

ICONCLASS - classification system for art and iconography

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**ICONCLASS - Classification System for Art and
Iconography**
BSc Thesis

Mentor: Dr. sc. Goran Zlodi

Zagreb, 2019

Izjava o akademskoj čestitosti

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(potpis)

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*“Come forth, and bring with you a heart
That watches and receives.”* – W. Wordsworth

SUMMARY

Documenting is a crucial activity for any museum or art institution. Today, that importance is growing for the metadata museum provides us with, is essential in retrieving information in the vast amount of data of the modern world. The goal of this study is to discuss the design of thesauri, how they work and what is their purpose in documenting museum objects. It further discusses content indexing together with aboutness, isness and ofness, to draw a parallel with Panofsky's categories in iconography. The central focus of the work falls onto analyzing Iconclass, its features, and usage. Additionally, it concentrates on new developments in machine learning within artificial intelligence, which use Iconclass to generate and automatize new data and connections. Finally, it gives a brief overview of folksonomy and social tagging.

Keywords: Iconclass, content indexing, documenting, thesauri, Panofsky, iconography, machine learning.

SAŽETAK

Dokumentiranje je ključna aktivnost svakog muzeja ili umjetničke institucije. Danas ta važnost raste jer metapodaci koje nam muzej pruža igraju bitnu ulogu u pronalaženju informacija u ogromnoj količini podataka suvremenog svijeta. Cilj ovog rada je predstaviti i raspravljati o dizajnu tezaurusa, kako oni rade i koja je njihova svrha u dokumentiranju muzejskih objekata. Nadalje se također predstavlja sadržajnu obradu zajedno s sustinom, postojanošću i svojstvom (*aboutness, isness, ofness*) kako bi se usporedila s Panofskijevim kategorijama u ikonografiji. Središnji fokus rada je analiziranje Iconclass-a, njegovih značajki i upotrebe. Osim toga, rad se usredotočuje na nove razvoje u strojnom učenju preko umjetne inteligencije, koji koriste Iconclass za generiranje i automatizaciju novih podataka i veza. Na kraju, daje se kratak pregled folksonomije i socijalnog označavanja.

Ključne riječi: Iconclass, sadržajna obrada, dokumentiranje, tezaursi, Panofsky, ikonografija, strojno učenje.

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List of Abbreviations

AAT Art & Architecture Thesaurus (Getty Research Institute)

BT Broader Term

BTG Broader Term Generic

CONA Cultural Objects Name Authority

DLO Document Like Objects

IA Iconographical Authority

ISO International Standardization Organization

KNAW Koninklijke Nederlandse Akademie van Wetenschappen/ The Royal Netherlands Academy of Arts and Science

LOD Linked Open Data

NT Narrower Term

NTG Narrower Term Generic

OWL Web Ontology Language - Semantic Web Standards

RDF Resource Description Framework – Semantic Web Standards

RKD Rijksbureau voor Kunsthistorische Documentatie/ Netherlands Institute of Art History

RT Related Terms

SKOS Simple Knowledge Organization System

SPARQL Simple Protocol and RDF Query Language

TGN Thesaurus of Geographic Names (Getty Research Institute)

UF Use For

ULAN Union List of Artist Names

URI Uniform Resource Identifier

W3C World Wide Web Consortium

1 Introduction

The aim of this thesis is to explore more closely the importance of classification systems, controlled terminologies and thesauri when documenting fine arts, and examine the ways in which content indexing is done.

Firstly, the thesis will address documenting museum objects and art in general, whilst discussing the fundamental role of tertiary documentation in maintaining the whole process of documenting in this area. Specifically, it focuses on *Iconclass*, which is a classification system for iconographical description with a standardized, controlled terminology, used not only for research purposes but also for content processing, describing, indexing, and information retrieval in museum visual documentation. Furthermore, it will discuss the development of artificial intelligence in this realm, together with the history of *Iconclass*, new developments such as linked open data, similarities with other classification systems based on iconography, and social tagging.

Iconclass defines themselves as follows: “*Iconclass is a classification system designed for art and iconography. It is the most widely accepted scientific tool for the description and retrieval of subjects represented in images (works of art, book illustrations, reproductions, photographs, etc.) and is used by museums and art institutions around the world.*” It has been developing since 1950; it has several computerized additions, and now it is a freely accessible multilingual default online browser. It contains keywords and descriptions not only in English but also in German, Italian and French, partly in Finnish and Norwegian and experimental translations in Dutch and Chinese which are not yet available online.¹

2 Documenting in museums

The importance of documenting cannot be stressed enough yet it is often overlooked. It could even be said that if an object in a museum is not documented, it might as well not be a part of the museum at all. To ensure that data is efficiently and properly documented from its form, content and value there exist a few standards and

¹ *Iconclass* (2012). Retrieved November 7, 2018, from <http://www.iconclass.nl/home>

structures, which are as follows: *procedural standards, data structure, data content and data value.*²

Because the development of technology is exponential, it constantly offers new and easier solutions to information retrieval, access, and most importantly it broadens the possibilities of visual documenting. Still every so often it challenges institutions to the point that today documentation and informatization in museums have merged and have become practically the same.³

There are a lot of reasons why data in a museum must be reliable and preserved, for example in a case of thievery or destruction, what is documented could be the only information left of that part of our cultural heritage. Documentation also plays a big role on preserving the meaning and the significance of museum objects.⁴

According to Ivo Maroević, function and content are primarily two ways in which the museum documentation can be divided. Moreover, it can also be divided into primary, secondary and tertiary documentation. Even though, the distinction between those three is slowly fading away because of new technology, they still stand. It is important to note that data in the secondary and tertiary documentation is always related to the object whose description data belongs to the primary documentation, which, what is more, stands like a node.⁵

The primary documentation includes the first elementary description of the museum object in inventory books or museum catalogues, which is usually done by ISO, Object ID or CIDOC standards to name a few, however these standards can also be self determined by the institution or law. They usually include data about the type of objects, material and technique, measurements, date, maker, title, subject and so on.

The secondary documentation includes museum activities, audiovisual fundus, records of newspapers, exhibitions and so on.⁶

Tertiary documentation includes reviews, catalogues, thesauri and indexes, controlled vocabulary along with other, which are regarded as helpers for overiewing

² Zlodi, G. (2004). Muzejska vizualna dokumentacija u digitalnom obliku. *Muzeologija*, (40), 9-105. (p. 12)

³ibid. (p. 13)

⁴ Maroevic, I. (1998). *Introduction to museology: the European approach*. Vlg. Dr. C. Müller-Straten.(pp. 178, 237)

⁵ Zlodi, G. (2004). Muzejska vizualna dokumentacija u digitalnom obliku. *Muzeologija*, (40), 9-105. (pp. 17-18)

⁶ Ibid.

documentation.⁷ Here, in the tertiary documentation lies the focus of this thesis, which will further explore how and why this documentation is done, specifically giving attention to the prior mentioned classification system *Iconclass*.

