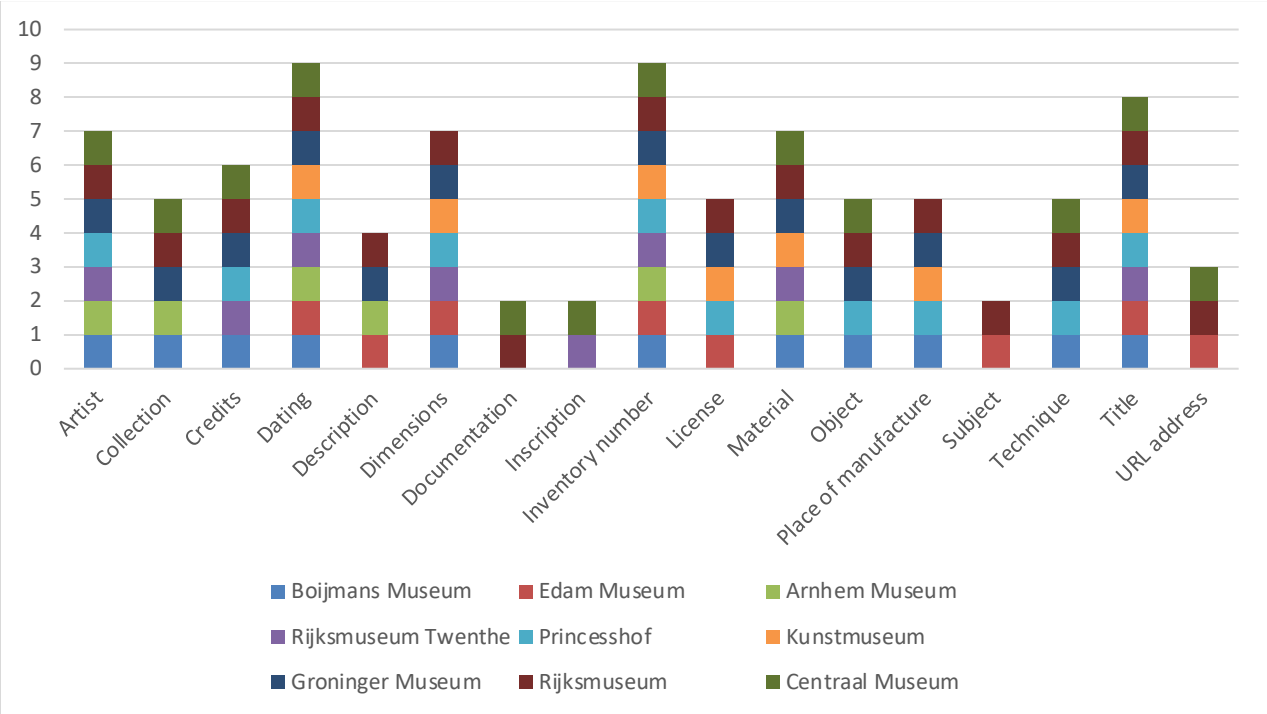

Table 4. The charts representing the number of the repeating metadata within collections.

Another thing is how the objects are connected within the collection. While it was already said that Delftware is not exactly an united group, some specific items still get grouped together. It is best seen in the Boijmans museum metadata, in the Appendix B, Table 1, which really shows the interconnectedness between the objects of the collection. In the section about the object, which describes its function, this interconnectedness is most visible. Delftware is considered either an utensil or art object. The latter is further specified as being a three-dimensional object that can be either a plaquette, sculpture or shard, while the utensils are separated into kitchen and household items, or living accessories. Utensils represent the biggest group that is further specified, creating smaller groups that are less general and describe function of the object more specifically, like the kitchen items. Because there are many different kitchen items, this group gets more specific as well, further distinguishing between the item's function, whether it is for serving food or drinks. Even that can get more specific, to distinguish what can of drink was being served in the specific objects. On some level, all of these items are connected through being utensils, but can also form very specific groups that refer to their function better. Then there is also a section about material, which also catalogues items more specifically. All objects are connected as a part of ceramics, but selecting a more specified group creates better chances at retrieving only Delftware. That is because less results are being retrieved, as there are thousands of earthenware objects, but

only hundreds of faience items. If every Delftware was classified as tin-glazed earthenware, the search would be much easier as that is the most specific group, but some items are only a part of faience, and do not get defined further.

While this is a particular way of Boijmans, many museums catalogue their objects in a similar way, by categorising them together based on their function or material. In the collections that are managed properly, every item into the placed group. Nevertheless, mistakes still happen, and some objects are categorised inaccurately. For example in the Appendix B, Table 3, the material of item number 15 is incorrectly listed as porcelain. These sorts of mistakes get noticed more quickly if the item is set in the particular context, in this situation as an item of Delft pottery. That is why it is important to create small collections that could be managed together as a group, leading to a more precise cataloguing.

Overall, the metadata observed from this sample was quite ordinary, providing general information about the items' appearance and provenance. While the average museum has around ten metadata sections, the content of these sections can provide great help in finding the desired item, in this case Delftware. For that, those sections need to be used correctly and consistently through the whole collection, which is seldom a case. There are indeed many discrepancies, particularly in the section about material, which should be the same in the content of every item. This is sadly not the case yet, apart from the Rijksmuseum and Kunstmuseum, who both use the word faience to describe their Delftware. Ultimately, this study of metadata served to introduce notions of descriptive and administrative metadata. They will be further discussed in the following analysis chapter, as they play a great part especially for the Interoperability and Reusability principles.

3. FAIR principles in museums' collections

3.1. F stands for Findability

The principle of Findability was already defined as the discoverability of the object on the Internet. As can be seen in the Table 5 below, F1 and F3 require the presence of the unique identifier to differentiate between individual Delftware, F2 talks about importance of the extensive metadata, and F4 demands that collections storing Delftware appear in the results of web search. As such, the museums will be compared to see whether they provide said identifier for the items in their collection, as well as if their online collection websites are indexed on Google search. Lastly, the content of the metadata section that was explored in the previous chapter will be discussed once again.

Findable
F1. (Meta)data are assigned a globally unique and persistent identifier
F2. Data are described with rich metadata (defined by R1 below)
F3. Metadata clearly and explicitly include the identifier of the data they describe
F4. (Meta)data are registered or indexed in a searchable resource

Table 5. The principle of Findability[114]

Starting with F1 parameter, only three out of nine museums have a globally unique identifier, namely: the Edams Museum, the Rijksmuseum, and the Centraal Museum (see

[114] GO FAIR, "FAIR Principles".

Table 4 below). Furthermore, all their identifiers are of the same nature, which is a permanent and sustainable URL or Uniform Resource Locator.[115] This type of identifier is referencing not only the object itself but also the museum collection it is a part of. Ordinary URL addresses have a great risk of going obsolete, but URLs that were designed as persistent identifiers (PI) should not have this issue. That is because this type of address is not based on the main domain server, so the museum website, but rather on the server that is responsible for dealing with and preserving the identifiers.[116] In case the online collection site went down, the object and its metadata are still safely stored and protected on a different server. Yet, this requires collaboration with third parties that would provide this security. All three museums are registered under Handle.Net registry, which oversees the proper functioning of their PIs. Although it is a costly endeavour, prominent museums like Rijksmuseum and The Centraal Museum can afford it. The Edam Museum has the benefit of being a part of the Zuiderzee collection, which provides identifiers for all twenty-six institutions it is currently managing.

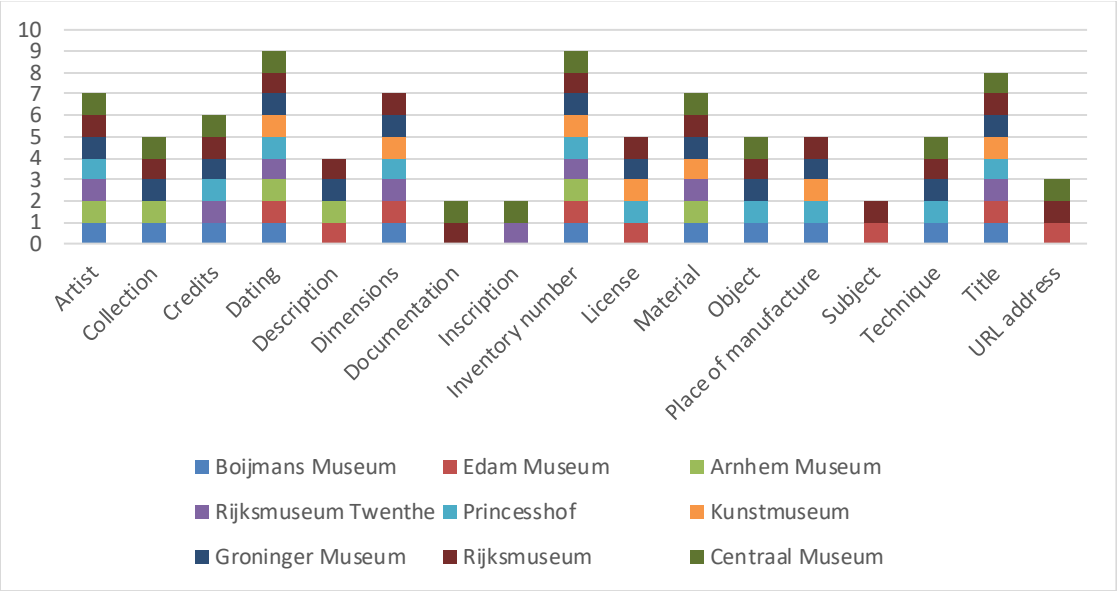

Table 4. The charts representing the number of the repeating metadata within collections.

Moving to the next F4 parameter, which requires the online collections to be indexed. For the sake of the simplicity of the research, the focus shall be on Google, as it is the most usable search engine.[117] What is meant by indexing, is that the collection website appears in Google search results. This is easily verifiable by typing the query "site:" followed by the domain of the museum collection, into the Google search tab. All the websites appeared after

[115] Gleim and Decker, "Timestamped URLs as Persistent Identifiers", 2.
[116] Hilse and Kothe, "Implementing Persistent Identifiers", 17.
[117] Statista, " Market share of leading desktop search engines worldwide from January 2015 to January 2024".

this search, which marks them as indexed. But there seems to be some problem with the collection of the Edams Museum. As there are a number of other museums present within the Zuiderzee online collection, it seems to hinder the specific indexing. The Edams Museum needs to be explicitly selected, so as to only browse through its collection. Yet the indexed website does not distinguish between museums and does not automatically select the Edams Museum, instead showing the general collection without any filters (fig. 3). On the other hand, the website with a link that automatically takes you to the Edams Museum collection is indexed and works properly.[118]

This is as far as the findability on the Web goes. Although the Findability of FAIR in general, focuses purely on this type of discoverability, the findability in the sense of the searchability within the collection is also interesting to evaluate. The retrieval of Delftware was already discussed in the previous chapter, but now it is time to examine the findability on the collection website through the identification or inventory number of the object, which is specific within the museum. As every museum provides this inventory number, it would be reasonable if it worked as a shortcut to finding a specific object on the website. As it turns out, the search by inventory number is indeed quite successful, as every collection does find the specific item based on its inventory number, with the exception of the Edams Museum. Yet only the Rijksmuseum and the Centraal Museum provide a specific search option for the object number. For the rest of the museums this search needs to be done through keywords. As there are examples of the failure in the keyword search of the Arnhem Museum, and the Rijksmuseum Twenthe, it is questionable whether the search by object number would always work in these collections.[119]

Lastly, F2 requirement lists rich metadata as a prerequisite for Findability. Metadata sections were already counted, and the Rijksmuseum, closely followed by the Boijmans Museum, contains the most varied selection of the metadata with the respective seventeen and sixteen elements. It should be considered that descriptive metadata is the most useful regarding the findability, as it contains more appropriate information that the users might look for, and through which the object can be found. This way, the Boijmans Museum is in the lead, changing its place with Rijksmuseum, with eleven descriptive metadata present. But the question about “richness” of this metadata still remains, as it is unclear what is the general average number of descriptive metadata of all the museum collections in the world. To

[118] Zuiderzeecollectie, "Edams Museum’.
[119] Failure within the keyword search was also noted for the Centraal Museum, but as it has the specific *object number* category within its advanced search, the museum was not counted among the above mentioned two museums.

provide a certain perspective in this matter, the Smithsonian and Victoria & Albert Museum should be seen as evaluation examples. Their items seem to contain around fifteen or twenty metadata sections in total, depending on the information that is available about the object - ten out of which are descriptive metadata. That puts the metadata of the Rijksmuseum and the Boijmans Museum in a good light and provides an aspiration to lower-ranking museums.

