Henri van de Waal Foundation - Policy plan

About the Foundation

By supporting excellent research and establishing supportive networks, the Henri van de Waal aims to encourage the continuous development of the Iconclass classification and its use within worldwide scholarly research.

Iconclass is one of the leading vocabularies within the GLAM sector for the description of cultural content and available in multiple languages. In scholarly research, in particular in (digital) art history and visual studies, Iconclass plays an important role in increasing our understanding of images, their meanings and contexts. First initiatives also demonstrate the potential of this vocabulary for AI and data innovation. Although Iconclass offers unprecedented opportunities, continuous action is needed to build further on the strengths of this vocabulary and extend Iconclass into the future. The Henri van de Waal foundation will support the continuous development and use of the Iconclass vocabulary.

This foundation is dedicated to Henri van de Waal († 7 May 1972), the creator of Iconclass which was published between 1972 and 1985. In line with his pioneering vision, the foundation will continue to support research in the systematic approach of iconography and combine this with the possibilities of computer technology.

The objectives of the Henri van de Waal Foundation

a. to collect and interpret the visual and textual images that have been produced by human cultures of the present and the past, to provide access to their subject matter and make them available for research, preferably in the public domain;
b. to promote iconography as a scientific discipline in academia and beyond, and its importance for the understanding of cultural object and their historical significance;
c. to promote and support the use of classification systems and thesauri such as, but not restricted to, Iconclass and the Chinese Iconography Thesaurus;
d. to advocate for content indexation in digital collections, being galleries, libraries, archives and museums, around the globe;
e. to promote the collaboration and the exchange of ideas on the topic of subject access between researchers in the fields of the Humanities and Information sciences;
f. to facilitate and stimulate computer-supported iconological research in the spirit of Henri van de Waal;
g. and anything that can be related to, and is possibly beneficial to this objective, in the widest possible sense

These objectives combine concrete actions by the foundation itself with an invitation to researchers and heritage institutions to join forces and collaborate. This policy plan reflects that combination. It describes the development of software instruments to support faster and better content indexation of visual and textual sources with the help of Machine Learning technology. It lays down a strategy to make those instruments available to also allow others - individuals and organizations - to create rich subject metadata.

Rich, structured subject metadata, tailored to the Humanities domain, are essential for the development of Artificial Intelligence applications. We do not think AI applications will replace human cataloguers or

researchers, but we are convinced that pattern recognition and Machine Learning technology can seriously accelerate the subject cataloguing of visual sources.

Themes / Priorities

The policy commitments congregate around four themes, below are introductions to each theme:

1: Iconclass, an evolving vocabulary

The way images are described is undergoing constant and rapid change. In response to these changes, there is a need for a continuous assessment of the Iconclass vocabulary. The foundation will continue to engage with stakeholders to discuss developments and the need for further improving the Iconclass vocabulary.

Case study (see appendix: "What we say is what we see")

2: Promoting Iconclass in visual research

The goal is to stimulate the use of the Iconclass vocabulary for the research of images. Visual research methods are widely applied in field like (digital) art history, anthropology and visual culture studies. For this the foundation will closely collaborate with universities and museums.

Nowadays we take it for granted that we can use a *picture* of a lion rather than the *word* "lion" to start an internet search for images of lions. We are not surprised when algorithms, like those of *Google Images*, are able to retrieve a series of "*visually similar images*". Not many of us are really interested in *how* the images that are offered to us as "similar", were actually selected from the billions of images in Google's databases. And unless we have a background in advanced information sciences, we do not understand the technical details at work in making the selection.

At the same time, most of us *do understand* that every image, even if it is a straightforward snapshot of a lion in its natural environment, is part of a narrative. Every image has a context and can be used to tell a story. To record that story, to document and discuss the context of an image, we use words. With words we document, for instance, that the picture on the left is not just a photograph of a lion, but the image of an animal species under threat because humans are taking away more and more of its natural habitat.

Over time and across cultures, images of lions have been used to tell an endless array of stories and to visualize a wide range of ideas. Even in a very small selection we can see the lion acting as the symbol of the evangelist saint Mark; the Nemean lion killed by Hercules; a lion as an attribute of saint Jerome; a lion attacking a monkey to symbolize a man curing himself of a fever; lions guarding and protecting buildings; a lion killed by Samson; a lion representing Strength bowing for Justice; a lion denoting a "couragious man"; a lion subjugated by Amor; a lion as symbol of Fortitude and Constancy; a lion as a loving and wise father; the lion as a sign of the Zodiac; lions as protagonist in many different fables; the lion as king of the jungle; and a lion as a symbol of state and a symbol of Christ.

This small anthology of "*lion iconography*" illustrates that the context of images always plays a role. To understand the images in this tableau we need contextual information based on domain expertise. Because contextual information changes with the knowledge the researcher brings to the table, it is never static, and therefore "completeness" is an irrelevant concept in iconography. However much is

said about an image, there will always be new ways of looking at it, new questions to ask about it, and new information to be distilled from it.