It is said that museum objects are already documents that have embodied and never cease to represent not only the reality in which they were created but also the journey through time that was consciously or unconsciously bestowed upon them. Every museum object has the potential to uncover something new about the past, if we only know how to read.

3 Controlled terminology and thesauri

Today, in the modern age, computerization is finally reaching everywhere, even in the most traditional art institutions. This means that with the help of information science and technology, art collections are becoming increasingly more available online, creating an immense opportunity for easy research or just enjoyment of art even from our tiniest screens. In order for users to be satisfied, information systems ought to be managed seriously. One of the most important tasks of an information system is presenting the user with relevant information. This is done through a closely and carefully controlled terminology, which is best structured and regulated by a thesaurus.

A thesaurus is a system of organized knowledge with the possibility of overseeing and structuring this knowledge, as well as finding it as easy and fast as possible. It is important to point out that in information science, thesauri are like dictionaries with a special and controlled terminology that are used in indexing. A non-controlled terminology can lead to a lot of problems, especially when it comes to information retrieval, because it would not provide the user with all the relevant information. However, thesauri are not only an effective way for controlling the terminology, but also overlooking it, that is having sight of all the possible terms in a specific field.⁸

There are a lot of standards that regulate how a thesaurus should work, from the controlled terminology to the structure of a thesaurus itself. These standards include but are not limited to: HRN ISO 2788:1999 – *Dokumentacija - Smjernice za izradu i*

⁷ Ibid.

⁸ Leoni, L. (2016). *Model izrade višjejezičnog multimedijskog tezaurusa u području konzerviranja i restauriranja* (Doctoral dissertation). (p. 75)

razvoj jednojezičnih tezaurusa, Thesaurus Construction and Use: a practical manual, Guidelines for Constructing a Museum, ISO 5964:1985 Documentation – Guidelines for the Establishment and Development of Multilingual Thesauri, Guidelines for Constructing a Museum Object Name Thesaurus.

We can identify two ways of controlling terminology while working with a thesaurus; the first one, unlike a lexicon that links a single term to two or three definitions, this one links one term only to one definition. The second one is usually used when a single term has two or more synonyms, in which case *the preferred term* for indexing is chosen. All the other terms are considered as *non-preferred*, however when searched they refer to *the preferred term*.⁹

There are a variety of aspects to be considered in choosing the right indexing terms, mostly related to the syntax and the semantics of a language. In building the modern thesauri it is important to make a web of semantic and generic connections of simple concepts, which also means to make logical connections between terms. Moreover with the further development of the semantic web, the semantic search for information, and semantic connections between concepts, the importance of a thesaurus grew immensely.¹⁰

Terminological thesaurus is a preferred term for what is called ‘classified glossary’ or ‘classified vocabulary’. It is still a list of terms; however these terms are arranged in a specific way corresponding to their relationships with each other and the conceptual structure, which means the exact location a term takes in relation with its broader meaning, unlike classical dictionaries that are arranged only by alphabetical order.¹¹ Sager defines it as follows “A terminological thesaurus is a classified schedule representing the conceptual relationships of the terms of a particular subject field according to pre-established rules.”¹²

⁹ Zlodi, G. (2004). Muzejska vizualna dokumentacija u digitalnom obliku. *Muzeologija*, (40), 9-105. (p. 57)

¹⁰ Leoni, L. (2016). *Model izrade višjejezičnog multimedijskog tezaurusa u području konzerviranja i restauriranja* (Doctoral dissertation). (pp. 75-77)

¹¹ Sager, J. C. (1982). Terminological Thesaurus. A more appropriate designation or a deprecated synonym?. *Social Science Information Studies*, 2(4), 211-214. (p. 211)

¹² Ibid. (p. 214)

4 Indexing terms

From standards mentioned above, the most important for defining indexing terms is Standard ISO 2788. It is recommended that indexing terms usually be a noun or noun groups, and it is not advised that indexing terms be either verbs or adjectives. It is important to not use abbreviations. Another crucial aspect that shouldn't be ignored is whether the terms are in singular or plural form. In almost every case, institutions try to avoid using plural forms, thus singular forms are most often used or better said are used as often as possible. Sometimes it is required to use plural forms, especially in languages other than English. In spite of this, there are some thesauri that use only plural forms, however the singular form is always presented; an excellent example of this is AAT (*Getty's Art and Architecture Thesaurus*).¹³

Another significant aspect of ISO 2788 is when an indexing term consists of two or more words. This automatically specifies the term, and usually it is advised that if possible indexing terms should only consist of one word, thus an indexing term with multiple words should be separated into a single word. However if it proves to be impossible to separate then it is accepted.¹⁴

5 Relationships between concepts in a Thesaurus

Firstly, it is essential to mention that a thesaurus should only consist of pragmatic connections between concepts, meaning that they stand-alone and are independent from any context¹⁵. Furthermore for these connections, Standard ISO 2788 differentiates two types:

- Relationships between concepts,
- Relationships between groups and subgroups or subdivisions

¹³ Zlodi, G. (2004). Muzejska vizualna dokumentacija u digitalnom obliku. *Muzeologija*, (40), 9-105. (pp. 57-58)

¹⁴ Leoni, L. (2016). *Model izrade višjejezičnog multimedijskog tezaurusa u području konzerviranja i restauriranja* (Doctoral dissertation). (p. 95)

¹⁵ *ibid* (p. 102)

The first one, relationships between concepts, hence relationships between terms are also called micro relationships. While the second one, relationships between groups and subgroups are also called macro relationships¹⁶.

Analyzing these micro relationships, and knowing the importance of the location of a term in a thesaurus thus the conceptual structure, Standard ISO 25964-1 separates two kinds of relationships¹⁷:

- 1) Relationships between terms
 - Equivalent relationships (including synonyms and terms that have similar meanings)
- 2) Relationships between concepts
 - Hierarchical relationships
 - Associative relationships

5.1 Equivalent relationships

These are relationships between terms that express the same or similar concepts, including synonyms. In these cases, a single term is chosen as a *preferred term*, also known as descriptors, while all the other terms are classified as *non-preferred terms*, also known as non-descriptors, which even so stay in the system and are usually offered as options or refer to the *preferred terms*.

These abbreviations appear in the thesauri¹⁸:

UF (use for) – is a strong recommendation to use *the preferred term* instead of the *non-preferred term*. For example book USE FOR paperback; here book is the *preferred term*.

USE (use) – is used when recommending the *preferred term*, and thus is the exact opposite of **UF** (use for). For example paperback USE book; here again book is the *preferred term*.¹⁹

¹⁶ Zlodi, G. (2004). Muzejska vizualna dokumentacija u digitalnom obliku. *Muzeologija*, (40), 9-105. (p. 60).