All in all, all museums fulfil the Findability to a certain degree. The low number of museums with PIs can be explained by the costs that come with it, which are perhaps deemed too high for some museums. The three museums which do contain persistent identifiers, all aim towards permanent URL address, as it directly refers to the museum itself. As for the other parameters, all museums are discoverable through Google search, which also speaks to the fact that their websites are frequently visited. The last requirement of rich metadata is also fulfilled to a certain degree, although museums with below average number of metadata sections like Edam Museum, Arnhem Museum, Rijksmuseum Twenthe, and Kunstmuseum, should strive to make their metadata more varied, with at least the average ten sections.

3.2. A stands for Accessibility

To assess the Accessibility of the museum collections, certain things need to be determined, including the question of open access, available backups, and public APIs. The reasons why open data is not equal to the accessibility were already presented as private data needing necessary protection, that is not usually required by open access. Nevertheless, it is important to note, that in the cases of Delft pottery or museum websites, there is no need for any such safeguards or additional security measures concerning private data. In this way, accessibility can equal to the open access, which all nine collections are accessible, as they are openly available to all internet users.

There is still a matter of the collection staying accessible and available, which is enabled by the security in the form of backups. If by some accident, the collection ceases to exist, the data will still be saved and preserved. This type of security is not a matter for the museum itself, but rather for its collection management system (CMS). Four out of nine museums have information available about their CMS, which makes the Boijmans Museum, Groninger Museum, the Kunstmuseum and Rijksmuseum comply with this aspect of Accessibility.[120] For the rest, this is hard to determine, as their exact CMS is unknown.

[120] Axiell, "From Adlib to Axiell Collections"

Even though this safety measure that is granted by CMS, cannot be further detected and analysed for the rest of museums, there is a more public possibility and perhaps even an opportunity to see the preserved online collection websites. The tool that enables such preservation is a digital archive called Wayback Machine, which is a special initiative of the Internet Archive. The main function of the Wayback Machine is that it stores the snapshots of the websites frozen in time. This is not an endeavour that a museum itself would specifically do. Instead, normal users choose to archive a website by uploading it on the Wayback Machine to preserve it. While it perhaps should not count in favour of the museums, it is still an interesting thing to explore as something that could potentially be used if other means of protection fail. If anything, it at least shows that users themselves care about the digital material in the collections, as well as about its preservation.

For the four museums that do have known security backups, only the main collection site was checked whether it is archived. For the remaining five, it was a main site as well as detailed pages of the fifteen items that were selected as an observation pool. As can be seen in Table 6, no individual pages were archived, only the general collection. Rijksmuseum is quite in lead with 6180 archived snapshots, spanning from 2013 which is a year when the digitising endeavour of the museum truly started.[121] While the second most archived museum on the Wayback Machine is the Centraal museum, the gap between the first and second place is incredibly wide. Nevertheless, it is still remarkable that all collection sites are recorded, even when there is only one record as is the case for Princesshof and Groninger Museum.

Museum	**Number**	**Time range**	**Link**	**Explanation**
Boijmans	39	March 29, 2019 - January 19, 2024	Link	
Edam	17	August 8, 2020 - July 18, 2023	Link	Zuiderzee collection
	5	November 26, 2022 - July 18, 2023	Link	Redirection that leads you to Edam collection within Zuiderzee collection
Arnhem	11	September 26, 2020 - April 5, 2024	Link	
Rijksmuseum Twenthe	14	March 23, 2019 - May 19, 2023	Link	
Princesshof	1	February 12, 2022	Link	
Kunstmuseum	18	July 30, 2020 - April 6, 2024	Link	
Groninger	1	May 6, 2023	Link	
Rijksmuseum	6180	January 12, 2013 - April 28, 2024	Link	
Centraal	509	October 12, 2018 - March 24, 2024	Link	

[121] Rijksmuseum, "Our data in the nutshell".

Table 6. The list with links to archived museum collection websites on Wayback Machine.

Lastly, there is a matter of publicly available APIs. If working properly, retrieving objects through API would be much easier than filtering through the advanced search on the website. Yet only the Rijksmuseum provides this opportunity. Rijksmuseum API is available to anyone who registers to obtain a key. The website also provides a manual on how to navigate the retrieval and what exact query to use. Although this retrieval is said to be "identical to the advanced search page", there are still benefits for the API search including the compactness of the results, with the clearer structure of the metadata.[122] Perhaps it is not a coincidence then, that the museum with the most conveniently searchable collection, is also the only one providing API retrieval. While it is aided by their collection system, meaning that the Axiell Collections provides the opportunity to set the API, the museums have to set it themselves. This is perhaps why so many do not use this opportunity. It is a technically challenging endeavour, that requires resources some museums are not in the disposal of.

In conclusion, the Accessibility principle is tricky to assess. On one hand, there is the open data policy, which every museum complies with. This would make the evaluation of compliance with the principle simple. Yet, on the other hand, there is a question of the backups that was only resolved for four out of nine museums. Granted, every collection was saved on the Wayback Machine, but that is more related to the preservation of the appearance of websites, and less about the actual objects that are stored in the collection. Not a single object was recorded in this way, and that includes the sub-collection of Delftware that is available on the museum site of the Kunstmuseum. It is not the responsibility of the museum to have every object from its collection archived on the Wayback Machine. But it does show that they do need to put the effort into the digital protection, as in the case of the server failure, the object will not be able to be restored in any other way.

It is still hard to explicitly say anything without knowing about the exact collection management system of the museum website. The nature of CMS can explain the safety measures, and the lack of API, as certain systems might not support this type of software interference. For the museums with known management systems, who still do not provide API, the answer may lay in the lack of the necessary resources.[123] Be it the budget, or lack of

[122] Rijksdata. "API".
[123] This is the case for the Boijmans, the Kunstmuseum, and the Groniger Museum

trained technical staff, setting the API might not currently be an option for them. However, if that is the case, the museums should then perhaps work to make the search within their website easier. The current filter options do not suffice in most of the cases, and the advanced search is almost never available. The retrieval of all Delftware, or at least of most of the Delftware, would be more feasible with API, which could specify certain criteria that cannot be filtered through. Although it would not be perfect, as for that Delftware needs to be catalogued together as a group, it would still make the Delftware collection more accessible to the users.

In any case, it can be safely said that the Rijksmuseum complies the most with the general ideas of the Accessibility principle, as the museum highlights its compliance with open access policy, usage of API, as well as the new and future-proof CMS. It would perhaps be wise, especially, for the Groninger Museum and Kunstmuseum, to follow this example and update their management system as that is what in the end provides the best security for the digital content.[124]

3.3. I stands for Interoperability

The Interoperability principle is in its simplicity about the communication between two or more types of software.[125] This is difficult to assess from the perspective of how the users operate on the website, as it is not something that would be noticeable or something that would be easy to influence.[126] Instead, it requires "domain expertise" that is privy only to the technical department responsible for the digital collection and museum website.[127] As such, the focus of this chapter will be more on the Interoperability of the collection in terms of how interconnected the items of the Delftware are. For that, the discussion will be centred around the descriptive metadata and hyperlinks that it provides, as well as the controlled vocabulary that should connect all the items as per I3 requirement: "(Meta)data include qualified references to other (meta)data."[128]

It is important to preface that five out of nine museums do not contain any hyperlinks in their metadata that would redirect the user to a more specific category of the data. This is quite inconvenient and causes a less clear idea about how the items in the collection are

[124] Groninger Museum and Kunstmuseum are specifically mentioned as they are currently using the older version of the Rijksmuseum's CMS the Axiell Collections, called Adlib.
[125] Jacobsen et al., "FAIR Principles", 14.
[126] Mokrane and Recker, 'CoreTrustSeal–Certified Repositories', 7.
[127] Ibid.
[128] GO FAIR, "FAIR principles"

connected. Therefore, the following text only refers to Boijmans, Princesshof, Groninger Museum, Rijksmuseum, and Centraal Museum, as all of them provide hyperlinks in their metadata. The second important thing to mention, is that there are seven metadata sections through which Delftware can be retrieved: the artist, collection and subject, documentation, material or technique, and place of manufacture. These metadata should be the most reliable in connecting Delftware, if used accordingly.

Starting with the metadata section of the artist that describes the maker of the item. Usually, it would be the name of the factory that unites all objects that were produced there. Although this is connecting only small portions of the Delftware, it is still a connection. It can even be made more specific if the owner of the factory is listed, which then reveals approximate dating as well. This type of information can be known from the inscription on the object.[129] The inscription should be listed in the metadata of the object, as the evidence that attests to the maker, either as separate metadata information or as a part of the description. Yet, only two museums list inscriptions as metadata, and only four different museums provide descriptions, as can be seen in Table 4 below.

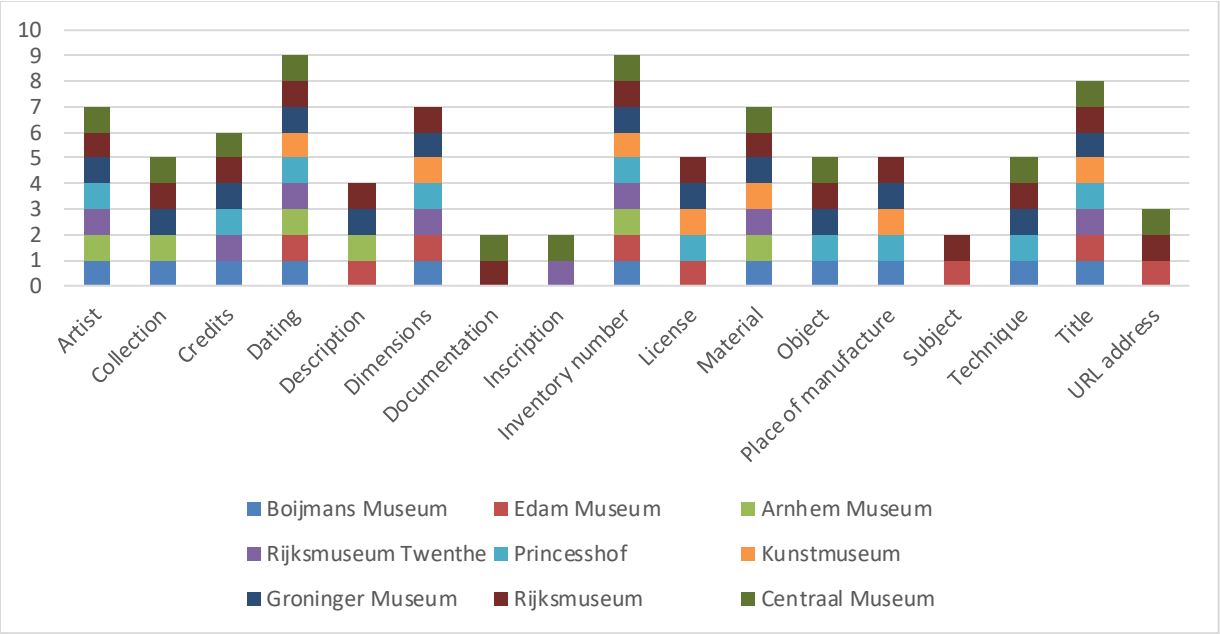

Table 4. The charts representing the number of the repeating metadata within collections.