Documenting the stories that images tell us, and documenting the endless variety of their iconography, requires resources beyond those available to most heritage institutions. As a consequence, students of the cultural history of images and visual communication are not only confronted with lacunae in their data as many sources are lost to history, but also with disorganized and unsystematic information about the documents that actually *have* survived.

We think that understanding how images tell their stories is important. We think that metadata of sufficient quality are key to getting a grip on the content of images. We also think that information technology can help to significantly accelerate the creation of subject metadata of better quality. To stimulate subject-based image research and support the development of software that can lift that research to a more advanced level, we have established this foundation. It is dedicated to Henri van de Waal, the creator of Iconclass, who at an unlikely early stage saw the advantages of combining a systematic approach to iconography with the possibilities of computer technology.

3: Unlocking the potential for AI applications

Case study: Iconclass browser (new version)

The present online browser for Henri van de Waal's Iconclass system is already ten years old. Its software is up for a fundamental revision and its content is undergoing careful editorial updates to modernize its terminology. The indispensable role of ontologies and classification is recognized by both the heritage community and computer scientists working in the field of Artificial Intelligence. Many museums, libraries and research institutions use Iconclass for their subject access, and they have created dozens of datasets with rich iconographic metadata. When combined they constitute a virtual training set for Machine Learning applications of more than 1.5 million objects. The majority of these are already available as an aggregated dataset at the Henri van de Waal foundation.

Put together all conditions are there for the transformation of the online Iconclass browser into a modern "*Illustrated Iconclass*" that can also be used as a training set for AI applications. Obviously, it will first of all be the authoritative version of Iconclass. However, it will also be the core of an application that offers *proof of principle* for new possibilities, with the added intention to inspire heritage institutions and stimulate software developers to embrace the idea and build on that.

This part of the browser application has a double aim:

1. to use the dataset of "Iconclassified" images as a knowledge base for the identification of the subject matter of new images exposed to the application
2. to make it possible to simultaneously assign classification concepts to batches of images with similar subject matter, thus seriously speeding up the process of metadata creation

For a long time cataloguing and retrieving images has followed a procedure with little variation. A prose description and/or a set of keywords would be entered in a database record to identify its subject matter and these words would then also be used for its retrieval.

The use of a controlled vocabulary like a thesaurus or a classification does not really affect this procedure. A label like "*Saint George killing the dragon*" would still be located in the schedules with the help of a keyword search and a similar keyword search would be used to retrieve the picture. The new *Illustrated Iconclass* browser will complement this traditional procedure with the help of the hundreds of thousands of pictures that have already been tagged with Iconclass labels.

Here a small sample of the pictures of saint George selected from our much larger aggregated dataset - to demonstrate the idea.

All of the pictures in this dataset have been manually labelled with Iconclass tags. To help identify the subject matter of a print like the one on the right, the procedure would start with *uploading the image* for the comparison of its visual features with the images in the dataset. A successful pattern match would then trigger a thematic search - using the Iconclass notation - to retrieve a much richer sample of images of saint George from the dataset to help refine the identification of the subject matter and offer concepts to the user for tagging or further searching.

Of course we do not claim that Artificial Intelligence will identify the subject of an image, the details of its iconography or its meaning. The aim is more modest, namely to *offer suggestions* to the human user.

The browser will therefore be part of a "learning" application. It should allow users to confirm or reject the suggestions made by the algorithm. So if a visually similar image comes along, like the one on the right, the user should be able to annotate it as *Perseus on his winged horse Pegasus, slaying a dragon to liberate Andromeda*, rather than *saint George slaying a dragon*.

4: Improving the accessibility of collections

In the Illustrated Iconclass application pattern matching algorithms will work in tandem with textual metadata to speed up the process of selecting visually similar images from a database and prepare them for tagging with Iconclass concepts. When tagged with a concept, a standardized set of words is automatically linked to an image. The Iconclass label **11H(GEORGE)**, for example, links the following default definition to the image: "the warrior martyr George (Georgius); possible attributes: banner (red cross on white field), (red) cross, dragon, (white) horse, broken lance, shield (with cross), sword." A few words from the entry vocabulary are also added, resulting in the following "*Bag of Words*" for every image tagged with **11H(GEORGE):**

> *attributes, banner, breaking, broken lance, Christian religion, cross, dragon, George, Georgius, horse, lance, martyr, red cross, religion, shield, soldier, supernatural, sword, warrior, white field*

Because the Iconclass system has been translated into German, French, Italian, and Portuguese, *Bags of Words* in those languages are also automatically linked.