¹⁷ Leoni, L. (2016). *Model izrade višjejezičnog multimedijskog tezaurusa u području konzerviranja i restauriranja* (Doctoral dissertation). (p.102)

¹⁸ Zlodi, G. (2004). Muzejska vizualna dokumentacija u digitalnom obliku. *Muzeologija*, (40), 9-105. (p. 61)

¹⁹ The collection trust (2016). Spectrum Advice: Terminology control. *The collection trust WC 209, Natural History Museum London*. (pp. 3)

5.2 Hierarchical relationships

This relationship between concepts is thought to be a more convenient terminological structure when it comes to the classification of collections in any art institution. For it is suitable in retrieving information not only by scholars and professionals of these specific fields (e.g. history of art, archeology et cetera), but also by common users, which in this case, can easily be directed to specific terms just by knowing general concepts. For instance, a curator or a researcher could browse for all depictions of *Labarum* in a museum collection, however a common user without a lot of knowledge of Christian symbols and even less knowledge of military symbols of the Roman emperor Constantine the Great, would have a hard time finding these depictions. That's why in a hierarchical structured thesaurus, the broader concepts Christian religion, Christ, or even only religion and magic, which are all valid but general concepts for this type of depiction, serve as access points to finding all depictions of *Labarum*. Therefore, this terminology structure accommodates almost all users.

Besides the advantages when retrieving information, another important aspect is the graphical display (tree-view), which helps the user when browsing. In the system these abbreviations can be found²⁰:

BT (broader term)

NT (narrower term)

5.2.1 Types of Hierarchical Relationships

There are two types of hierarchical relationship, generic and partitive.

In the generic relationship, the broader term (generic) is abbreviated as **BTG** and the narrower term (generic) as **NTG**. In this relationship type, the narrower term has all the properties of the broader term but also has some unique ones, which the broader term doesn't have. For example if **BTG** is *water*, then one of the **NTG** can be *drinking water*.

In the partitive relationship the broader term (partitive) is abbreviated as **BTP** and the narrower term (partitive) as **NTP**. Here the narrower term is a single independent part

²⁰ Zlodi, G. (2004). Muzejska vizualna dokumentacija u digitalnom obliku. *Muzeologija*, (40), 9-105. (p. 62).

of the broader term, but different from the generic as it doesn't necessarily include all the properties of the broader term. An exquisite example of this type of relationship is the classification of geographical territory, for example if **BTP** is *Croatia* then one of the **NTP** could be *Zagreb*.

Another important feature are so called *dummy terms*, these are representative terms that shouldn't be used when indexing, but only when putting terms into groups, the main purpose is to make logical nodes. In the system these *dummy terms* are represented by the abbreviation **NL** (*node labels*).

Finally, some terms can belong to more than one concept therefore could be a part of more than one hierarchy or group.²¹

5.3 Associative relationships

When a connection between concepts exists, however it cannot be represented in hierarchical terms, then associative relationships are used to connect these concepts. In the system it is abbreviated as **RT** (related terms).²²

6 Content Indexing

For the modern age, retrieving information on the Internet is becoming something that is done on a daily basis. It is needless to say that the information we retrieve has been documented/indexed. The main aim of indexing is precisely directing the user where to find something. Any indexical language should always be effective and systematic i.e. should always have controlled terms in order to work effectively. To be exact it should, simultaneously retrieve or recall all works of art on a given subject and make sure that the retrieved information is not of an enormous size, but something that the user can comb through easily.²³

²¹ *ibid.* (p. 63).

²² Leoni, L. (2016). *Model izrade višjejezičnog multimedijjskog tezaurusa u području konzerviranja i restauriranja* (Doctoral dissertation). (p.107)

²³ Svenonius, E. (1994). Access to nonbook materials: the limits of subject indexing for visual and aural languages. *Journal of the American Society for Information Science*, 45(8), 600-606. (p. 602)

It is known that the general public is more interested in the content of fine arts objects than in its formal characteristics; which, on the other hand are more appealing or usable for researchers.²⁴

When choosing the correct indexing terms, it is very important to rely on a controlled language. These are terms that come from our everyday language, which when put out of context still make sense. These controlled languages that help in indexing are arranged in a form of a thesaurus, as previously explained.²⁵

However, content or subject indexing is not as easy as it might seem; making this transition from visual representation to written language, a complex procedure, for when the medium of expression is changed the meaning itself might alter. Elaine Svenonius in her article about indexing visual arts and music, challenges us to think whether it is possible for words to correctly and completely index visual representations, together with their symbolism and deeper meanings. Some works of art, apart from their deeper concepts, visually depict reality or objects and events close to reality; for these works of art it is said that are *indexable*.

In *indexable* art, for symbols, signs, subject, and other visual depictions we have numerous lexicons, for instance lexicons of early Christian art and lexicons of icons. However, the same cannot be said for abstract and non-representational art, which is usually objectless and in which the forms that are used to express content don't have these explanations, although they might be clearly defined. Meanwhile it is known that in fine arts content and form are indivisible.²⁶ This chapter will further discuss some methods for indexing the content of an art piece.

6.1 Document-like objects

When considering documenting fine arts, we stumble upon the term *document-like objects* or DLOs.²⁷

²⁴ Zlodi, G. (2004). Muzejska vizualna dokumentacija u digitalnom obliku. *Muzeologija*, (40), 9-105. (p. 38).

²⁵ Ibid. (pp. 41-46).

²⁶ Svenonius, E. (1994). Access to nonbook materials: the limits of subject indexing for visual and aural languages. *Journal of the American Society for Information Science*, 45(8), 600-606. (pp. 600-602)

²⁷ Zlodi, G. (2004). Muzejska vizualna dokumentacija u digitalnom obliku. *Muzeologija*, (40), 9-105. (p. 38).

DLOs are nothing more than a defined set of metadata, which is easily understandable and retrievable. It could be said it contains basic data about an electronic text, image, map, et cetera.²⁸

When a fine arts object is represented as a document, such as the earlier mentioned *document-like objects*, then logically standards for content indexing of documents are used. International Organization for Standardization or ISO 5963 in their *Documentation- Methods for examining documents, determining their subject, and selecting indexing terms* has established three phases on content indexing. Which when slightly modified can be used also in documenting fine arts.

The first phase is called *examining the document and determining its subjects' content*; we can clearly relate this with the later on explained Panofsky's categories, more precisely *The Iconographical Description*, where it is required to identify themes, symbols, signs et cetera, for which the knowledge of the visual language representation is required.²⁹

The second phase is *recognizing the main concepts in the content (of documents)*, which concretely means finding the most suitable indexing terms, bearing in mind that these terms play the role of representing that object that has been indexed, to the world. It is especially challenging since these terms should at the same time give a lot of information clearly and in a few words, therefore be brief but very precise; it is mainly problematic when complex ideas and concepts have to be put into simple and straightforward terms.³⁰

The third phase is called *researching subject indexing terms*. After identifying the subject and the content of an art piece, and identifying the indexing terms, every museum professional should as well consult a classification system just like *Iconclass* or *AAT*. Because these classification systems have an organized system, and since a lot of people work in documenting collections in art institutions around the world, and more people search for items in these collections, having a unified and controlled set of classifying terms is very effective as well as valuable. These indexing or classifying terms are most commonly represented with a set of symbols or classification signs.