There are some cases when the information about the artist is not known. In these cases, museums just list the maker as "Anonymous" which connects the Delftware to all objects of the whole museum collection with unknown makers. In terms of hyperlinks, all

[129] Delfts Aardewerk, "Factory marks".

museums recognize and catalogue items with "unknown maker" under the same category, except for Princesshof. There, the hyperlink "unknown" redirects to query results that are equal to a keyword search of the word "unknown". This is inconvenient as the word in question can refer to different metadata, and not just the maker. Moreover, this is pointlessly mixing unmarked Delftware with items that it has no relation to. The one exception is the Centraal Museum which lists the unknown potters as "Anonymous Delft". This then connects all Delftware of this kind, as can be seen in the metadata of the object number 3, from the Appendix B, Table 9.[130]

The collection and subject sections could connect objects more specifically as Delftware pottery, yet it is underused or used for different means. The Boijmans and Rijksmuseum Twenthe simply describe the Department of Applied Arts. For the Groninger and Centraal Museum, the most common type the Delftware is registered under are "Western ceramics" and "Dutch pottery" collections respectively, which is way too broad, both in terms of geographical region and non-existing timeframe. As for the Rijksmuseum, both the collection and subject sections are unreliable as they are not always present. They are also rather vague in what they are describing, as it can sometimes be related to the decoration or the function of the object.[131] Similar to the subject section of the Edams Museum, which is only present in one item and refers to its decoration.[132] Even though all museums have their hyperlinks present for these categories, the groups that are created by these metadata are rather vague. Museums have an opportunity to create a specific collection and to group all the Delftware purely on the basis of the objects being Delftware. The only museum that did so was Kunstmuseum, yet the objects do not reference the subcollection they came from in their metadata. Rijksmuseum also seems to plan purely Delftware digital collection, but it is hard to determine how well will this endeavour work.[133]

As for the information about documentation, only the Rijksmuseum and the Centraal Museum provide this data. Although they are only referencing their own publications or the documents they can provide access to, it is still useful in setting Delftware into a broader context. It also connects all the objects that were published in the same publication, although the only way all of such objects can be retrieved is searching the collection by keyword. His specific method can cause incorrect retrievals, especially in the Centraal Museum collection.

[130] This is for the objects that are not marked, or if the mark is not recognizable.
[131] The examples can be found in (8) *Tray with Chinese figures on a terrace* and (2) *Flower pyramid*, in the appendix B, Table 8
[132] The examples can be found in (14) *Delft earthenware cabinet set*, in the appendix B, Table 2
[133] Rijksmuseum, "Delftware Collection Catalogue"

Continuing with material and technology, which is metadata that is oftentimes grouped together as just the material. This is one of the most important metadata that helps in finding the Delftware. Yet, the main problem for every museum except the Rijksmuseum is that it is not a unified section. In general, Delftware is understood as faience, glazed or tin-glazed earthenware, but in the controlled vocabulary of the museums, all these terms are understood as completely different. For example, in the Groninger Museum, there are two distinct technologies that do not overlap: one is "glazing", and the other one is called "glazing of the pottery".[134] As even such a small difference can make two different groups, Delftware should be unified under one material and one technique only. Hyperlinks are present for this metadata section as well, even though the links oftentimes lead to incomplete selections if there is more than one hyperlink, thus more than one material, present. This is the case for the Groninger Museum and Princesshof, as can be seen in their metadata in appendix B, Table 5 and 7.

Lastly, there is a place of manufacture, which describes the city of Delft. Yet, not every museum contains this metadata as can be seen in Table 4. Some of the collections mention it in their descriptions which makes the retrieval by keyword possible. Although every museum connects this metadata with hyperlinks, there are certain issues concerning the Groninger Museum and Princesshof. For the former, it is unclear where the hyperlink leads as the manufacturing place is not an option to filter through, even in an advanced search. It does seem like there is a category of the place of manufacture but it is not possible to search through it from the beginning. It is then interesting that the reverse search can be done once you find one item from Delft, but to find it, the only possibility is searching through keywords. As for the Princesshof, there is the same issue as there was with the maker, of redirecting back to the keyword search query.

In conclusion, there are many ways in which Delftware can be connected and how can this connection be explored by the users. The Interoperability principle should certainly help in this regard, yet it seems like not every museum considers it as it should. The main issue seems to be that antique Delftware is not seen as a group, and much information that should be unified is actually different. The whole system is also incredibly sensitive and as such, even small differences in wording mean two completely different things. The hyperlinks that are the main connecting devices are only present in five museums. Yet they are not working properly in the Princesshof, turning it into a general keyword search. The most useful

[134] In the Appendix B, Table 7, the material of the artwork (1) *Wedding plate*, is glazing, the rest of the artworks are known catalogued glazing of pottery.

hyperlink in the retrieval of Delftware are in the Centraal Museum, particularly the one concerning the maker and the collection, even though the latter is not exactly orientated towards Delftware. Even the Rijksmuseum collection experiences issues in regard to connecting Delftware, although it manages to do so by the material. All in all, every museum has its ups and downs with the controlled vocabulary system they use, and the hyperlinks they provide. Perhaps a clearer system should be advised, a system that would emphasise the similarities of Delftware and make it a coherent group. This is once again tied to the technical resources that are perhaps lacking in some museums. While the lack of resources makes this matter more complicated, it is necessary that the museums perfect retrievals and search within their digital collection, as well as focus on more cohesive cataloguing.

3.4. R stands for Reusability

The Reusability principle is like all the others, also connected to the metadata of the objects. Particularly, the administrative metadata is of importance here, as it describes how to reuse and credit the data. This metadata is often underappreciated, as it only forms a small part of the general information about the object. As can be seen in Table 3, only in the Edam Museum does it surpass the descriptive metadata. Administrative metadata mostly describes the information about the licence or the rights holder. This refers to the information about who owns the rights to the object, and what is the correct procedure in referencing the righ's holder, in a case the data is reproduced and reused, for example in a research.

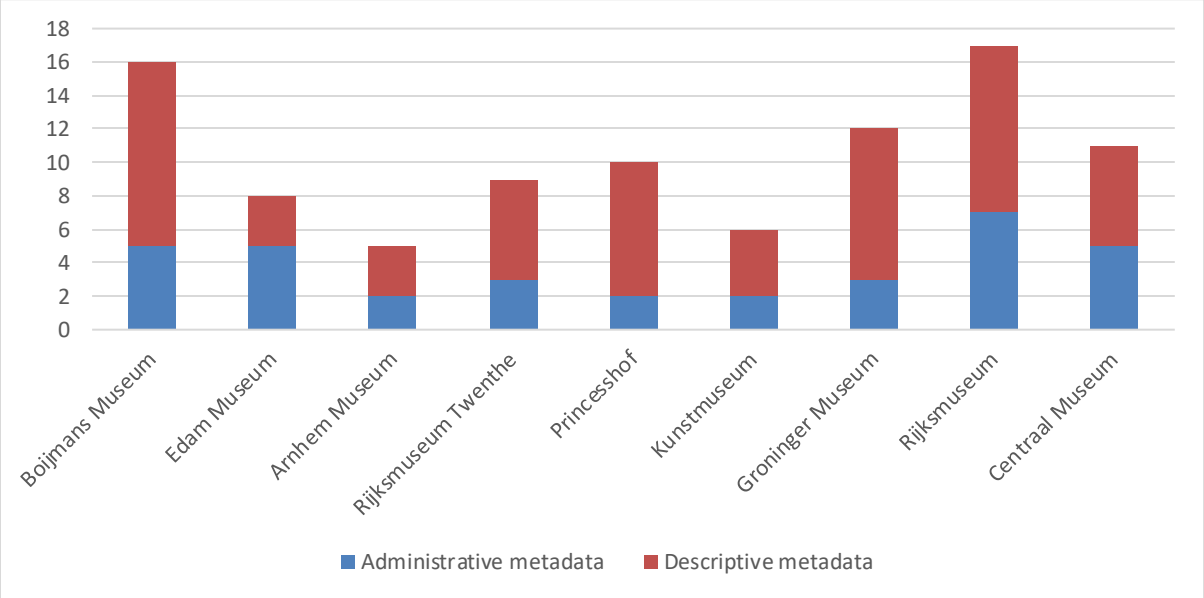

Table 3. Chart representing the number of administrative and descriptive metadata within museum collections.

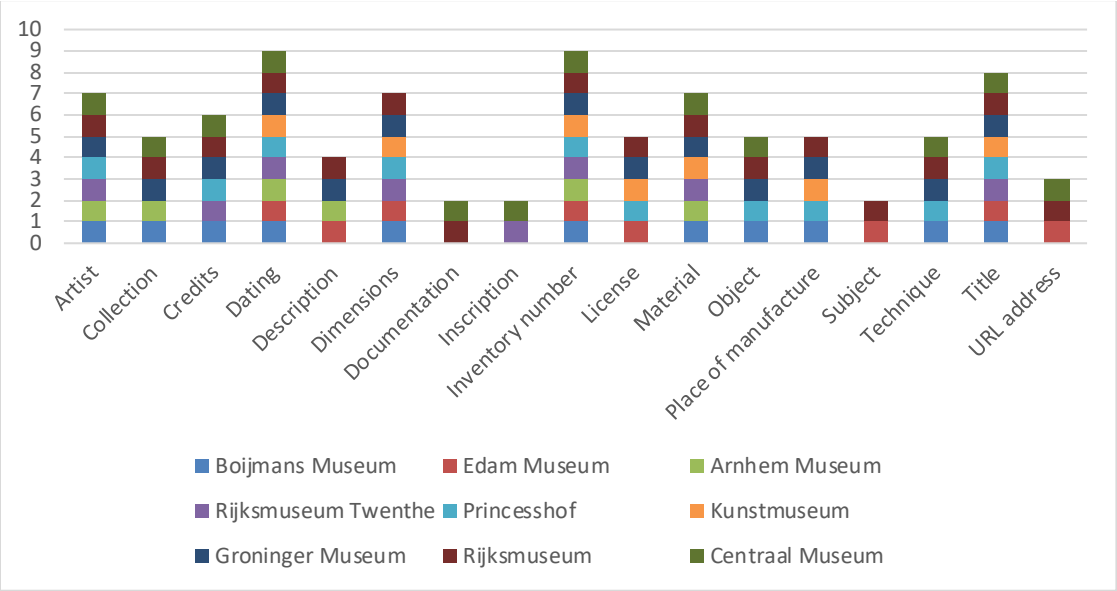

Table 4. The charts representing the number of the repeating metadata within collections.

As seen in Table 4, five out of nine museums contain information about "License". Each of the museums is also handling this information differently. The Rijksmuseum is the only museum that specifies its licence, as it provides a hyperlink, that serves as redirection to the Creative Commons website. The website explains the use of the particular licence, which in the case of Rijksmuseum is public domain.[135] This means that the data can be used without needing the permission of the Rijksmuseum as no copyright applies.[136] For the rest of the museums, all rights apply and are reserved for these institutions only. That is the opposite of the approach done by the Rijksmuseum. What it means in practice, is that referencing Rijksmuseum while reusing their data is mere courtesy, but for the above-mentioned four museums it is a necessity.

Although having the collection in the public domain brings many benefits, it is also rather taxing to achieve, especially for the smaller museum.[137] The monetary resources are once again a main issue as it would be hard for many museums to just give upon the revenue they get from charging for the use of their images[138] Yet, it is important to note that the nature of licensing is not a matter for FAIR. It does not matter if the object is under copyrights or in the public domain, what matters is that it is listed in the metadata. This way, the users can

[135] Creative Commons, "About CC Licenses"
[136] Rijksmuseum, "Open data policy".
[137] Pekel, *Democratising the Rijksmuseum*, 8.
[138] Ibid., 13.

know how to approach and cite the data they are reusing. A similar case is with the open access and the Accessibility principle. Data does not need to be open as long as there is a way to access it by fulfilling certain demands. If the site is transparent about how the data works, the exact nature of access or the licence is a secondary issue.

While the reusability is primarily connected to the administrative metadata, Barbuti suggests expanding this notion of reusability to descriptive metadata as well. Moreover, its definition would change to encompass reusability, relevancy, reliability, and resiliency, to create so-called R^4. [139] As was described in one of Barbuti's articles, the main objective of this endeavour would be to monitor metadata's "life cycle and design, creation, fruition, reuse and transformation over time" to "make digital heritage more sustainable and permanent".[140] While this is not something museum collection would be concerned about today, it is an interesting proposition that could change how they are documenting changes in their data in the future. Even now, there seem to be first implementations happening, however accidental. The relevancy and reliability of a particular object and its metadata can be checked for example by its history. This can be provided by the documentation section in the metadata of the item, or even in the exhibition history section which is present in the Centraal Museum (see Appendix A, Table 9). If these sections expanded their content, and if more museums applied these metadata, it would improve the quality of the whole collection, and fulfil the requirement of R1.2: "(Meta)data are associated with detailed provenance".[141] The continuous documentation of the history of the data would also meant that data is preserved in different shapes and forms. This would add towards Barbuti's resiliency, which is the requirement set to "preserve the memory of the original function" of the data.[142].