So, assuming that a sufficient number of images have been processed with machine learning algorithms, the application will offer sets of images for identification and tagging. For example:

these four images could very well be selected by a pattern matching algorithm as visually similar to saint George slaying a dragon. Offered for evaluation to a human indexer, however, they should be tagged with Iconclass notation **94S32**, which would come with the following *Bag of Words*:

Bellerophon, flying on Pegasus' back, kills the Chimera, a fire-breathing monster, with arrows or a spear

Bellerophon · Chimera · Greek legend · Iobates (King) · Lycia · Pegasus · ancient history · arrow · breathing · classical antiquity · deed · fire · hero · heroic legend · history · killing (animal) · king · legend · monster · mythology · spear · task

Following the same procedure of pattern matching and object identification these images of lions would be selected from the dataset and presented for tagging:
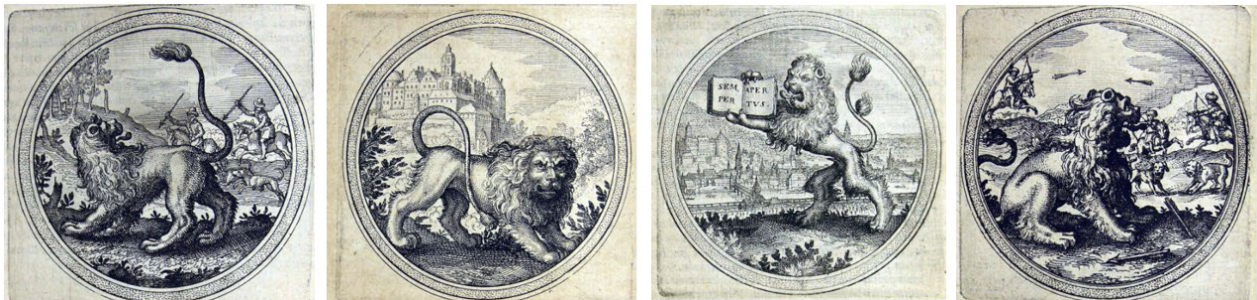
The Iconclass tag **25F23(LION)(+1)** would come with the following Bag of Words:

beasts of prey, predatory animals: lion (+ animals used symbolically)

animal · earth · lion · mammal · nature · predatory animal · world · symbol

Two millennia of European art have produced thousands of images of saints, most of which are no longer understood by modern viewers who visit museums and churches. It would therefore be helpful if the Illustrated Iconclass application can offer suggestions for their identification on the basis of features like their attributes. The issue is simple: if an algorithm can select images of a woman and a tower from our datasets, the application can suggest to us that we are looking at pictures of saint Barbara.
The tag **11HH(BARBARA)** would then produce a rich Bag of Words:
the virgin martyr Barbara; possible attributes: book, cannon(ball), crown, cross, chalice with wafer, Dioscuros (her father), peacock feather, sword, torches, mason's tools, tower
Barbara (St.) · Christian religion · Dioscuros · Host · cannon · cannonball · chalice · cross · crown · feather · martyr · mason's tools · peacock feather · religion · saint · supernatural · sword · tool · torch · tower · virgin · woman

Our relatively small dataset already contains thousands of pictures of lions expressing all kinds of symbolic messages and thousands of pictures of saints like saint Barbara. Even if Artificial Intelligence algorithms are not able to *determine* what the meaning is of a new batch of pictures, using this dataset they should be able to offer *informed suggestions*. If images presented to the application in batches can indeed be pre-sorted on the basis of their visual characteristics, the process of accepting or rejecting the algorithm's suggestions can be seriously accelerated.

5. Strengthening cooperation

Iconclass is only one way to organize information about images. The Warburg Institute's *Iconographic Database*, the Princeton *Index of Medieval Art*, the *Chinese Iconography Thesaurus*, Getty's *Iconography Authority*, the Library of Congress's *Thesaurus for Graphic Materials* are just a few examples of datasets and controlled vocabularies with a similar aim. In addition many museums and libraries have developed their own vocabulary systems, dedicated to their collections and representing their world views.

Case study: Iconclass and Semantic Web

At many levels efforts are made to interconnect vocabulary systems. The foundation's contribution to those efforts can only be modest. However, as Iconclass is the most widely used system for iconographic information making it available in the shape of the online browser, but also in the shape of its raw data files, is a useful stimulus to Humanities information science. Depositing the data files together with the browser's source code in the open repository Github is therefore an important step in opening up these assets for shared research and software development in the Digital Humanities.

We can launch an *Illustrated Iconclass* with AI functionality; we can put the Iconclass data and the browser's source code within easy reach of curators and software developers; and we can make it available for interlinking with other vocabulary systems. But none of these steps will by itself lift the quality of information about museum and library collections, or of the research results in the humanities.

For good reason the foundation's objectives use words like *stimulate*, *promote*, *advocate* and *facilitate*. Unless what we make is actually *used*, it will not benefit anyone. Many students of early modern cultural history will be familiar with this emblem showing an ostrich spreading its wings but unable to fly. The message of the English motto "*To have, and not to use the same, is not our glory, but our shame*" may sound too moralistic to modern ears, but as in so many emblems, there is some truth there. For obvious reasons, creating our own system and facilitating its use is the main part of the process that is actually within our reach. Organizing the communication about its existence, however, is also within the scope of this policy plan. Hence the publication of this plan on the foundation's website. The next step will be to organize an advisory board with representation from all fields for which the foundation wants to be relevant, from AI development to digital Art History.