²⁸ Caplan, P. (1995). You call it corn, we call it syntax-independent metadata for document-like objects. *Public-Access Computer Systems Review*, 6(4), 19-23. (pp. 19-20)

²⁹ Zlodi, G. (2004). Muzejska vizualna dokumentacija u digitalnom obliku. *Muzeologija*, (40), 9-105. (p. 39).

³⁰ Ibid. (p. 40).

6.2 The “Ofness”, “Aboutness” and “Isness”

Elaine Svenonius discusses the separation Shatford did in her analysis of the subjects of paintings. She differentiates something she calls the *ofness* and the *aboutness* of a painting, hence what it consists *of* and what is it *about*. This, in addition, is closely linked with Panofsky’s categories on analyzing a work of art, which are thoroughly explained below. Shatford identifies the *ofness* and the *aboutness* in each of Panofsky’s categories. Svenonius claims: “While the *ofness* of representational art can be indexed, at least so far as it can be named, its *aboutness* is more problematic.”

The *ofness* is easily indexed and thus definable, as in pre-iconographical level as well as in iconographical level, whereas the *aboutness* refers to moods and the symbolism conveyed in an art piece, which can be tricky to put into words. One of the most problematic cases are synonyms and homonyms, these circumstances complicate the information recall.³¹

The *isness*, simply said, has the function of indicating what the work of art is; e.g. in this case is it a drawing, painting, photograph or other visual representation.³²

Furthermore, because representations in art tend to have a dual nature, representing objects or things and ideas, this may easily result in dilemmas when choosing terms to index.³³ That’s why both pre-iconographic and iconographic analyses are crucial when indexing in fine arts to make recall results more accurate. To illustrate, if a user wants to find all the depictions of water in early Christian art, and another one all the depiction of baptism, ideally both results should be approximately the same. It has been established that for indexing fine arts it is crucial to shift the media of expression, as a result transforming visual language into verbal or written language. It is important to note that these indexing terms should be given by professionals who are ‘fluent’ in this visual language, and are able to make this shift from visual to verbal, nonetheless the terms ought to be simple and understandable, so that the user comes to contact with a reproduction of an art piece without necessarily being familiar with the visual language.

³¹ Svenonius, E. (1994). Access to nonbook materials: the limits of subject indexing for visual and aural languages. *Journal of the American Society for Information Science*, 45(8), 600-606. (p. 603)

³² Zeng, M. L., Žumer, M., & Salaba, A. (Eds.). (2011). *Functional requirements for subject authority data (FRSAD): a conceptual model* (Vol. 43). Walter de Gruyter. (pp. 10-11)

³³ Zlodi, G. (2004). Muzejska vizualna dokumentacija u digitalnom obliku. *Muzeologija*, (40), 9-105. (p. 39- 42).

6.3 Iconography as a branch of Art History (Panofsky's categories)

It is said that a picture is worth a thousand words, meaning that it can convey complex ideas and contain a wide range of information in itself. A picture is not limited by language boundaries, like a poem might be, and in spite of its beauty, rhythm and powerful message if we don't know the language (code) it will be incomprehensible, thus all its features worthless.

Visual arts on the other hand are somewhat more understandable; however, they also have layers upon layers. A work of art may provoke our senses, and awaken emotions we have never felt before. For some people this is enough, while others need to know the meaning behind different visual representations such as symbols, people, events, situations, abstract ideas and most importantly what connects them with each other and with the real world. All of the aforementioned might be considered as codes or as a language of representations that must be learnt in order to understand and interpret a work of art. Because human artistic creation developed through millennia, these codes were perfectly understandable during the time they were created, however today we struggle trying to decipher them, sometimes misunderstanding or reading too much into them. It is exciting to say that some of them still remain a mystery to the modern man. Encyclopedia Britannica defines Iconography as “*the science of identification, description, classification, and interpretation of symbols, themes, and subject matter in visual arts*”.³⁴ Moreover, iconography as a branch of Art History deals with interpreting the deeper or underlying meaning of a work of art, not only as a whole but also its specific details. Roelof van Straten (2002) describes four main categories for analyzing a work of art; this system of classification helps distinguish four levels of meaning i.e. four phases for iconographic research. Straten based this system of classification on an earlier known one from Erwin Panofsky³⁵. However, the latter has only three phases and lacks some important features. These absences are mainly shown in the description of the difference between iconography and iconology, as well as when interpreting the meaning that was intended by the artist and the one that may be unintentional or its understanding has changed with time.

³⁴ Britannica, T. E. (2014, February 04). Iconography. Retrieved from <https://www.britannica.com/art/iconography>

³⁵ Panofsky, E., & Drechsel, B. (1955). *Meaning in the visual arts*(p. 55). Chicago: University of Chicago Press.

These categories are described as follows:

First phase: *The pre-iconographical Description*, which is simply listing everything we see in the work of art without trying to identify the relation between objects, nor their meaning.

Second phase: *The iconographical Description*, its aim is to identify the subject depicted in the work of art, also the relation between objects, and symbols. This requires a wider knowledge of how are different subjects represented in various ways.

Third phase: *The iconographical Interpretation*, aims to explain the deeper or secondary meaning that a work of art may have, but not necessarily has.

Iconology as the last of Straten’s main categories brings to light the social, historical and cultural background of subjects’ chosen for the depiction as well as including an investigation on the commissioners or artists.

Figure 1: Three phases of iconographical description

	Phase 1	Phase 2	Phase 3
A	Description	Still Life with Skull	<i>vanitas</i>
B	Description	The Judgment of Solomon	Justice
C	Description	Winter Landscape	The month of January
D	Description	Landscape with Farm	No iconographic interpretation
E	Description	Two Boys Blowing Soap Bubbles	<i>vanitas</i>
F	Description	The Suicide of Lucretia	Virtue

Source: Van Straten, R. (2012). *An introduction to iconography: Symbols, allusions and meaning in the visual arts*. Routledge. (p. 21)

The example below illustrates how these three phases work, when indexing the content in visual representations. The chosen work of art is “Metamorphosis of Narcissus” by Salvador Dalí finished in 1937, due to the richness of its elements.

Figure 2: Metamorphosis of Narcissus, Salvador Dali, 1937, Photo: © Tate, London [2019]



Table 1: Example of pre-iconographical, iconographical description and iconographical interpretation using indexing terms to describe the content of the painting "Metamorphosis of Narcissus" by Salvador Dali

Pre-iconographical description	Iconographical description	Iconographical interpretation
Human, hand, egg, crack, narcissus, ants, women, men, sculpture, dog, mountains, chessboard.	Mythology, Narcissus, metamorphosis, beauty, self absorbed, punishment, religion an belief	Sub-consciousness, psychology, Freud, death and decay, psyche and soul, love, frustration, narcissism

7 History of Iconclass

Henri van de Waal (1910-1972) who was a professor of Art History at the University of Leiden saw the need for the development of a new, more complete system for iconographic documentation and research. By 1950, some of his ideas had already

fallen into place; these were mostly related to systematic overview of themes, subjects and motifs of Western art³⁶.