While the metadata in general is important for every of the FAIR principles, only the Reusability emphasises its actual content. It is perhaps reasonable, as it is the content that is being further reused. Nevertheless, only five out of nine museums mention how they want the users to handle the provided data. Out of these five, only the Rijksmuseum presents more context to their data by describing data's history. While the latter requirement is more of a suggestion that would improve the state of the metadata and the collection in general, every museum should let the users know how to approach the citation and use of their data. The copyright is not automatically a given information and needs to be specifically stated. Not only is that legally required information, but it is beneficial for the museum to have their data

[139] Barbuti, "Thinking Digital Libraries for Preservation as Digital Cultural Heritage", 310.
[140] Ibid.
[141] GO FAIR, "FAIR principles"
[142] Barbuti, "Thinking Digital Libraries for Preservation as Digital Cultural Heritage", 310.

appropriately reused. Putting the museum's name in the research context provides certain credibility and widens the museum's possible audience.

Conclusion

The conversation around digitization and digital preservation is getting more and more prevalent in recent years. Although digital archiving already existed in the nineteen nineties, digital museum collections gained quite a lot of attention in the past decade.[143] This is tied to ongoing debate and the process of making research on the Internet more manageable, not only for the users but also for the software that is dealing with requests for the search. That is how FAIR principles came to be.[144] These guiding principles are supposed to facilitate the research and improve data management on the websites. This improvement has far-reaching consequences and touches upon many different issues that are experienced in the digital realm. One of them is the topic of digital preservation. Even though FAIR does not explicitly seek to preserve the data, it provides for good management which makes the preservation strategy easier to implement.

The aim of this thesis was to see how the Dutch museums approach the topic of digital preservation, particularly through the use of FAIR principles. Each principle was explained and set in a particular context concerning online museum collection, yet the essence of the principle as presented by its official definition remained. The main study was Delftware pottery, which takes a particular place in the Dutch socio-historical context, and is therefore a part of the collections of some of the most important museums in the Netherlands, including the Rijksmuseum or Museum Boijmans. The aim was also to see how the museums handle the categorization and presentation of Delftware in the digital sphere, which is so different from the actual physical space of the museum.

It was understood from the beginning that every museum will have its specific approach towards digitization, mainly based on its goal, capability, and resources available for the particular museum. The final results were indeed quite mixed, both in terms of FAIR principles application and dealings with Delftware. It is important to remember the interconnection between digitization and digital preservation as presented by Conway and explained in the beginning of this thesis.[145] That is that digital preservation needs to accompany digitization immediately, otherwise, there is no point in digitising the physical item, especially if its transformation to the digital sphere is supposed to help preserve it in the psychical reality. But not many museums share this sentiment. Although they deal with the

[143] Task Force On Archiving of Digital Information, *Preserving Digital Information*.; Rijksmuseum, "Our data in the nutshell".
[144] Wilkinson et al., "The FAIR Guiding Principles for Scientific Data Management and Stewardship".
[145] Conway, "Preservation in the Age of Google".

digital content in their collection, going as far as mentioning it in their multi-year policy plans, the act of preservation itself is seldom mentioned. The scarce mention also applies to FAIR principles. The one exception would be the Rijksmuseum which is very clear about the state of its data as well as about its continuous improvement.[146] It positions itself as quite progressive in this regard, and comparing it with other museums, it must be said that it is not a false or misleading statement. The Rijksmuseum fulfils every principle especially if compared to the remaining eight museums, although it does not yet provide a cohesive collection of Delftware, something that Kunstmuseum den Haag did manage to make.

In general, it seems like the museums are quite genuine in their policy plans, as the way they mention digitization is also the way they approach it. The Edam Museum, Arnhem Museum and Rijksmuseum Twenthe do not really occupy themselves with this topic in their plans, and their online collections reflect this approach. Considering the general lack of Persistent identifiers, complicated retrieval of the Delftware items, lack of hyperlinks, and not exactly rich metadata, it seems like the collection is functioning more like an archive that is simply storing the digital versions of the objects, with minimal information about them. The Princesshof, Kunstmuseum, Groninger, and Centraal Museum are more focused on their digital collections, but only to a certain degree. Their metadata, both administrative and descriptive, is certainly richer in the information, but there are still certain drawbacks in how their website operates. These drawbacks are fixable, but it seems like it is not a current focus of the museums to correct the issues and make their collections easier to operate on.[147] Lastly, Boijmans Museum, and the Rijksmuseum especially, are rather diligent in their efforts to make their collections as accessible and as user-friendly as possible. It is, of course, no surprise as those are also the museums with some of the biggest collections here. As such, they have more resources available for this effort than the above-mentioned museums.

The fact that needs to be mentioned, is that having a digital collection is an accomplishment on its own. Although the functioning side of said collection is important as well, it is more than possible that it will keep improving in the future years. Even though it is not a priority now, perhaps because the museum is dealing with far more pressing issues, it does not mean it will never become a more important matter in the museums' policy plans. It also seems that many museums count on the collection management system to manage their collection, including the implementation of FAIR and the preservation itself. The system

[146] Rijksmuseum, "Our data in the nutshell".
[147] The exception might be the Centraal Museum, which is currently working on fixing their website, yet it is hard to predict to which extent the presented problems here will be fixed.

employed by the Boijamns, prides itself on its easy use, access, and security.[148] More museums should publish the information about the CMS they use, to provide the outlook on what potential their collection has. It is perhaps worthy research on its own, to cross-compare particular applications of the same CMS by different museums. For example, if to compare Groninger Museum and Kunstmuseum, which both use Adlib, it is quite interesting to see that certain metadata that is present in Groninger, is lacking in Kunstmuseum, and that the subcollection differentiation that is available in the Kunstmuseum, is missing in the Groninger Museum. It all then leads towards what the museum itself is capable of providing and how they can use the presented opportunities. In this regard, it seems to me that museums should invest in good CMS or at least use most of it to their advantage. Rich metadata is key to the majority of FAIR requirements, and as such, it would be wise to improve the quality of already existing metadata, especially to add information about the artist, material, and the place of manufacture as those are the crucial descriptive metadata for the Delftware. Information about the licence and its application needs to be present as well.

Perhaps the most interesting concluding remark from the analysis of the collections' metadata is that Delftware needs to be unified. Ideally, all Delftware pottery would be stored under the same collection as it is in the Kunstmuseum, or at least the unification of material needs to be achieved, as it is in the Rijksmuseum. Right now, it seems like Delftware is not considered to be a special category in the rest of the collections. This is a missed opportunity, as digital cataloguing provides a new way for museums to store their objects and to realise what they actually store. [149] This creates possibilities of making new connections, or further establishing the old ones. While in the physical collections items that are connected can be stored and displayed together, in the digital realm, this sort of connection often disappears, especially with unclear controlled vocabulary or confusing advanced search. This is unfortunate, as many museums and users would benefit from re-establishing these sorts of relations between objects.

This is also connected to the display of Delftware pottery in the virtual realm. In eight out of nine museums, the display mainly consists of one photograph, which is more appropriate to the two-dimensional physical objects like drawings or prints. The best solution for the display of Delftware is the 3D scans of the objects. Those show the object from every side and make a strong point in translating the physicality of Delftware to the digital sphere. But that is a costly endeavour requiring both monetary resources and qualified staff. Another

[148] Gallery Systems, "Collections Management with TMS Collections".
[149] Müller, "Deciding on Digital Archives", 88.

good approach would be similar to the Groninger Museum, which shows numerous photographs of the same item, just from different angles. Yet, for many museums this would mean that the digitization process needs to start practically all over as the items need to be photographed again. As such, this would be a solution for objects that do not currently have an image attached to the information that is available about them in the collection. Many of those objects are in the Boijmans, Rijksmuseum, and the Centraal Museum as in those collections it is possible to filter through objects without image. The rest of the items with only one picture would benefit from the description, which would provide for the gaps about different sides of the object, or just generally help in distinguishing the scenes or ornaments that are portrayed on the surface of the item.

In conclusion, different museums are in different stages of how they handle their digital collections. While the lack of attention to certain factors can be explained by the lack of resources from the museum's side, there are still things that can be improved by a little more effort. While the online collection might not be a top priority for some museums, they should not ignore its needs, as the lack of digital preservation in this regard renders the collection useless. Ultimately, every museum is on the way of implementing the FAIR principles, even if it is not explicitly done on purpose. Good data management makes the operation and use of the collection much easier and serves to the benefit of all. As such, digital preservation and FAIR principles should not be seen as some sort of non-achievable goal. By considering the available resources and priorities of the museums, it is clear that it is harder for the majority of them to achieve the status of the Rijksmuseum collection. Nevertheless, they continue at their own pace to maintain their collection and to improve it. As was presented by the archaeological article from Cambridge University: "The only question that remains should be ´How quickly can we implement FAIR practices?´ rather than ´Will it ever be FAIR?´"[150] It is that very question that every museum should continue asking themselves and trying to answer as soon as possible.

[150] Nicholson et al., "Will It Ever Be FAIR?", 72.

Bibliography

Aronson Antiquairs. “The Centraal Museum of Utrecht, Netherlands.” Accessed on 13 June 2024.

Aronson Antiquairs. “Delftware and ´Cheese City´ Edam.” Museums. Accessed on 13 June 2024. https://www.aronson.com/museums/delftware-and-cheese-city-edam/.

Aronson Antiquairs. “Delftware in Museum Collections.” Accessed on 13 June 2024. https://www.aronson.com/delftware-in-museum-collections/.

Aronson Antiquairs. “Groninger Museum.” Museums. Accessed on 13 June 2024. https://www.aronson.com/museums/groninger-museum/.

Aronson Antiquairs. “Museum Arnhem.” Accessed on 13 June 2024. https://www.aronson.com/museums/museum-arnhem/.

Aronson Antiquairs. “Museum Boijmans Van Beuningen in Rotterdam, the Netherlands.” Museums. Accessed on 13 June 2024. https://www.aronson.com/museums/museum-boijmans-van-beuningen-in-rotterdam-the-netherlands/.

Aronson Antiquairs. “Kunstmuseum, The Hague.” Museums. Accessed on 13 June 2024. https://www.aronson.com/museums/gemeentemuseum-the-hague/. https://www.aronson.com/museums/the-centraal-museum-of-utrecht-netherlands/.

Aronson Antiquairs. “Rijksmuseum, Amsterdam.” Museums. Accessed on 13 June 2024. https://www.aronson.com/museums/rijksmuseum-amsterdam/.

Aronson Antiquairs. “Rijksmuseum Twenthe, Enschede.”Museums. Accessed on 13 June 2024. https://www.aronson.com/museums/rijksmuseum-twenthe-enschede/.

Aronson Antiquairs. “Royal Visit at The Princessehof, Leeuwarden.” Accessed on 13 June 2024. https://www.aronson.com/museums/royal-visit-princessehof-leeuwarden/.

The Art of Information. “Rijksmuseum Migreert van Adlib Naar Axiell Collections.” 24 November 2023. Accessed on 13 June 2024. https://theartofinformationblog.wordpress.com/2023/11/24/rijksmuseum-migreert-van-adlib-naar-axiell-collections/.

Axiell. “From Adlib to Axiell Collections.” Accessed on 13 June 2024. https://www.axiell.com/nl/oplossingen/product/adlib/

Barbuti, Nicola. "Thinking Digital Libraries for Preservation as Digital Cultural Heritage: By R to R4 Facet of FAIR Principles." *International Journal on Digital Libraries* 22, no. 3 (September 2021): 309–18.

Berg-Cross, Gary, and Sage Arbor. "Beyond Simple FAIR Principles for Ontologies and Semantic Resources: Grounding Rich, Meaningful Metadata." *Journal of the Washington Academy of Sciences* 108, no. 4 (2022): 1–26.

Bertacchini, Enrico, and Federico Morando. "The Future of Museums in the Digital Age: New Models for Access to and Use of Digital Collections". *International Journal of Arts Management* 15, no. 2 (2013): 60–72.

Bonino da Silva Santos, Luiz Olavo, Mark Wilkinson, Arnold Kuzniar, Rajaram Kaliyaperumal, Mark Thompson, Michel Dumontier, and Kees Burger. "FAIR data points supporting big data interoperability." *Enterprise Interoperability in the Digitized and Networked Factory of the Future. ISTE, London* (2016): 270-279.

The British Museum. "Collection." Accessed on 13 June 2024. https://www.britishmuseum.org/collection.

Charles, Valentine, Antoine Isaac, Kate Fernie, Costis Dallas, Dimitris Gavrilis, and Stavros Angelis. "Achieving Interoperability between the CARARE Schema for Monuments and Sites and the Europeana Data Model." Presented during Dublin Core Conference, Lisbon, 2 September to 6 September, 2013.

Centraal Museum Utrecht. *Collectie Beleidsplan 2021-2024*. Accessed through the official website of the Centraal Museum on 13 June 2024. https://www.centraalmuseum.nl/nl/ontdek/over-de-collectie/collectie-informatie/cm_collectiebeleidsplan20212024-2.pdf.

Centraal Museum Utrecht. "Collection Online." Accessed on 13 June 2024. https://www.centraalmuseum.nl/en/explore/collection.

Cofield, Melanie. "Metadata Basics." University of Texas Libraries. Accessed 30 April 2024. https://guides.lib.utexas.edu/metadata-basics

Collections Trust. "TMS Collections and eMuseum." Accessed on 13 June 2024. https://collectionstrust.org.uk/software/tms-collections/.

Conway, Paul. "Preservation in the Age of Google: Digitization, Digital Preservation, and Dilemmas". *The Library Quarterly* 80, no. 1 (January 2010): 61–79.

Cooper Hewitt, Smithsonian Design Museum. "The Collection." Accessed on 13 June 2024. https://collection.cooperhewitt.org/.

Corona, Lara. “Digitization: An Overview of the Advantages and Disadvantages.” In *Aspects of Digital Libraries - Digitization, Standards, Open Access, Repositories and User's Skills*, edited by Liat Klain Gabbay. IntechOpen, 2023.

Creative Commons. “About CC Licenses”. Accessed on 13 June 2024. https://creativecommons.org/share-your-work/cclicenses/.

Dam, Jan Daniel van. *Delffse Porceleyne: Dutch Delftware 1620-1850*. Amsterdam and Zwolle: Rijksmuseum and Waanders Publishers, 2004.

David, Romain, Laurence Mabile, Alison Specht, Sarah Stryeck, Mogens Thomsen, Mohamed Yahia, Clement Jonquet, et al. “FAIRness Literacy: The Achilles' Heel of Applying FAIR Principles.” *Data Science Journal* 19, no. 1 (11 August 2020).

Delfts Aardewerk. “Factory Marks.” Accessed on 13 June 2024. https://delftsaardewerk.nl/en/discover/factory-marks

Delfts Aardewerk. “How Was Delftware Made?” Accessed on 13 June 2024. https://delftsaardewerk.nl/en/discover/how-was-delftware-made.

Delfts Aardewerk. “Marks”. Accessed on 13 June 2024. https://delftsaardewerk.nl/en/recognize/marks.

Delfts Aardewerk. “Partners and Sponsors”. Accessed on 13 June 2024. https://delftsaardewerk.nl/en/partners-and-sponsors.

Delfts Aardewerk. “Types of Ceramic: An Overview of Earthenware, Stoneware and Porcelain” Accessed on 13 June 2024. https://delftsaardewerk.nl/en/learn/193-types-of-ceramic-an-overview-of-earthenware-stoneware-and-porcelain.

Delfts Aardewerk. “What Is Delftware?” Accessed on 13 June 2024. https://delftsaardewerk.nl/en/discover/what-is-delftware.

De Paolis, Lucio Tommaso, Valerio De Luca, Carola Gatto, Giovanni D'Errico, and Giovanna Ilenia Paladini. "Photogrammetric 3D reconstruction of small objects for a real-time fruition." In *Augmented Reality, Virtual Reality, and Computer Graphics: 7th International Conference*, AVR 2020, Lecce in Italy, 7 September to 10 September, 2020: pp. 375-394. Springer International Publishing, 2020.

Directorate-General for Research and Innovation (European Commission) and PwC EU Services. *Cost-Benefit Analysis for FAIR Research Data: Cost of Not Having FAIR Research Data*. Publications Office of the European Union, 2018. Accessed on 13 June 2024. https://data.europa.eu/doi/10.2777/02999.

Dutch Techcentre for Life Sciences. “What Is FAIR Data Stewardship?” Accessed on 13 June 2024. https://www.dtls.nl/fair-data/data-stewardship/.

Elo, Kimmo. “Big Data, Bad Metadata: A Methodological Note on the Importance of Good Metadata in the Age of Digital History”. In *Digital Histories: Emergent Approaches within the New Digital History*, edited by Mats Fridlund, Mila Oiva, and Petri Paju, 103–12. Helsinki University Press, 2020.

Essen, Jessica Parland-von. “Building Historical Knowledge Byte by Byte: Infrastructures and Data Management in Modern Scholarship”. In *Digital Histories: Emergent Approaches within the New Digital History*, edited by Mats Fridlund, Mila Oiva, and Petri Paju, 89–102. Helsinki University Press, 2020.

EU Culture and Creativity. “European Digital Heritage.” Accessed on 13 June 2024. https://culture.ec.europa.eu/cultural-heritage/cultural-heritage-in-eu-policies/european-digital-heritage.

Europeana PRO. “Europeana Data Model.” Accessed on 13 June 2024. https://pro.europeana.eu/page/edm-documentation.

European Commission. “Commission recommendation (EU) 2021/1970 of 10 November 2021 on a common European data space for cultural heritage.”*Official Journal of the European Union* 64 (November 2021).

Gallery Systems. “Collections Management with TMS Collection”. Accessed on 13 June 2024. https://www.gallerysystems.com/solutions/collections-management/.

Gilchrest, Alison. “Factors Affecting Controlled Vocabulary Usage in Art Museum Information Systems”. *Art Documentation: Journal of the Art Libraries Society of North America* 22, no. 1 (2003): 13–20.

Gilliland, Anne J. “Setting the Stage.” In *Introduction to Metadata*, edited by Murtha Baca. 3rd ed. Los Angeles: Getty Publications, 2016.

Gleim, Lars Christoph, and Stefan Decker. "Timestamped URLs as persistent identifiers." Submitted for *Managing the Evolution and Preservation Of the Data Web Workshop* (MEPDaW), 6th edition, co-located with International Semantic Web Conference (ISWC), 19th edition, virtual event, 1 November, 2020: 11-16.

GO FAIR. “FAIR Principles”. Accessed on 13 June 2024. https://www.go-fair.org/fair-principles/.

Groninger Museum Groningen. *Groninger Museum: Beleidsplan 2021-2028*. Accessed through the official website of the Groninger Museum on 13 June 2024. https://www.groningermuseum.nl/media/2/Downloads/GM-2020-beleidsplan-DEF.pdf.

Groninger Museum. "Groninger Museum Collection." Accessed on 13 June 2024. https://grm-collections.adlibhosting.com/ais6/search/simple. https://pro.europeana.eu/post/europeana-and-the-fair-principles-for-research-data.

Hermon, Sorin, and Franco Niccolucci. "FAIR Data and Cultural Heritage Special Issue Editorial Note." *International Journal on Digital Libraries* 22, no. 3 (1 September 2021): 251–55.

Hilse, Hans Werner, and Jochen Kothe. *Implementing Persistent Identifiers: Overview of concepts, guidelines and recommendations*. London: Consortium of European Research Libraries, 2006.

Isaac, Antoine, and Freire, Nuno. "Europeana and the FAIR Principles for Research Data". Europeana PRO, 3 April, 2019. Accessed on 13 June 2024.

Jacobsen, Annika, Ricardo de Miranda Azevedo, Nick Juty, Dominique Batista, Simon Coles, Ronald Cornet, Mélanie Courtot, et al. "FAIR Principles: Interpretations and Implementation Considerations". *Data Intelligence* 2, no. 1–2 (1 January 2020): 10–29.

Kehoe, Marsely L. "The nautilus cup between foreign and domestic in the Dutch Golden Age." *Dutch Crossing* 35, no. 3 (2011): 275-285.

Keramiekmuseum Princesshof. "Princesshof Collectie." Accessed on 13 June 2024. https://collectie.princessehof.nl/?query=*:*&sortBy=icn_notes.

Keramiekmuseum Princesshof Leeuwarden. *Princesshof: Activiteiten plan 2021-2024*. Accessed through the official website of the Princesshof on 13 June 2024. https://files.friesmuseum.nl/files/5/5/1/6/Activiteitenplan%20PH%202021-2024.pdf

Koster, Lukas, and Saskia Woutersen-Windhouwer. "FAIR Principles for Library, Archive and Museum Collections: A Proposal for Standards for Reusable Collections." *The Code4Lib Journal*, no. 40 (4 May 2018).

Kunstmuseum den Haag. *Kunstmuseum: Meerjarenbeleidsplan 2021-2024*. Accessed through the official website of the Kunstmuseum on 13 June 2024. https://www.kunstmuseum.nl/sites/default/files/downloads/Meerjarenbeleidsplan%202021-2024.pdf.

Kunstmuseum den Haag. "Our Collection." Accessed on 13 June 2024.

https://www.kunstmuseum.nl/nl/node/15498.

Lo Turco, M., M. Calvano, and E. C. Giovannini. "Data Modeling for Museum Collections." *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences* XLII-2-W9 (31 January 2019): 433–40.

The Metropolitan Museum of Art. "The Metropolitan Museum of Art". Accessed on 13 June 2024. https://www.metmuseum.org/art/collection.

Mokrane, Mustapha, and Jonas Recker. *CoreTrustSeal–Certified Repositories: Enabling Findable, Accessible, Interoperable, and Reusable (FAIR)*. Presented during iPres 2019 conference, Amsterdam, 16 September to 20 September, 2019.

Mons, Barend, Erik Schultes, Fenghong Liu, and Annika Jacobsen. "The FAIR Principles: First Generation Implementation Choices and Challenges". *Data Intelligence* 2, no. 1–2 (1 January 2020): 1–9.

Müller, Katja. "Deciding on Digital Archives: Improvement through Collection Management Systems." In *Digital Archives and Collections: Creating Online Access to Cultural Heritage* 11 :57–97. Berghahn Books, 2021

Museum Arnhem. "Collection." Accessed on 13 June 2024. https://www.museumarnhem.nl/en/collection.

Museum Arnhem. *Museum Arnhem: Meerjarenbeleidsplan 2022-2027*. Accessed through the official website of the Arnhem Museum on 13 June 2024. https://www.museumarnhem.nl/media/pages/over-ons/missie-visie/256ce8cf12-1691607607/open-museum-arnhem-2022-2027.pdf.

Museum Boijmans Van Beuningen. "Boijmans Collection Online." Accessed on 13 June 2024. https://www.boijmans.nl/en/collection.

Museum Boijmans Van Beuningen. "Digitalisering". Accessed on 13 June 2024. https://www.boijmans.nl/collectie/verdieping/digitalisering.

Museum Boijmans Van Beuningen Rotterdam. *Museum Boijmans Van Beuningen: Meerjarenbeleidsplan 2021-2024*. Accessed through the official website of the Boijman Museum on 13 June 2024. https://storage.boijmans.nl/uploads/2020/06/22/Rp55rNqJtExgoA1crXUBSb03UQnwgHt3OwRjmAna.pdf.

Nicholson, Christopher, Sarah Kansa, Neha Gupta, and Rachel Fernandez. “Will It Ever Be FAIR?: Making Archaeological Data Findable, Accessible, Interoperable, and Reusable.” *Advances in Archaeological Practice* 11, no. 1 (February 2023): 63–75.

Ooghe, Bart, and Dries Moreels. “Analysing Selection for Digitisation: Current Practices and Common Incentives”. *D-Lib Magazine* 15, no. 9/10 (September 2009).

Pekel, Joris. “Democratising the Rijksmuseum.” In collaboration with Europeana Foundation. Accessed on 13 June 2024. https://pro.europeana.eu/files/Europeana_Professional/Publications/Democratising%20the%20Rijksmuseum.pdf

Philadelphia Museum of Art. “Explore Our Collection.” Accessed on 13 June 2024. https://www.philamuseum.org/collection.