He singlehandedly developed a classification system that made possible the creation of iconographic catalogues for paintings, drawing et cetera; this system would later be called Iconclass. Even though this project started as an individual work, Henri van de Waal's colleagues promptly joined the project.³⁷

The system was finished and published somewhere between 1973 and 1985 by The Royal Netherlands Academy of Arts and Science (KNAW). University of Utrecht, from 1990 to 2001 started developing computerized editions. In the year 2001 KNAW again took the management of Iconclass, highly supporting its translation, resulting with the multilingual Iconclass. Finally, in 2006 RKD (Rijksbureau voor Kunsthistorische Documentatie/ Netherlands Institute of Art History) was given the management of Iconclass. In 2009 in partnership with Etienne Posthumus and Hans Brandhorst they developed the new Iconclass browser, which is also accessible as Linked open data or LOD, both of which we use today.³⁸

8 Iconclass as an iconographic 'handbook'

Regarding handbooks and collections of reproductions, there are a significant number of books, lexicons, dictionaries and websites. However, what makes Iconclass different is that it is not only a handbook, but may be considered as a new method that helps for researching in the field of iconography.³⁹

Straten strongly believes that if every art institution in the world would use Iconclass for classifying their collections, ideally each concept would have a specific code; and this in turn would make for much faster and easier information retrieval.⁴⁰

The system by itself is an empty skeleton of systematic numbers or codes; each code is given to a specific theme, person, artifact, et cetera. Therefore, the codes are a universal language for searching and retrieving information in institutions with an

³⁶ Van Straten, R. (2012). *An introduction to iconography: Symbols, allusions and meaning in the visual arts*. Routledge. (p. 110)

³⁷ Vujić, Ž. (1998). Što je ICONCLASS i možemo li ga primijeniti u našim muzejima i galerijama. *Bilten o informatizaciji muzejske djelatnosti*, 1-4. (p. 2)

³⁸ *Iconclass* (2012). Retrieved November 7, 2018, from <http://www.iconclass.nl/home>

³⁹ Van Straten, R. (2012). *An introduction to iconography: Symbols, allusions and meaning in the visual arts*. Routledge. (p. 95)

⁴⁰ *Ibid.* (p. 111)

immense collection, whose themes, names and titles may be in different languages. Additionally, it makes reaching research material that usually would be inaccessible possible. *Arkyves* is a prominent example and an exceptional illustration how Iconclass could be best put to use.

Where as, there is a digital version in CD; my research is mostly focused on the web-developed system, which is free and online.

We can identify three main components of Iconclass⁴¹:

- The first component is *the classification system* that has 28,000 definitions, all of which are in a hierarchical order. These are clustered in 10 main divisions. As previously mentioned, each of these definitions has a code attached to it, containing letters and numbers, and the description of the subject.
- The second component is the *Alphabetical index* which contains 14,000 keywords used for locating the code and its corresponding text.
- And lastly, the third component, *Bibliography* that has 40,000 references to books and articles, which is yet to be released online.

8.1 Contents of Iconclass

One of the main elements of this system are its one of a kind alphanumeric codes also known as *notations*. In spite of the complexity of subjects depicted in works of art, these notations are used to index or describe them; in addition, the more complex the subject the more notations are used to index it. Notations always start off with one of the numbers from 0 to 9; they accordingly fit the ten major divisions of Iconclass. It is important to note that every notation is part of a hierarchical structure, starting with general terms to more specific.⁴²

These 10 divisions are:

0. Abstract, Non Representational Art
1. Religion and Magic
2. Nature
3. Human being, Men in general
4. Society, Civilization, Culture

⁴¹ *Iconclass* (2012). Retrieved November 7, 2018, from <http://www.iconclass.nl/home>

⁴² *ibid.*

5. Abstract Ideas and Concepts
6. History
7. Bible
8. Literature
9. Classical mythology and Ancient History

This system of classification helps distinguish between all the principal aspects of what can be represented and subjects of narrative nature, numbers from 1 to 5 represent more general topics, where as 6 to 9 are somewhat more specific and narrative. *Abstract, Non-Representational Art* was added later in 1996, as the last division.⁴³

8.2 Subdivisions

Each main division can be divided into 9 other subdivisions, thus becoming more specific. In the system, this is done by simply adding a second digit to the notation. For example, *1 Religion and Magic* is divided into⁴⁴:

10. (symbolic) representations ~ creation, cosmos, cosmogony, universe, and life (in the broadest sense)
11. Christian religion
12. Non-Christian religions (including institutions, customs and antiquities)
13. Magic, Supernaturalism, Occultism
14. Astrology

To specify the subject we then should add a letter to the notation, for example:

- 13A general phenomena ~ magic and supernaturalism (spirits, ghosts etc.)
- 13B witchcraft, sorcery

Understandably these further divisions are under *13 Magic, supernaturalism, occultism*.

Additionally, if it is needed to further specify the subject, after adding the letter, the notation keeps getting only numbers. To illustrate: *13B2* is a notation given to the

⁴³ Ibid.

⁴⁴ *ibid.*

subject *sorcerer, magician, wizard, warlock*, which understandably is a further specification of *13B witchcraft, sorcery*.

Other important features that Iconclass offers are: bracketed text, keys, doubling of the letter and structural digits.

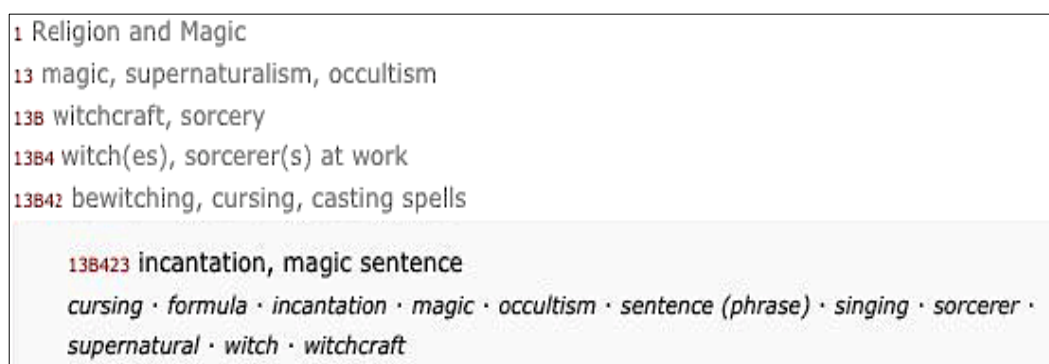
Bracketed text is used when the user wants to add a specific name, which breaks it away from the hierarchy.

For some notations in the system there is a specific list, which are called Keys, they are made of strings of digits, sometimes including words, and are always led by a plus sign (+). Giving a deeper meaning to the notation.