Princeton University Art Museum. “Collections.” Accessed on 13 June 2024. https://artmuseum.princeton.edu/search/collections

RijksData. “API”. Accessed on 13 June 2024. https://data.rijksmuseum.nl/object-metadata/api/.

RijksData. “Controlled Vocabularies.” Accessed on 13 June 2024. https://data.rijksmuseum.nl/controlled-vocabularies/.

Rijksmuseum. “Delftware Collection Catalogue.” Accessed on 13 June 2024. https://www.rijksmuseum.nl/en/research/our-research/fine-and-decorative-arts/decorative-arts/delftware.

Rijksmuseum. “Rijksmuseum and DELL Technologies are joining forces to digitally share the entire collection with the world.” Press releases, 2021. Accessed on 13 June 2024. https://www.rijksmuseum.nl/en/press/press-releases/rijksmuseum-en-dell-technologies-slaan-handen-ineen-om-volledige-collectie-digitaal-te-delen-met-de-wereld.

Rijksmuseum. “Open data policy.” Accessed on 13 June 2024. https://www.rijksmuseum.nl/en/research/conduct-research/data/policy

Rijksmuseum. “Our data in the nutshell.” Accessed on 13 June 2024. https://www.rijksmuseum.nl/en/research/conduct-research/data/overview.

Rijksmuseum. “Rijksstudio.” Accessed on 13 June 2024. https://www.rijksmuseum.nl/nl/rijksstudio.

Rijksmuseum Twenthe. “Collectie van Rijksmuseum Twenthe”. Accessed on 13 June 2024. https://collectie.rijksmuseumtwenthe.nl/zoeken-in-de-collectie.

Rijksmuseum Twenthe, Enschede. *Rijksmuseum Twenthe: Activiteiten Plan 2021-2024*. Accessed on 13 June 2024. https://start.rijksmuseumtwenthe.nl/uploads/pdfs/rmt_activiteitenplan_2021-2024_0YHxZ4SfRI9H7nyn.pdf.

Ronzino, Paola, Nicola Amico, and Franco Niccolucci. "Assessment and comparison of metadata schemas for architectural heritage." In *Proceedings of CIPA* (2011): 71-78.

Santos, Luiz Olavo Bonino da Silva, Tiago Prince Sales, Claudenir M. Fonseca, and Giancarlo Guizzardi. "Towards a Conceptual Model for the FAIR Digital Object Framework." In *Formal Ontology in Information Systems*, vol. 377 from the series *Frontiers in Artificial Intelligence and Application*, 2023: 227-241.

Schweibenz, Werner. "The virtual museum: an overview of its origins, concepts, and terminology." *The Museum Review* 4, no. 1 (2019): 1-29.

Semantic Web. "Introduction to SKOS - SKOS Simple Knowledge Organization System." Accessed on 13 June 2024. https://www.w3.org/2004/02/skos/intro.

Sierman, Barbara. "Do FAIR Data Ever Become Heritage?" Digital Preservation (23 January 2019). Accessed on 13 June 2024. https://digitalpreservation.nl/seeds/do-fair-data-ever-become-heritage/.

Smithsonian. "Smithsonian 3D." Smithsonian 3D Digitization. Accessed on 13 June 2024. https://3d.si.edu/

Smithsonian Institution. "Smithsonian Institution." Accessed on 13 June 2024. https://www.si.edu/home.

Statista. "Market share of leading desktop search engines worldwide from January 2015 to January 2024." Accessed on 13 June, 2024. https://www.statista.com/statistics/216573/worldwide-market-share-of-search-engines/

Task Force On Archiving of Digital Information. "Preserving Digital Information: Report of the Task Force on Archiving of Digital Information". Commissioned by The Commission on Preservation and Access and The Research Libraries Group (May 1996). Accessed through Council on Library and Information Resources on 13 June 2024. https://www.clir.org/pubs/reports/pub63/

UNESCO. *Charter on the Preservation of the Digital Heritage*. Presented during the General Conference, 32nd session, Paris, 29 September to 17 October, 2003. Accessed on 17 June 2024. https://unesdoc.unesco.org/ark:/48223/pf0000133171/PDF/133171eng.pdf.multi

UNESCO. "Concept of Digital Preservation". Digital Heritage, 2019. Accessed on 13 June 2024. https://webarchive.unesco.org/web/20230616073605/https://en.unesco.org/themes/information-preservation/digital-heritage/concept-digital-preservation.

van Erp, Jarno AA, Carolyn D. Langen, Anca Boon, and Kees van Bochove. "Testing the FAIR metrics on data catalogs." *PeerJ Preprints* 6 (2018).

Victoria and Albert Museum. "Explore the Collections." Accessed on 13 June 2024. https://www.vam.ac.uk/collections.

Wessels, Bridgette, Rachel L. Finn, Kush Wadhwa, Thordis Sveinsdottir, Lorenzo Bigagli, Stefano Nativi, and Merel Noorman. "Visions of Open Data." In *Open Data and the Knowledge Society*, 45–64. Amsterdam University Press, 2017.

Weststeijn, Arthur. "Empire of Riches: Visions of Dutch Commercial Imperialism, c. 1600–1750." In *The Dutch Empire between Ideas and Practice, 1600–2000*, edited by René Koekkoek, Anne-Isabelle Richard, and Arthur Weststeijn, 37–65. Cham: Springer International Publishing, 2019.

Wilkinson, Mark D., Michel Dumontier, IJsbrand Jan Aalbersberg, Gabrielle Appleton, Myles Axton, Arie Baak, Niklas Blomberg, et al. "The FAIR Guiding Principles for Scientific Data Management and Stewardship." *Scientific Data* 3, no. 1 (15 March 2016).

Zhang, Jane, and Dayne Mauney. "When Archival Description Meets Digital Object Metadata: A Typological Study of Digital Archival Representation." *The American Archivist* 76, no. 1 (2013): 174–95.

Zoller, Gabriela, and Katie DeMarsh. "For the Record: Museum Cataloging from a Library and Information Science Perspective." *Art Documentation: Journal of the Art Libraries Society of North America* 32, no. 1 (2013): 54–70.

Zuiderzeecollectie. "Edams Museum." Accessed on 13 June 2024. http://www.zuiderzeecollectie.nl/page/7035/edams-museum.

Zuiderzeecollectie. "Over de Zuiderzeecollectie." Accessed on 13 June 2024. http://www.zuiderzeecollectie.nl/overdecollecties.

Zuiderzeecollectie. “Zuiderzee Collection.” Accessed on 13 June 2024. https://www.zuiderzeecollectie.nl/zoeken?qs=#XQAAAAL6AwAAAAAAAABEqIonNUNwnShOsbVy8xv8-PkMFWiGkRb2e_dHtY5owbBwE2z3kcjkpswDdkiWVHvrMAKCXpz-zsmTTSCv_1pZsMm07e6VoXv3WezmvgIEGG7BoAkG26x8qneNiAi-BYgJ6qqw1DFIebcwIP5Mg5siLDJjU4b9qYROtHBku4Dh1xRhkiEUMu8Ew9_Ylctt_cQAPiDfpyy6It_NCrYuSfzwHZn_pybF4iu57Z0WTJ35YbYlN4WMxhIjeLQc1WW22-CcXkubGktiSBl9oIJNNr6dyA5I3WJGq9lMy1g0DcCucB6cmi9LO8cMmzTNqNv-F-4behlrIjpV7T-GidCd6fAqgOVSqS6KAEvIPfJVNBqBBszZDgzjyX0R-lv5xYIR83ZlCtxMqf6qyLkquuDVrjNimIirYkuL9ZheK1fhkzSdHI66xOyFN4VOlos6KPtjpkYLceH6hg4ilOmGhzueNE5uA8YvS8UKFZRm7k1Q1h2UnGPKS1rnPxqblbjLcj2_52Bp2rr_szG5QA.

Illustrations

Fig. 1. *Large lidded jar*, 1670-1690, pottery, height: 51,50 cm, diameter of the base: 23 cm (Groningen, Groninger Museum, inv. nr. 1967.0368). The jar is photographed from upfront. While it does not have an explicitly front side, a choice was made to capture this particular scene. The image is a property of the Groninger Museum.

Fig. 2. De Drie Porceleyne Flesschen, *Plate*, 1700-1720, tin-glazed pottery, diameter: 22,7 cm, height: 2 cm, (Groningen, Groninger Museum, inv. nr. 1960.0170). The plate is positioned upward, relying on outside support to be able to stand like it does. This is done so the decoration of the inside of the plate is visible. The image is a property of Groninger museum.

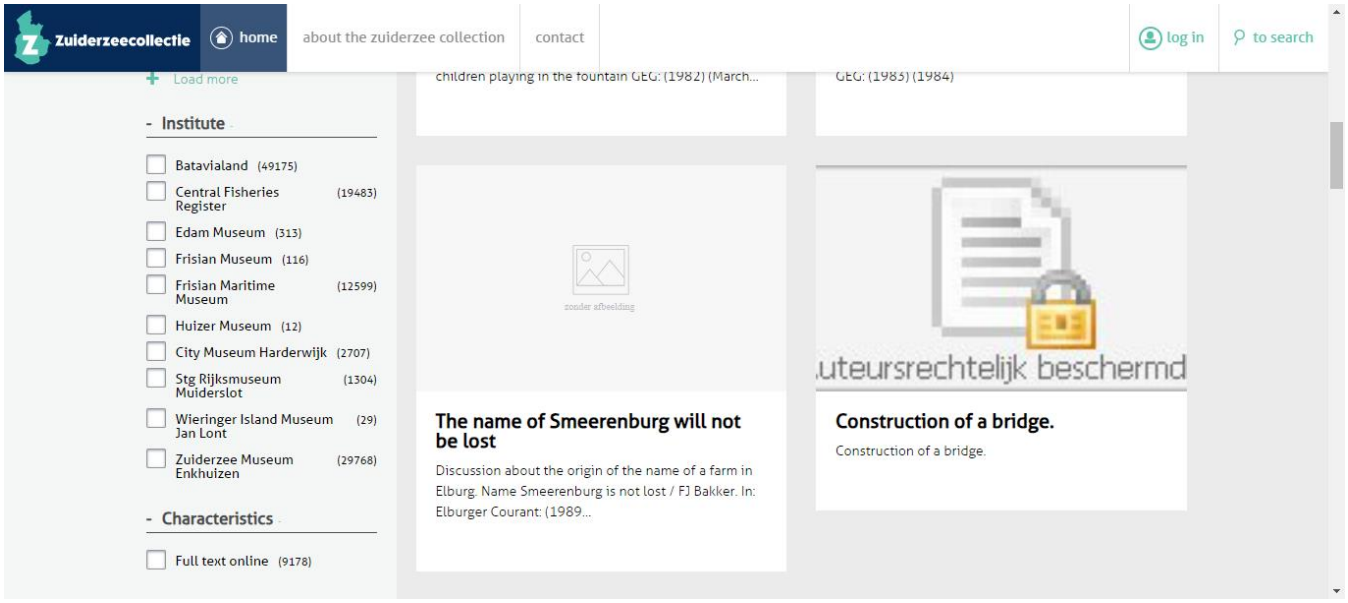

Fig. 3. The view on the Zuiderzee Collection where the Edam Museum is not selected. The image is generated by the author.

Appendix A: Definition of metadata records

Administrative metadata	Definition AM	Descriptive metadata	Definition DM
Accession number	The number under which the object is known in the Boijmans Museum	Title	The name of the object
Credits	Describes the way of how was the object acquired in the collection (either as a gift, purchase, or a loan)	Material and Technique	Describes how was the object made and which materials were used in the process
Department	The name of the collection the object is a part of. In this case, it is called Applied Arts & Design	Object	Classification of the object based on its function
Acquisition date	The year when it was acquired in the museum	Location	Whether the item is in the depot, or on the display, or is travelling and is on display in another museum
Collector	If the object was gifted, the name of the benefactor (otherwise omitted)	Dimensions	Describes the size of the object
		Artist	Maker of the object - usually the owner of the workshop or factory where it was made
		Creation date	Describes the year or period when the object was made
		Material	Same as "Material and Technique", but shows how specifically is the object categorized as we follow from the biggest grouping towards smaller, more specified groups that contain less and less items

		Object	Same as "Object" as described above, but shows how specifically is the object categorized as we follow from the biggest grouping towards smaller, more specified groups that contain less and less items
		Geographical origin	Describes the country of the origin, while also showing how specifically is the object categorized as we follow from the biggest group "Europe" towards the smallest group "the Netherlands"
		Place of manufacture	Similar to the "Geographical origin" but continuing with specification until reaching Delft as the city of the origin

Table 1. The Boijmans Museum

Administrative metadata	Definition AM	Descriptive metadata	Definition DM
Identification number	The number under which the object is known in the Edam Museum	Title	The name of the object
Persistent URL	Globally unique and persistent identifier of the object	Dating	Describes the year or period when the object was made
Language	The language used in describing the object (in this case always Dutch)	Dimensions	Describes the size of the object (not always present)
Museum	Name of the museum the object is part of (in this case it is always Edam Museum)	Subject	Relating to the nature of the decoration of the object. Only present for one item, and as such will not be generally counted
License	Rights that apply in handling the object online		

Table 2. The Edam Museum

Administrative metadata	Definition AD	Descriptive metadata	Definition DM
Identification number	The number under which the object is known in the Arnhem Museum	Maker	Maker of the object - usually the owner of the workshop or factory where it was made
Collection	The name of the collection the object is a part of	Year of production	Describes the year or period when the object was made
		Material	Describes which materials were used in the process of the making of the object

Table 3. The Arnhem Museum

Administrative metadata	Definition AD	Descriptive metadata	Definition DM
Inventory number	The number under which the object is known in the Rijksmuseum Twenthe Museum	Title	The name of the object
Credits	Describes the way of how was the object acquired in the collection (either as a gift, purchase, or a loan)	Manufacturer	Maker of the object - usually the owner of the workshop or factory where it was made
Collection	The name of the collection the object is a part of. In this case it is always named Rijksmuseum Twenthe Collection	Material	Describes which materials were used in the process of the making of the object
		Dating	Describes the year or period when the object was made
		Dimensions	Describes the size of the object
		Inscription	Mark or signature that is present on the objects

Table 4. The Rijksmuseum Twenthe

Administrative metadata	Definition AD	Descriptive metadata	Definition DM
Object number	The number under which the object is known in the Princesshof Museum	Title	The name of the object
Rights holder	Describes who owns the rights to the object, and also the way of how was the object acquired in the collection (either as a gift, purchase, or a loan) = not always available	Manufacturer	Maker of the object - usually the owner of the workshop or factory where it was made
		The kind of object	Classification of the object based on its function
		Production site	Describes the place of the manufacture
		Production period	Describes the year or period when the object was made
		Technology	Describes how was the object made and the techniques of this process
		Place	Same as the "Production site", but with hyperlink
		Format	Describes the size of the object

Table 5. The Keramiekmuseum Princessehof

Administrative metadata	Definition AD	Descriptive metadata	Definition DM
Object number	The number under which the object is known in the Kunstmuseum	Title	The name of the object
Rights holder	Describes who owns the rights to the object online	Dimensions	Describes the size of the object
		Material	Describes which materials were used in the process of the making of the object
		Date	Describes the year or period when the object was made
		Production place	Describes the place of the manufacture

Table 6. The Kunstmuseum

Administrative metadata	Definition AD	Descriptive metadata	Definition DM
Object number	The number under which the object is known in the Groninger Museum	Title	The name of the object
Credit line	Describes who owns the rights to the object, and also the way of how and when was the object acquired in the collection (either as a gift, purchase, or a loan)	Manufacturer	Maker of the object - usually the owner of the workshop or factory where it was made
Object category	The name of the collection the object is a part of. There is no unified name for Delftware	Manufacturing place	Describes the place of the manufacture
		Manufacturing date	Describes the year when the object was made
		Period	Describes the century when the object was made
		Object name	Classification of the object based on its function
		Material	Describes which materials were used in the process of the making of the object
		Technology	Describes how was the object made and the techniques of this process
		Format	Describes the size of the object

Table 7. The Groninger Museum

Metadata sections	Administrative metadata	Definition AD	Descriptive metadata	Definition DM
Identification	Object number	The number under which the object is known in the Rijksmuseum	Title	The name of the object
			Object type	Classification of the object based on its function
Manufacture			Manufacturer	Maker of the object - usually the owner of the workshop or factory where it was made
			Place of manufacture	Describes the place of the manufacture
			Dating	Describes the year or period when the object was made
Material and Technology			Physical characteristics	Descriptive combination of "Material" and "Technology"
			Material	Describes which materials were used in the process of the making of the object
			Technology	Describes how was the object made and the techniques of this process = not always present
			Dimensions	Describes the size of the object
Subject			Subject	Listing of the items related to the object - either by its function or physical characteristics = not always present
Acquisition and rights	Credit line	Describes the way of how the object was acquired in the collection (either as a gift, purchase, or a loan)		

	Acquisition	The year and the method of the acquisition of the object in the museum		
	Copyright	Describes who owns the rights to the object online		
Relationships	Relationships	Describing the "Object type" or to what other objects does the item relate to as a sort of collection = not always present		
Documentation	Documentation	List of publications containing the object		
Sustainable URL	Sustainable URL	Globally unique and persistent identifier of the object		

Table 8. The Rijksmuseum

Administrative metadata	**Definition AD**	**Descriptive metadata**	**Definition DM**
Inventory number	The number under which the object is known in the Centraal Museum	Title	The name of the object
Acquisition method	Describes the way of how and when was the object acquired in the collection (either as a gift, purchase, or a loan)	Manufacturer	Maker of the object - usually the owner of the workshop or factory where it was made
Documentation	List of publications containing the object	Dating	Describes the year or period when the object was made
Exhibition history	List of exhibitions the object was a part of	Material/Technology	Describes how was the object made and which materials were used in the process

Sustainable URL	Globally unique and persistent identifier of the object	Object name	Classification of the object based on its function, but also a collection the object is a part of
		Inscription	Mark or signature that is present on the objects

Table 9. The Centraal Museum

Appendix B: The selection of objects

Enumeration	Title of the object	Link to metadata	Material	Object
1.	Set of ornamental jars	Link to Set of ornamental jars	Tin-glazed earthenware (as a specification of faience)	Utensils (further specified as living accessory and set of ornamental jars)
2.	Tile scene	Link to Tile scene	Tin-glazed earthenware (as a specification of faience)	Utensils (further specified as living accessory and tile)
3.	Water pitcher	Link to Water pitcher	Earthenware (as a specification of ceramics)	Utensils (further specified as kitchen and household item, tableware, pitcher, and water pitcher)
4.	Tankard	Link to Tankard	Tin-glazed earthenware (as a specification of faience)	Utensils (further specified as kitchen and household item, tableware, pitcher, beer glass and tankard)
5.	Butter dish	Link to Butter dish	Tin-glaze (as a specification of glaze) & Earthenware (as a specification of ceramics)	Utensils (further specified as kitchen and household item, tableware, and butter dish)

6.	Tea caddy	Link to Tea Caddy	Faience (as a specification of earthenware)	Utensils (further specified as kitchen and household item, server ware, drinkware, tea service, and tea caddy)
7.	Plate	Link to Plate	Faience (as a specification of earthenware)	Utensils (further specified as kitchen and household item, tableware, and plate)
8.	Teapot	Link to Teapot	Faience (as a specification of earthenware)	Utensils (further specified as kitchen and household item, server ware, drinkware, tea service, and teapot)
9.	Dish	Link to Dish	Faience (as a specification of earthenware)	Utensils (further specified as kitchen and household item, tableware, and dish)
10.	Sculpture	Link to Sculpture	Lead-glazed earthenware (as a specification of earthenware)	Art object (further specified as three-dimensional object and sculpture)
11.	Lidded vase	Link to Lidded vase	Earthenware (as a specification of ceramics)	Utensils (further specified as living accessory, vase, and

				lidded vase)
12.	Plate	Link to Plate	Tin-glazed earthenware (as a specification of faience)	Utensils (further specified as kitchen and household item, tableware, and plate)
13.	Tea Caddy	Link to Tea Caddy	Silver (as a specification of precious metal) & faience (as a specification of earthenware)	Utensils (further specified as kitchen and household item, server ware, drinkware, tea service, and tea caddy)
14.	Tulip vase	Link to Tulip vase	Tin-glazed earthenware (as a specification of faience)	Utensils (further specified as living accessory, vase, and tulip vase)
15.	Teapot	Link to Teapot	Faience (as a specification of earthenware)	Utensils (further specified as kitchen and household item, server ware, drinkware, tea service, and teapot)

Table 1. The Boijmans Museum

Enumeration	Title of the object	Link to metadata
1	Decorative plate	Link to Decorative plate
2	Memorial plate	Link to Memorial plate
3	Occasion plate	Link to Occasion plate
4	Occasion sign	Link to Occasion sign
5	Plate. Delft	Link to Plate.Delft
6	Plate. Delft	Link to Plate.Delft
7	Plate. Delft	Link to Plate.Delft
8	Plate. Delft	Link to Plate.Delft
9	Plate. Delft	Link to Plate.Delft
10	Decorative plate. Delft	Link to Decorative plate.Delft
11	Memorial plaque	Link to Memorial plaque
12	Tile tableau	Link to Tile tableau
13	Delft earthenware dog	Link to Delft earthenware dog
14	Delft earthenware cabinet set	Link to Delft earthenware cabinet set
15	Pair of Delft earthenware cows	Link to pair of Delft earthenware cows

Table 2. The Edam Museum

Enumeration	Title of the object	Link to metadata	Material
1	Vase	Link to Vase	pottery, tin glaze
2	Jar with lid	Link to Jar with lid	pottery, tin glaze
3	Plate	Link to Plate	pottery, tin glaze
4	Vase	Link to Vase	pottery, tin glaze
5	Spice jar with jar	Link to spice jar with lid	pottery, tin glaze
6	Plate	Link to Plate	pottery, tin glaze
7	Plate	Link to Plate	pottery, tin glaze
8	Plate	Link to Plate	pottery, tin glaze
9	Plate	Link to Plate	pottery, tin glaze
10	Plate	Link to Plate	pottery, tin glaze
11	Teapot with lid	Link to Teapot with lid	pottery, tin glaze
12	Tea caddy	Link to Tea caddy	pottery, tin glaze
13	Tea caddy	Link to Tea Caddy	pottery, tin glaze
14	Jug	Link to Jug	faience, glaze, tin glaze
15	Jar with lid	Link to Jar with lid	faience, porcelain

Table 3. The Arnhem Museum

Enumeration	Title of the object	Link to metadata
1	Can decorated with blossom branches and birds	Link to Can with cherry blossom branches
2	Faience jug with silver cap	Link to Faience jug
3	Tea caddy with Chinese decor of flowers and vines	Link to Tea caddy
4	Pie pot in the shape of a rolled up pike, on a saucer	Link to Pie pot
5	Plaque with decoration of Venus with bow and arrow on the shore of a water landscape	LInk to Plaque
6	Sitting dog	Link to Sitting dog
7	Plaque with decoration of a flower vase	Link to Plaque with decoration of a flower vase
8	Running horse with long hanging tail	Link to Running horse with long hanging tail
9	Orange plate with portrait of Willem V. (1748-1806)	Link to Orange plate with portrait of Willem V.
10	Mule with zigzag pattern on the forefoot	Link to Mule with zigzag pattern on the forefoot
11	Vase with Chinese decor of three figures in a landscape	Link to Vase with Chinese decor of three figures in a landscape
12	Seated Chinese with pipe and mushroom, so-called Pu-tai Ho-shang	Seated Chinese with pipe and mushroom
13	Teapot with decoration of stylized flowers	Link to Teapot
14	Pot with cashmere decoration of flower bouquets and a bird of paradise	Link to Pot with cashmere decoration
15	Salt cellar on foot with Chinese decor of a bird in a tree and an edge with floral motifs	Link to Salt Cellar