Doubling of letters, same as Keys are not used in every notation, just in some specific cases; they alter the meaning of the notation usually opposing it. For example if 31A is the (nude) human figure (male), then 31AA is the (nude) human figure (female).

Structural digits are an integral part of the notation, as well constructed in lists. They correspond with specific periods or events usually in an either fictional or non-fictional characters life. It is important to note that structural digits are used to make cross-sections through the system.⁴⁵

Figure 3: An Example of Iconclass' online browser



Source: *Iconclass* (2012). Retrieved November 7, 2018, from <http://www.iconclass.org/rkd/13B423/>

This general alphanumerical index, with its hierarchical order, and the enormous collection of notations and subjects, is the biggest iconographical corpus for fine arts. Even if the user doesn't know the exact name of the subject, just by describing actions or elements in a visual document, with the help of Iconclass the subject can be identified. The bibliography contains 7 volumes, which is not published online yet. It

⁴⁵ *ibid.*

helps with finding literature for certain subject in iconography, which makes its use easier for researchers or common users.⁴⁶

The example below illustrates the three phases of iconographical analysis when indexing with terms and notations provided by Iconclass. This is in regard to the previous example “Metamorphosis of Narcissus” by Salvador Dalí, in chapter 6.4 (see Table 1).

Table 2: Example of pre-iconographical, iconographical description and iconographical interpretation using indexing terms and notations from Iconclass, to describe the content of the painting "Metamorphosis of Narcissus" by Salvador Dali.

Pre-iconographical description	Iconographical description	Iconographical interpretation
31A the (nude) human figure; 'Corpo humano' (Ripa) 31A2245 hand 41C64 dairy products and eggs 25G41 (NARCISSUS) flowers: narcissus 25F711 (ANT) insects: ant 34B11 dog 43B16 mountain climbing, mountaineering 43C521 chess	97 metamorphoses ~ classical mythology 97B6 Narcissus changed into a narcissus: when Narcissus is pining away for the love of his image reflected from the water, he is changed into a narcissus (Ovid, <i>Metamorphoses</i> III 510) 95A(NARCISSUS) 6 suffering, misfortune of Narcissus	31F1 symbols of Death 49G71 psychology 56F241 Narcissism 56BB35 Frustration 31B18 unconsciousness 31B3 dream 31B0 symbolic representations, allegories and emblems ~ mind, spirit 33C85 free love

9 Iconclass as Linked Open Data (LOD)

Iconclass among other things is also available as linked open data, which is a combination between linked data and open data. Linked data connects data through W3C standards; within the semantic web, linked data is also a web of data. The technologies of Semantic Web that are usually used are as follows: RDF, OWL, SKOS, and SPARQL. This link between data should be accessible to provide better results.⁴⁷

⁴⁶ Van Straten, R. (2012). *An introduction to iconography: Symbols, allusions and meaning in the visual arts*. Routledge. (p. 112)

⁴⁷ Linked Data. (n.d.). Retrieved from <https://www.w3.org/standards/semanticweb/data.html>

In *Iconclass* every notation has its own unique Uniform Resource Identifier or URI. Two main types can be differentiated, one for that is convenient and readable by humans, and the other one by machines.⁴⁸

For example the URI for “beings from outer space” is <http://iconclass.org/46C491>, where as the machine readable format should be ‘.rdf’ or ‘.json’ in this instance in would then become <http://iconclass.org/46C491.rdf> or <http://iconclass.org/46C491.json> depending on the preference. If, however, there is a ‘+’ sign, it does not go in the URI, but it is represented as %2B.⁴⁹

10 New projects that include Iconclass

What does it mean to be a museum or an art institution in the digital age? Is changing the concept of how we view a traditional museum that terrible? Why do most museums shiver when thinking about digitalizing their collections? Is it just the vast amount of work that scares them? A reproduction of an art piece i.e a surrogate in the Internet is more viewed than an original in a museum, therefore making these collections worth sharing online.

Furthermore, I would like to think that in the future, my fellow art historians and museology colleagues could easily turn on a holographic device and have a vivid lecture. In making all of these possible, art history and robotics have to intersect to give birth to a new interdisciplinary field. It is very important to note that the first steps towards these new developments are digitalizing and documenting collections⁵⁰; National Museum in Norway is a leading example regarding this. In 2015 they have launched two projects *Repcol* and *Principal components*, since the latter was developed using *Iconclass*, it will be further discussed. Besides these being enormous advancements, naturally they still have a lot of problems, gaps and space for improvement.⁵¹

⁴⁸ ICONCLASS as Linked Open Data. (n.d.). Retrieved from <http://www.iconclass.org/help/lod>

⁴⁹ Ibid.

⁵⁰ Mashable. “The Met Is Redefining What It Means to Be a Museum in the Digital Age - Mashable Originals.” *YouTube*, YouTube, 25 Oct. 2018, www.youtube.com/watch?v=tQMX8a4drnE.

⁵¹ “Iconclass Blog.” *Iconclass Blog*, iconclassblog.com/.

10.1 Principal components

This project is designed to identify and analyze all the components found in a work of art, namely paintings, by using machine vision and deep learning which are still being developed under the umbrella of machine learning.⁵² To clarify, according to Encyclopedia Britannica, machine learning in artificial intelligence is concerned with the implementation of computer software that can learn autonomously. At the present, these algorithms, which develop on their own, are more than capable in classifying images by neural networking. This is done using a large amount of raw data and graphic processing units that were previously developed for gaming. Because machine learning is developing in such a rapid way, and because computer scientists do not know exactly how these algorithms evolve, there is a good chance that besides conventional art history classifications and *Iconclass*, AI might develop a new unique way of classification.⁵³

As it was previously mentioned, this project is still in its earliest phases, however they have published some preliminary tests and results. Algorithms were trained in identifying objects in an image, finding faces together with age and gender, also grouping or classifying images based on styles, technique, color etc.⁵⁴

Only two examples are shown in order to explain the results.

The first test was performed in an oil painting from the romantic period done by Adolph Tidemann and Hans Gude called *The Bridal procession on the Hardangerfjord* (1848), depicting a Norwegian landscape.

⁵² Bognerud, M., & Pedersen B.G. (2015). RepCol (Representability in the Collections) - How to visualize an entire collection and the value of doing so., presented at Documenting diversity – Collection, Catalogues & Context, CIDOC New Delhi, 2015. (p. 5)

⁵³ *ibid.* (p. 7)

⁵⁴ *Ibid.*

Figure 4: The Bridal Procession on the Hardengerfjord, 1848, by Adolph Tidemann and Hans Gude

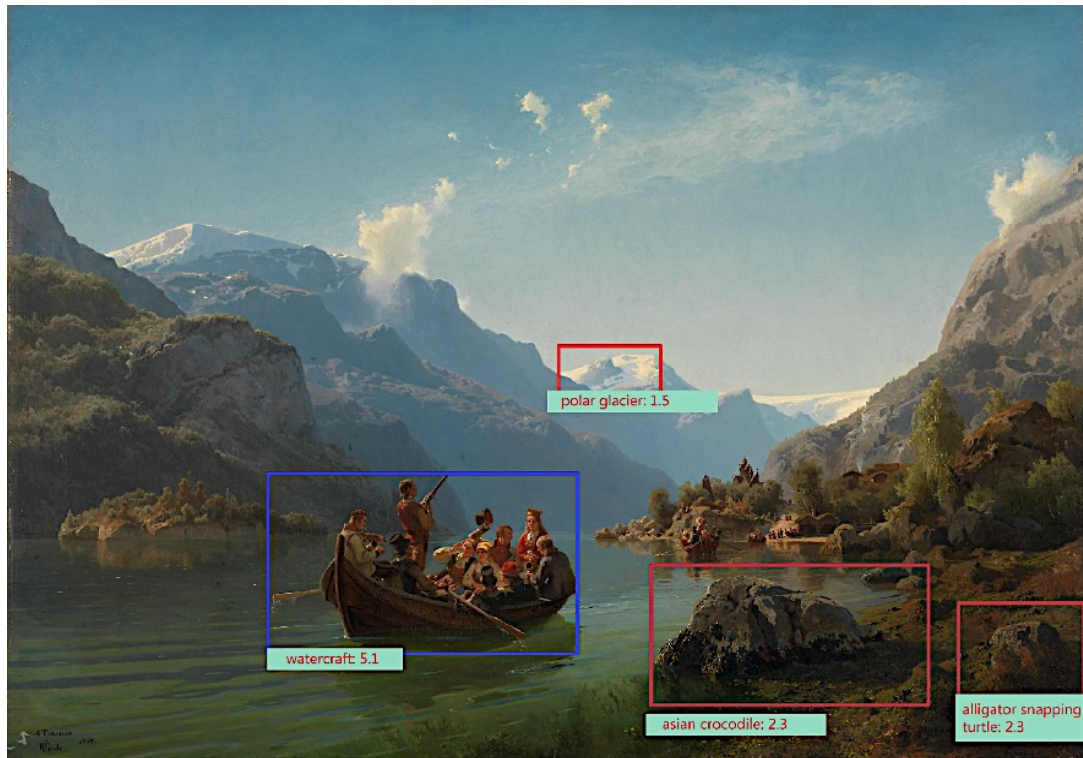


Illustration source: Bognerud, M., & Pedersen B.G. (2015). RepCol (Representability in the Collections) - How to visualize an entire collection and the value of doing so., presented at Documenting diversity – Collection, Catalogues & Context, CIDOC New Delhi, 2015. (p. 9)

Here is clearly shown that the machine recognized the *watercraft*, and the *polar glacier*, however it had a hard time differentiating between unusual shaped stones and crocodiles or alligators.

During the second phase, The National Museum in Norway, used algorithms that were already trained on the ImageNet by Google and then retrained by Wikiart's collection, obviously using a vast amount of data. Two algorithms were developed, one for classifying tags and the other stylistic components. Both were extremely successful, grouping portraits regardless of what style or period they belong, and grouping landscapes with water and then naval imagery, respectively.⁵⁵

⁵⁵ Bognerud, M., & Pedersen B.G. (2015). RepCol (Representability in the Collections) - How to visualize an entire collection and the value of doing so., presented at Documenting diversity – Collection, Catalogues & Context, CIDOC New Delhi, 2015. (p. 11)

10.1.1 Iconclass - test

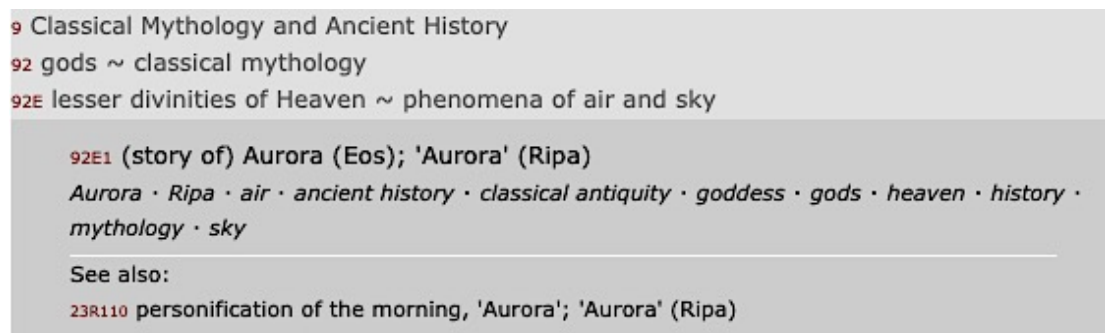
Through testing machine learning, *Iconclass*, was eager to find ways to improve themselves. This test, however, did not turn out to be very successful because of the hierarchical structure of *Iconclass*, and because many terms belong to more than one category or subcategory, which would overlap. For the machine, it was puzzling how some visually similar components, located in a subcategory did not always correspond to the main categories. This test was done using Arkyves data.⁵⁶

Although, on the other hand, when testing the main categories of *Iconclass* in Rijksmuseum's collection, it turned out to be very successful, automatically classifying and structuring most of the images.⁵⁷

10.2 Iconclass and AAT

One of the most important features of *Iconclass* are its keywords; the system contains 14,000 of them. Keywords help in more precise information retrieval and are separate components that are added to the notations. They are all alphabetically indexed and correspond to the hierarchical relationship between notations, as seen in the example below.⁵⁸

Figure 5: An example of a notation together with keywords in Iconclass



Source: *Iconclass* (2012). Retrieved March 19, 2019, from <http://www.iconclass.org/rkd/92E1/>

⁵⁶ "Iconclass and AI." *Iconclass Blog*, 29 May 2018, iconclassblog.com/2017/06/12/iconclass-and-ai/.

⁵⁷ *ibid.*

⁵⁸ Weda, R. (2017). Bringing two LOD vocabularies together Linking Iconclass keywords with AAT concepts. CIDOC annual conference, Tbilis, Georgia, 2017. (p. 3)

In this example the notation **92E1 (story of) Aurora (Eos); ‘Aurora’ (Ripa)** has the keywords *Aurora, Ripa, air, ancient history, classical antiquity, goddess, god, heaven, history, mythology, sky*. Moreover, keywords of any notation are also valid for all the other notations that are lower in the hierarchy.⁵⁹

However, these keywords are not fully functional, because they are not completely linked within the LOD publication.⁶⁰ What this means is that they do not have unique IDs, places or descriptions in the hierarchy of the system. Linked data, on the other hand requires for it to have a unique URI (Uniform Reference Identifier).⁶¹

As a result of this incompleteness, and since both are published as LODs, Iconclass and Getty’s AAT vocabulary are in the process of a collaboration that will result in linking *Iconclass*’ keywords with AAT’s concepts.

AAT is also a multilingual thesaurus with 42,000 generic concepts, grouped in 8 facets.

These two systems, as similar as they are, differ in a few ways. Because of these distinctions, not all the notations match. The ones that match, because they are found in AAT’s vocabulary, are the generic concepts. Therefore, the more specific ones do not find matches. Finally, bringing these two LOD systems together would be very beneficial for upgrading the systems and even more for guiding and easing information retrieval for users, “providing access to the full semantic content of a AAT record, with multilingual labels, equivalent, alternative terms, description of the concept, etc.”^{62 63}

11 Other similar classifying systems

Apart from *Iconclass* there is another system constructed like a thesaurus, which deals with iconographical indexing. Within the scope of Getty’s vocabularies, The Getty

⁵⁹ *ibid.* (p. 3)

⁶⁰ *Ibid.* (p. 1)

⁶¹ “Enriching Iconclass LOD by Linking Keywords to AAT Concepts.” *Iconclass Blog*, 9 Jan. 2018, iconclassblog.com/2018/01/09/enriching-iconclass-lod-by-linking-keywords-to-aat-concepts/.

⁶² *Ibid.*

⁶³ Weda, R. (2017). Bringing two LOD vocabularies together Linking Iconclass keywords with AAT concepts. CIDOC annual conference, Tbilis, Georgia, 2017. (pp. 8-10)

Iconographical Authority (IA), although recently developed, appears to be a strong competitor to *Iconclass*.

11.1 The Getty Iconographical Authority (IA)

This system was developed using *Subject Authority of the Categories for the Description of Works of Art*, which serves as information about different subjects in iconographical descriptions. These data usually come from other systems, which here are more thoroughly explained.⁶⁴

IA incorporates subjects that are not included in AAT (generic concepts), ULAN (real agents), TGN (real places), CONA (real artworks). And these subjects are as follows⁶⁵:

- Characters, Fictional Person, Named Animal, Event/Narrative, Fictional Place, Allegory/Symbolism, and Fictional Build Work, Fictional Literature, Religion/ Mythology/ Legend.
- Person (character), animal (character), event, imaginary place.

The system also incorporates multilingual labels and descriptions. It is organized in hierarchical relationships, however it also includes associative ones where necessary, Root Recording, Facets and Guide Terms. It is also related to other vocabularies within Getty. It is important to note that IA is also presented as LOD.⁶⁶

⁶⁴ “About CONA (Getty Research Institute).” *The Getty*, www.getty.edu/research/tools/vocabularies/cona/about.html#purpose_ia.

⁶⁵ Alexiev, V., Moumoutzis, N., Christoulakis, M., Christodoulakis, S., Paneva-Marinova, D., Márkus, Z. L., ... & Szkaliczki, T. (2018). Museum Linked Open Data: Ontologies, Datasets, Projects. *Digital Presentation and Preservation of Cultural and Scientific Heritage*, 8, 19-50.

⁶⁶ Ibid.

Figure 6: Example of a record on the IA system

<p>Sample IA Record</p> <p>Iconography ID: 1000851 Iconography Parent: 1000959 (Buddhist characters) Iconography Type: Character/Person</p> <p>Descriptive Note: As a subject in art and literature, the primary protagonist in narratives surrounding the life, deeds, and teachings of Buddhism.</p> <p>Display Date: from 6th century BCE Start Date: -520 End Date: 9999</p> <p>Label: Buddha (Buddhist characters, Buddhist iconography, Legend, Religion, Mythology)</p> <p>NAMES: (sequence, preferred/variant flag, name, language and preference, term type)</p> <p>1 P Buddha (primary character of Buddhism) (<i>English-P, descriptor</i>)</p>
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Source: retrieved Retrieved March 23, 2019 from http://www.getty.edu/research/tools/vocabularies/cona/about.html#sample_ia

12 Folksonomy and Social Tagging

This last chapter shifts the focus from how professional people working in a museum or any other art institution classify their collections, to the role the public might have in making the collection more accessible.

Firstly, '*folksonomy* is a user-generated system of classifying and organizing online content into different categories by the use of metadata such as electronic tags.'⁶⁷ Because information about museum objects is as important as the objects themselves if not more, bringing this information closer to the public should be one of the fundamental tasks of every museum. Social tagging and folksonomy help museums to identify their online visitors, and upgrade their vocabulary accordingly. Another great aspect of social tagging is that it creates space for public engagement with art and other museum objects, which is challenging considering how passive an online collection can be. Furthermore, seeing how technical can 'the curatorial language' get, it is important to take under consideration the semantic gap this creates between

⁶⁷ Folksonomy | Definition of folksonomy in English by Oxford Dictionaries. (n.d.). Retrieved from <https://en.oxforddictionaries.com/definition/folksonomy>

institutions and the public, making the collection virtually unsearchable by someone with no academic background. Giving users the opportunity to tag using keywords they find more suitable to describe/interpret an object fills in these gaps with small individual efforts ‘masked’ as fun tools.⁶⁸

Some examples of this are: *steve.museum* (now found only in web archives), Sidney’s Powerhouse Museum, Victoria and Albert Museum, ARTigo and so on.

Pamela LiCalzi O’Connell, a journalist of The New York Times, in her article about the role of social tagging wrote “One picture, 1000 tags”, which I think describes best the importance of this development.⁶⁹

⁶⁸ Trant, J., & Wyman, B. (2006, May). Investigating social tagging and folksonomy in art museums with *steve.museum*. In *Collaborative Web Tagging Workshop at WWW2006, Edinburgh, Scotland*. (pp. 1-4)

⁶⁹ O’connell, P. L. (2007, March 28). One Picture, 1,000 Tags. Retrieved from https://www.nytimes.com/2007/03/28/arts/artsspecial/28social.html?_r=1&oref=slogin&ref=technology&pagewanted=all

13 Conclusion

In conclusion, this thesis covered multiple areas within documenting fine arts, such as content indexing together with iconographical descriptions, creating of thesauri and the relationships within it. Furthermore, the main focus was Iconclass' structure and functions, it also covers the on going projects that adopt and test the latest technology in these classifying systems, here including *Iconclass*, Getty's AAT and IA, its similarities, differences and collaborations. It emphasizes the importance of controlled terminology when using thesauri in documenting, which today should be imperative, in order for information retrieval to be accurate and fast. The thesis, however, did not discuss the actual usage of Iconclass in museums or archives within documentation of museum objects or art in general.

Although the focus was to analyze an already existing classifying system, which is in use today, this thesis opened up more questions that it could answer.

Because the world around us is developing so rapidly and all at once, sometimes it is hard to keep up. Limiting our minds and imagination is an even greater fall back. We ought to think bigger, do more for future generations, open up opportunities, and give free access to all art collections. The thesis demonstrates the significance the collaboration between art history, information science and fields of computer science would have in future developments.

With a touch of a button or screen, museum staff will, in the future, classify, organize and map their digitalized repertoire, making it easier than ever not only to find these works of art but also research, preserve and present all the knowledge hidden in the deepest corners of museums.

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