Table 4. The Rijksmuseum Twenthe

Enumeration	Title of the object	Link to metadata	Technology
1	Plate with portraits of William V and Wilhelmina of Prussia	Link to Plate with portraits	twisted enamel painting polychrome tin glaze
2	Dish with decor of a bird	Link to Dish with decor of a bird	turned enamel painting unglazed tin glaze
3	Sculpture in the shape of a sled	Link to Sculpture	shaped enamel painting tin glaze
4	Apothecary spot	Link to Apothecary spot	twisted enamel painting tin glaze
5	Plate with flower bouquet decor	Link to Plate with flower bouquet decor	shaped enamel painting polychrome tin glaze
6	Plate in the shape of a bird's nest	Link to Plate in the shape of a bird's nest	shaped enamel painting polychrome tin glaze
7	Dish with floral motifs	Link to Dish with floral motifs	twisted enamel painting tin glaze
8	Bowl from jam set with peacock decor	Link to Bowl from jam set	modelled enamel painting tin glaze
9	Plate with landscape decor	Link to Plate with landscape decor	shaped enamel painting tin glaze
10	Plate with floral decor	Link to Plate with floral decor	twisted enamel painting polychrome tin glaze
11	Vase with sprinkle decor	Link to Vase with sprinkle decor	twisted enamel painting tin glaze
12	Pancake with blue and white chinoiserie decor	Link to Pancake	twisted enamel painting tin glaze

13	Porridge bowl with floral motifs	Link to Porridge bowl	turned shaped enamel painting tin glaze
14	Flower holder with decor of Chinese motifs	Link to Flower holder	tin glaze
15	Rococo style coffee pot	Link to Coffee pot	formed underglaze overglaze painting tin glaze

Table 5. The Keramiekmuseum Princessehof

Enumeration	Title of the object	Link to metadata
1	Lidded jar with chinoiserie decor	Link to Lidded jar
2	Bust of woman on pedestal	Link to Bust of woman on pedestal
3	Brush with floral decor	Link to Brush with floral decor
4	Plate with portrait of Prince Willem V	Link to Plate with portrait of Prince Willem V
5	Plate with Kangxi decor	Link to Plate with Kangxi decor
6	Plate with genre representation (herring catch)	Link to Plate with genre representation
7	Plate with chinoiserie decor	Link to Plate with chinoiserie decor
8	Plate with flower vase decor	Link to Plate with flower vase decor
9	Plate with floral decor	Link to Plate with floral decor
10	Plate with biblical scene (Solomon's judgment)	Link to Plate with biblical scene
11	Plate	Link to Plate
12	Plate	Link to Plate
13	Beaker vase, ribbed, with Chinoiserie-decoration	Link to Beaker vase
14	Vase	Link to Vase
15	Pedestal	Link to Pedestal

Table 6. The Kunstmuseum

Enumeration	Title of the object	Link to metadata
1	Wedding plate Hulshoff/Berents	Link to Wedding plate
2	Wall plaque	Link to Wall plaque
3	Dessert plate	Link to Dessert plate
4	Plate or pancake	Link to Plate
5	Gin barrel	Link to Gin barrel
6	Plate or pancake	Link to Plate
7	Pot	Link to Pot
8	Tub	Link to Tub
9	Plate or pancake	Link to Plate
10	Plate	Link to Plate
11	Plate or pancake	Link to Plate
12	Tazza	Link to Tazza
13	Cake dish on foot	Link to Cake dish on foot
14	Butter dish	Link to Butter dish
15	Large lidded jar	Link to Large lidded jar

Table 7. The Groninger Museum

Enumeration	Title of the object	Link to metadata
1	Teapot	Link to Teapot
2	Flower pyramid	Link to Flower pyramid
3	Bust of King-Stadtholder Willem III.	Link to Bust of King-Stadtholder Willem III.
4	Faience sconce	Link to Faience sconce
5	Plate, oval with scalloped edge	Link to Plate
6	Jar with lid	Link to Jar with lid
7	Faience cow	Link to Faience cow
8	Tray with Chinese figures on a terrace	Link to Tray
9	Fountain of faience	Link to Fountain
10	Apothecary jar made of faience	Link to Apothecary jar
11	Bowl, painted with floral decorations in blue	Link to Bowl
12	Faience cup	Link to Faience cup
13	Dish, belonging to a trembleuse	Link to Dish
14	Pair of shoes	Link to Pair of shoes
15	Jug made of multi-coloured painted faience	Link to Jug

Table 8. The Rijksmuseum

Enumeration	Title of the object	Link to metadata
1	Three vases (from a five-piece cabinet set)	Link to Three vases
2	Plate with peacock feather decoration	Link to Plate with peacock decoration
3	Octagonal, gourd-shaped vase with Chinese pattern	Link to Octagonal vase
4	Tea caddy with mismatched screw cap	Link to Tea caddy
5	Two spittoons with flower pattern, famille verte	Link to Two spittoons with floral decoration
6	Chimney pot with lid	Link to Chimney pot with lid
7	Bowl-shaped flower holder with spouts	Link to bow-shaped flower holder
8	Two plates decorated with flowers and leaves	Link to Two plates decorated with flowers
9	Eight-pointed bowl with floral motifs	Link to Eight-pointed bowl with floral motifs
10	Octagonal square plaque	Link to Octagonal square plaque
11	Plate with decor of water plants and bird	Link to Plate with decor of water plants and bird
12	Three cashmere vases, parts of a set of seven	Link to Three cashmere vases
13	Two candlesticks	Link to Two candelsticks
14	Butter dish	Link to Butter dish
15	Two pots with lids (from a five-piece cabinet set)	Link to Two pots with lids

Table 9. The Centraal Museum

Illustrations

Fig. 1. *Large lidded jar*, 1670-1690, pottery, height: 51,50 cm, diameter of the base: 23 cm (Groningen, Groninger Museum, inv. nr. 1967.0368). The jar is photographed from upfront. While it does not have an explicitly front side, a choice was made to capture this particular scene,

Fig. 2. De Drie Porceleyne Flesschen, *Plate*, 1700-1720, tin-glazed pottery, diameter: 22,7 cm, height: 2 cm, (Groningen, Groninger Museum, inv. nr. 1960.0170). The plate is positioned upward, relying on outside support to be able to stand like it does. This is done so the decoration of the inside of the plate is visible.

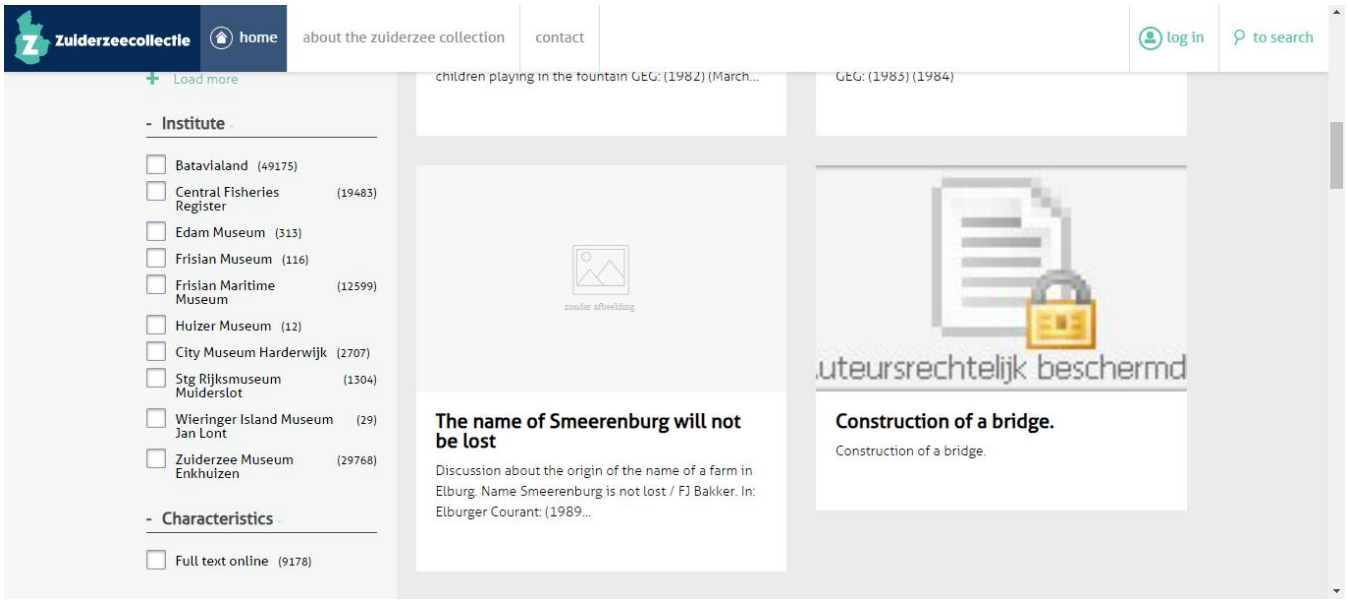

Fig. 3. The view on the Zuiderzee Collection where the Edam Museum is not selected.

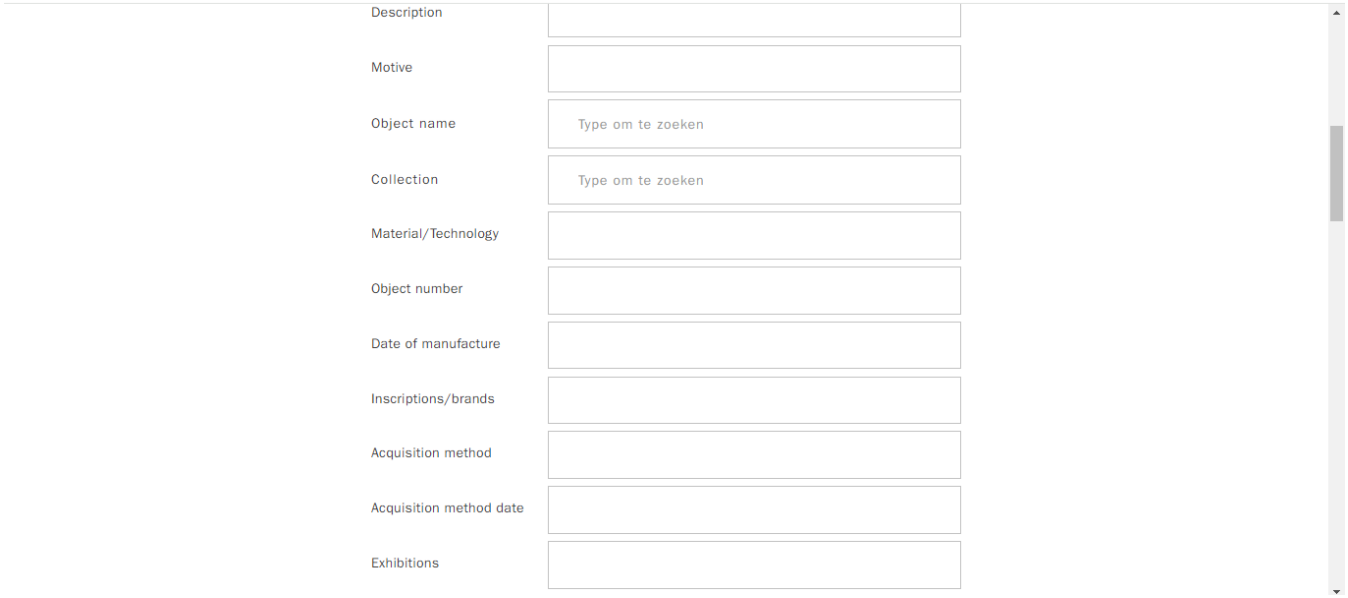

Fig. 15. The object number section visible in the advanced search within the Centraal Museum collection

Universiteit Leiden

Declaration of originality

By submitting this test, I certify that:

- ✓ this work has been drafted by me without any assistance from others (not applicable to group work);
- ✓ I have not discussed, shared, or copied submitted work from/with other students
- ✓ I have not used sources that are not explicitly allowed by the course instructors and I have clearly referenced all sources (either from a printed source, internet or any other source) used in the work in accordance with the course requirements and the indications of the course instructors;
- ✓ this work has not been previously used for other courses in the programme or for course of another programme or university unless explicitly allowed by the course instructors.

I understand that any false claim in respect to this work will result in disciplinary action in accordance with university regulations and the programme regulations, and that any false claim will be reported to the Board of Examiners. Disciplinary measures can result in exclusion from the course and/or the programme.

I understand that my work may be checked for plagiarism, by the use of plagiarism detection software as well as through other measures taken by the university to prevent and check on fraud and plagiarism.

I understand and endorse the significance of the prevention of fraud and I acknowledge that in case of (gross) fraud the Board of Examiners could declare the examination invalid, which may have consequences for all students.

Date: 13. 06. 2024

Name: Viktoria Razina

Signature: