The challenge of the visual: making medieval seals accessible in the digital age

John Alexander McEwan
Saint Louis University, Saint Louis, Missouri,USA

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Abstract

Purpose – The purpose of this paper is to present and evaluate an innovative classification system for medieval seals that was created as part of the Seals in Medieval Wales (SiMeW) project, funded by the UK's Arts and Humanities Research Council (AHRC). The classification system developed in response to the cataloguing challenges associated with rapidly gathering sigillographic information on about 2,500 medieval seals from a number of collections in several UK repositories.

Design/methodology/approach – This paper outlines the challenges involved in recording and classifying medieval seals from the British Isles, and describes existing systems for organizing sigillographic information. The SiMeW system is explained as a response to the limitations of existing systems.

Findings – Designers of systems for recording seals need to take into account the physical characteristics of seal impressions, matrices, and casts, the strength and limitations of digital media, as well as the need of cataloguers and users.

Originality/value – In recent years scholars have systematically investigated the problems associated with text-based image indexing and retrieval. Nonetheless, medieval seals have been largely overlooked, even though they are common in UK repositories. SiMeW's system offers cataloguers an example of an approach that they can use in new and existing seal catalogues, to generate metadata that can help make seals, which are a key component of the cultural legacy of the Middle Ages, more accessible to users.

Keywords Wales, Classification, Archives, Seals, Visual media

Paper type Case study

Introduction

Hundreds of thousands of seals survive from medieval Britain, offering a distinctive and important source of information (Harvey, 2000, p. 207). A seal is "a mark of authority or ownership, pressed in relief upon a plastic material by the impact of a matrix or die-engraved intaglio" (Bedos-Rezak, 1988, p. 123); see also: (Fabre, 2001, pp. 14-16). From c.1200 men and women from many levels of society used seals to authenticate documents (Plate 1) and to make statements about aspects of their selves including their occupations, family connections, social aspirations, and personal values. Large numbers of seals survive in archives, where they are now regarded as an important type of "special material" (International Council on Archives, 2000, p. 7). Since medieval seals survive from all across Britain, scholars can use them to study local and regional cultural variations. Furthermore, the finest seals are small-scale works of art, while even crude examples can be elaborate or distinctive. Seals therefore help us to understand the development of artistic styles and fashions (Heslop, 1984, p. 298). In short, seals are an important resource for a wide range of scholars, including archaeologists, art historians, and historians, as well as those interested in heraldry, folklore, genealogy, and local history (Pastoureau, 1981, pp. 64-76).

The "mark" which constitutes the medieval seal was expressed in a variety of material forms, including seal matrices (a type of stamp) and seal impressions (cakes of

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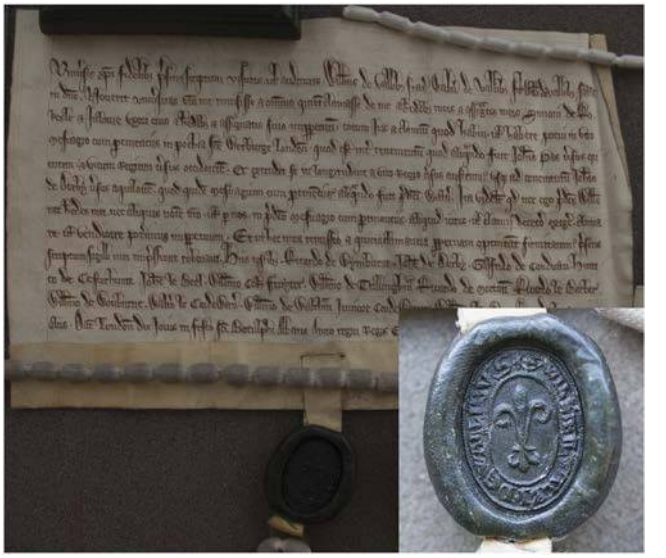


Plate 1.
Deed of
William de Vallibus
(with seal inset)

Source: London Metropolitan Archives, City of London, from the St Paul's Cathedral Collection, by permission of the Dean and Chapter of St Paul's Cathedral, CLC/313/L/H/MS25121/1819

wax or other materials attached to documents)[1]. Users often encounter seal matrices in museum collections, whereas they normally find seal impressions attached to documents stored in archival repositories. Moreover, some institutions, such as the British Library and the Archives Nationales in Paris, have also acquired large collections of seal casts (modern copies of medieval seal impressions) (Dalas-Garrigues, 1993, p. 69; New, 2010, p. 8). This range of material forms poses a challenge for the cataloguing of seals. So too does the fact that seals normally incorporate both textual and visual information. Throughout the Middle Ages, seals conventionally featured text around the outer edge and a motif at the centre. Cataloguers can transcribe the text, but the most effective way for them to record the motif is through a combination of photography and textual description (Besser, 1990, p. 790). Before the introduction of electronic data management systems, cataloguers normally created card or printed catalogues to store and make accessible sigillographic information (Plate 1, Figure 1; Bautier, 1990, p. 37). Institutions are now generally prioritizing the development of their electronic resources, and seals therefore need to find a place in digital catalogues in order to remain accessible.

Digital sigillographic catalogues can in many respects emulate their card and printed predecessors, but in some areas they can improve on those predecessors. The shift to digital catalogues has benefits including easier storage and access, but it also enables cataloguers to offer users new methods of searching for information (Cooper, 2002). Consequently, this is an appropriate moment to consider what metadata is required to enable users to search seal catalogues for seals with particular motifs, how that metadata could be collected, structured, and integrated into catalogues, and what new types of searches it would enable. In recent years scholars have systematically investigated the problems associated with text-based image indexing and retrieval and there is now an extensive scholarly literature on the subject (for an

1. *Seal of* William de Vallibus 2. *Dates* 1293-94

Seal

3. *Shape* Rounded Oval 4. *Dimensions* 25×18 mm

5. *Legend* *S'WILL'IFILWILL'I·DEWALLIBVS

6. *Description* Stylized Lily

Impression

7. *Material* Wax 8. *Color* Green

9. *Method of Sealing/Attachment* Tag

Document

11. *Repository* London Metropolitan Archives

12. *Reference* CLC/313/L/H/001/MS25121/1819

13. *Date* 1293-94

Source: Adapter from Bautier (1990, p. 37)

Figure 1.
Basic seal information

overview, see: Klenczon and Rygiel, 2014, pp. 43-49; see also: Krause, 1988; Svenonius, 1994, pp. 601-604; Shatford-Layne, 1994; Burford *et al.*, 2003). Nonetheless, medieval seals have been largely overlooked, which is remarkable. There are a prodigious numbers of seals, as they were a standard tool for validating records from the twelfth century onwards, and many repositories hold them[2]. Although sigillographers have long aspired to enable users to search for seals with particular motifs, still there is no generally accepted system for indexing or classifying them according to their visual content. This paper presents and evaluates a classification system for medieval seal motifs that emerged from the Seals in Medieval Wales (SiMeW) project, a three-year project funded by the UK's Arts and Humanities Research Council (AHRC)[3]. The classification system developed in response to the cataloguing challenges associated with rapidly gathering sigillographic information on about 2,500 seals from a number of collections in several UK repositories[4]. The classification system was designed to be suited to the nature of the material, the needs of users and cataloguers, and the strengths and limitations of the digital format. Most importantly, it was designed to be useable. Based on the classification system, the author established a set of keywords that can be used to identify a seal's motif (or the motif's principal element). When integrated into digital sigillographic catalogue entries, the keywords enable users to search for seals with particular motifs.

Searching for seals

People who consult medieval seals may be specifically interested in the history of seals and sealing practices, but more commonly they encounter seals while researching a person, place, period, or motif. Historically, cataloguers have not served all these types of users equally well (Pastoureau, 1981, pp. 59-61). Cataloguers have often ordered or indexed seals by the name of the particular person or corporate entity associated with the seal (Ranger, 1960; Ellis, 1978-1981). They have also categorized them

geographically, as seals can usually be associated with locations. Although seals are a visual source, to date cataloguers in Britain have generally made little attempt to help users search for particular motifs, with a few notable exceptions (Linenthal and Noel, 2004; Williams, 1993-1998). However, cataloguers have gradually refined their recording conventions and thus have become more consistent in their descriptions of particular motifs. Furthermore, digital catalogues, which facilitate new types of searches, are now common. The combination of these two developments enables cataloguers for the first time to provide users with effective methods of searching catalogues for seals with particular motifs.

Cataloguers have only gradually developed a set of recording conventions for medieval seals. Although medieval seals have been studied since the early modern era, only at the end of the nineteenth century did large scale catalogues begin to be published (Harvey and McGuinness, 1996, pp. 22-26; New, 2010, pp. 29-32). One of the greatest legacies of this period is Walter de Gray Birch's monumental catalogue of seals in the British Library (previously the British Museum), published in six volumes between 1887 and 1900 (Birch, 1887). Containing more than 23,000 entries, the catalogue remains the single largest published catalogue of seals from Britain, yet it includes only a fraction of the Library's holdings (Harvey, 1991, pp. 117-118). Birch paid particular attention to the seals of the social and political elite, including kings, bishops, and members of the nobility. He also assembled seals with motifs that represented members of the social and political elite, such as seals portraying armoured men on horseback (Figure 2), or presented their emblems, such as shields of arms (Figure 3) (Crouch, 1992, pp. 242-245). The result is a catalogue attuned to the interests of his contemporaries (whose attention was focused on the seals of the upper echelons of society), but which does not present a representative sample of the sigillographic material in the British Library's collection.

The process of surveying and describing the full range of material typical of medieval sigillographic collections in Britain began in this period, but took almost

Source: Based on National Library of Wales, Pitchford Hall 1248

Figure 2.
Armoured man equestrian

Source: Based on National Library of Wales, Penrice and Margam 194

Figure 3.
Shield

a century to complete. In 1913, at the National Archives (TNA; previously the Public Record Office), William St John Hope established a card catalogue, which succeeding generations of archivists have gradually expanded (Jenkinson, 1968, p. x). The card catalogue is complemented by R.H. Ellis' printed catalogues, of which three volumes appeared between 1979 and 1986. The work of the archivists at TNA was replicated on a smaller scale in a number of other repositories, but Ellis' catalogues are indicative of the work conducted in the period immediately prior to the widespread adoption of electronic data management systems. Although he offers detailed descriptions of the visual content of each seal, these descriptions are not indexed and the entries in his catalogue are ordered by the name of the seal owner or user (Ellis, 1978-1981, Vol. 1, p. viii). Nonetheless, the characteristics of the material challenged Ellis and his contemporaries to expand their vocabulary for seal description beyond the paradigm set by Birch. Out of this process developed an informal set of conventions for describing a fuller range of seals. This culminated in Paul Harvey's catalogue of TNA's Duchy of Lancaster Collection, which appeared at the end of the twentieth century and contains systematic descriptions of a wide range of medieval and early modern seals (Harvey, 1996; New, 2001).

At the beginning of the twenty-first century, then, cataloguers had effective methods of describing medieval seals, but their systems for enabling users to search their catalogue for seals with particular motifs were still of limited effectiveness. When TNA's Duchy of Lancaster Collection catalogue was devised, the problems associated with making the visual content searchable were not fully anticipated. The catalogue is available online through an interface that gives a user the capacity to search by word or phrase the field in the catalogue where Harvey described the seal's motif (Figure 4)[5]. Although this is an excellent way to find records where particular words or phrases appear, it is not a reliable way to find seals with a particular motif. This is due in part to the search system itself, which offers users a box in which to enter search terms, but no list of the words and phrases used in Harvey's descriptions or guidance as to how they

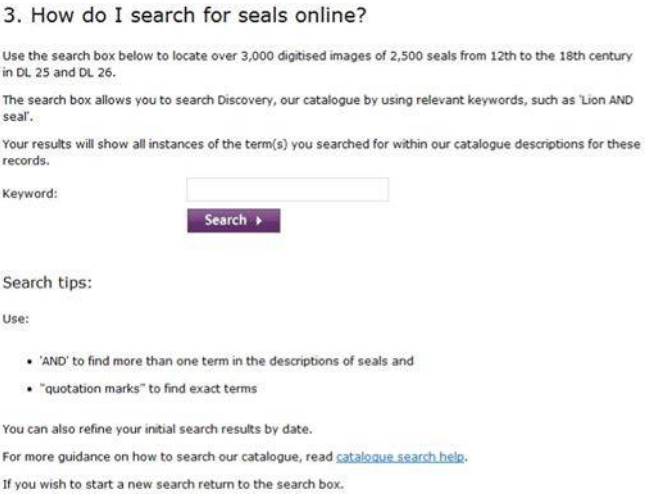


Figure 4.
TNA seal catalogue

are used. Moreover, because visual materials do not necessarily have precise linguistic equivalents, there are often several ways in which a seal can be described. Unfortunately, this ambiguity means that users must know precisely how Harvey described a particular motif to select an appropriate search term. Giving users more information about Harvey's conventions would improve the system but would still not make the searches reliable.

In the Duchy of Lancaster Collection catalogue, four different types of information are contained in the field where the cataloguer records each seal's motif. When a cataloguer records a seal, he or she must indicate the general nature of its motif, or if that is problematic, its key or principal element (e.g. a lion, see Plate 2). However, the cataloguer may also include additional qualifiers that indicate the motif's particular features (a lion facing to the left with foliage behind). A further complication is that any visual content can be described on a number of levels, as Erwin Panofsky argued. Any visual resource has a "primary" (or natural) subject matter (Panofsky, 1939, pp. 5-6). A description of a visual resource at the primary level is factual: this is a painting of 13 men having dinner. Panofsky distinguished this primary level from what he called the "secondary" (or conventional) subject matter. A description of a visual resource at the secondary level is iconographic and depends on cultural knowledge: not just 13 men having dinner, but the Last Supper. In the Duchy of Lancaster Collection recording system, a cataloguer records the general nature of the motif, at either the primary or secondary level of meaning, and may include qualifiers, at either the primary or secondary level of meaning. Therefore there are multiple valid ways to record a seal's visual content, but they will all incorporate different words (see Table I and Plate 3). Consequently, when a user tries to locate the examples of a particular motif by instructing a computer to run a word search, the computer's answer will be unreliable. The computer may return records which the users does not need and miss ones the user wants.

The Duchy of Lancaster Collection catalogue establishes a vocabulary for describing a full range of medieval and early modern British seals, but it also demonstrates the need for cataloguers to develop reliable ways to enable users to search catalogue entries for seals with particular motifs. As Paul Harvey was preparing the Duchy of Lancaster

Notes: Saint Bartholomew's Hospital Archives, HC/1/1215. Courtesy of Saint Bartholomew's Hospital Archives

Plate 2.
Seal of Peter son of Alan

	Primary	Secondary
General	Standing woman facing a kneeling angel	The Annunciation
Particular	Within ornate canopied niches, at the centre, a woman standing full-face facing an angel keeling in profile full-length, to the left a nimbed man standing full-face holding saltire cross, to the right a man standing full-face wearing a large hat, holding a pilgrim staff and carrying a bag	Within ornate canopied niches, at the centre the Annunciation, to the left St Andrew, to the right St James

Table I.
National library of Wales, Penrice, and Margam 526 (observe)

Collection catalogue, other cataloguers were experimenting with methods of making seal descriptions searchable, and their work offers further valuable lessons. David Williams' catalogue of seals from the National Museum of Wales offers a good example of an index (Williams, 1993-1998, Vol. 1, p. 67 and Vol. 2, p. 55). He indexes the motifs under 19 main headings, with a number of sub-headings (e.g: "Animals: Birds", or "Other Saints: Adrian"). As the number of headings is small, a cataloguer can create the index with little effort, but the resulting index offers users a limited number of search options. An even more pertinent example is the index which Martine Dalas-Garigues designed for the French Archives Nationales' digital catalogue of their collection of seal casts. Part of her intention was to enable users to assemble seals with common characteristics

Plate 3.
National Library of Wales, Penrice and Margam, deed 526 (obverse)

Source: © National Library of Wales

(Dalas-Garrigues, 1993, p. 73). She included terms for "broad" categories such as "Man", "Woman", and "Object", but also added more specific subcategories for motifs that were common in their collection or considered important to users (Dalas-Garrigues, 1993, pp. 73-74). Her system requires cataloguers to assess each seal's motif from a number of perspectives, taking into account its general and particular aspects as well as its primary and secondary meanings. Although this type of index has significant value to users, creating it is time-consuming and thus costly (Goodrum, 2000, p. 64) and inter-indexer consistency, which is critical to efficient retrieval, is difficult to achieve (Chan, 1989, p. 357; Olson and Wolfram, 2006; Hughes and Rafferty, 2011). As there are hundreds of thousands of uncatalogued seals in British collections and limited resources available to record them, an Archives Nationales style index is not the most practical option at this time. The cost of production render the index model less than ideal.

A third alternative is the system of seal classification set out in the Vocabulaire International de la Sigillographie (Bautier, 1990, pp. 151-63; Fabre, 2001, pp. 134-54). The International Archives Council's sigillographic committee made considerable progress towards establishing a controlled vocabulary for sigillography in the late twentieth century. As part of this project, they set out a typology with 26 types

(Diederich, 1993, p. 48), an attractively small number from the point of view of limiting the cataloguer's work load. However, if a cataloguer classified a typical seal collection in Britain using the Vocabulaire's system, users would find the result problematic because the types do not represent the major constituents of collections in Britain. Instead, the types reflect the traditional priorities and concerns of seal scholars, who have focused on the seals of the upper levels of society. Thus, for example, the typology includes three separate categories for representations of men on horseback (Figure 2): a type of motif often used by members of the social elite, but one found on only a fraction of seals in British collections. Indeed, in the Vocabulaire's typology, most of the seals in British collections fall into one class: "seal with a device". For these reasons, the Vocabulaire's typology is not ideal for implementation in a British setting.

A well-designed and constructed catalogue contains reliable information and makes that information accessible to users. In Britain, cataloguers of medieval seals have made remarkable progress in developing a systematic way of recording seal motifs, but they have devoted less attention to the problem of organizing their records to optimize search efficiency and reliability. Indexes and the Vocabulaire's typology offer cataloguers valuable models, but neither is an ideal solution. An alternative is to develop a classification system for seal motifs, and then to establish keywords for each class that can be included in catalogue entries to support searches. Classification is part of the process of building new knowledge, and systems for organizing sigillographic information are as old and diverse as the study of them (Pastoureau, 1981, pp. 59-61; Diederich, 1993, pp. 50-52; Mai, 2011). To serve the demands of users of a digital catalogue, an ideal classification system for seal motifs would have a number of features. First, the categories would be mutually exclusive, to enable users to search the seals, but also to sort and navigate (Svenonius, 2000, pp. 18-20). Second, the categories would both reflect significant features of the motifs and be meaningful for users. Third, the system of classification would encompass the full range of motifs found on medieval seals in British repositories and divide them into groups that reflect the major constituents. Finally, the process of classifying the motifs would add only a minimal amount to the work load of the cataloguers. A system of classification that met all these objectives would be of considerable value, and could be used to establish a set of keywords that would facilitate searches of the material. No doubt many different systems could be devised that would fit the criteria set out here. Furthermore, it seems likely that many existing systems could be adapted to fulfil the requirements. Fortunately for contemporary cataloguers, implicit within the conventions for seal description established by the TNA's Duchy of Lancaster Collection catalogue is a structure that can be adapted into a classification scheme.

Classifying seals for the SiMeW project

In 2009, the author was asked to develop a data management system for the SiMeW project, a three year project funded by the AHRC and led by Phillipp Schofield of Aberystwyth University. SiMeW's system follows on from TNA's Duchy of Lancaster Collection catalogue, and emulates its strengths while addressing its limitations. Thus the SiMeW project team recorded seals in TNA's manner, which entailed taking high-resolution digital photographs of all the seals, transcribing their textual content, and describing their visual content. However, as already discussed, in TNA's Duchy of Lancaster seal catalogue it is difficult to search for seals with particular motifs, and thus to improve access to the SiMeW data set, it was important to add formal keywords to the catalogue entries.

As the Duchy of Lancaster catalogue did not include a formal set of keywords, one had to be developed, and SiMeW had particular requirements. SiMeW needed the keywords to allow cataloguers to identify motifs with different degrees of precision, partly because many surviving seals are damaged or faint and consequently only partially preserve their motifs (Plate 4). Another challenge was that the cataloguers were conducting an unprecedented large-scale survey of medieval Welsh seals, so they did not know in advance what motifs they would encounter. Consequently they needed a system that could be progressively expanded in response to their discoveries. Moreover, it was anticipated that users would employ the keywords first and foremost to locate examples of standard motifs. A wide variety of motifs can appear on British medieval seals, but most people chose a conventional motif. For example, the hare riding a hound – which reflected fourteenth-century cultural sensibilities, for contemporaries considered it humorous – was used in the early fourteenth century (Figure 5) (Harvey and McGuinness, 1996, p. 89). For cataloguers, part of the challenge in recording seals is to consistently and accurately identify examples of these standard motifs, while drawing appropriate attention to the particular ways in which they were executed. The cataloguers wanted SiMeW's keywords to include a keyword for each standard motif. To satisfy these requirements, a motif classification system, inspired by TNA's Duchy of Lancaster Catalogue, was developed and used to create a set of keywords.

When cataloguers record a seal, they conventionally prepare a textual description of the motif, as already discussed. As TNA's Duchy of Lancaster catalogue shows, users find textual seal descriptions difficult to search partly because the descriptions contain several different types of information, including the general nature of the motif,

Source: London Metropolitan Archives, by permission of the Dean and Chapter of St Paul's Cathedral, CLC/313/L/H/001/MS25121/1819

Plate 4.
Hawk Hunting, possibly seal of Alice wife of William de Lewes

Source: Based on TNA DL25/1461

Figure 5.
Hare on Hound

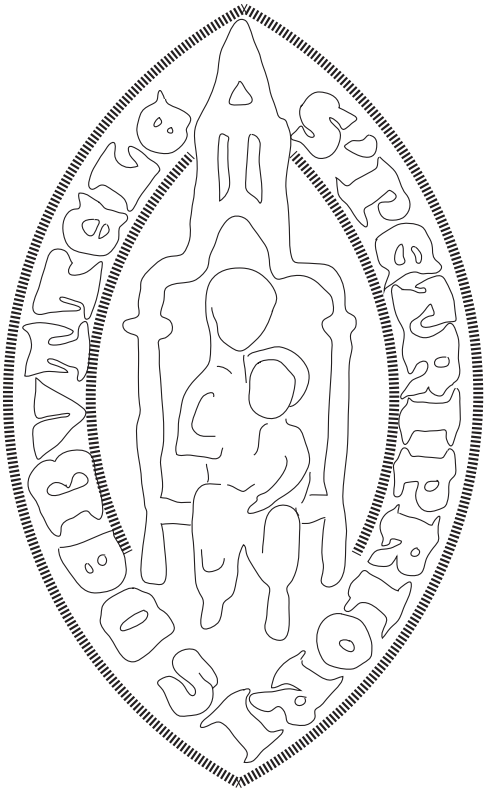
at either the primary or secondary level of meaning, and qualifiers, at either the primary or secondary level of meaning. In the design of a set of keywords, a crucial initial decision is determining what type(s) of information the keywords will convey. To minimize the complexity of the SiMeW system, it was determined that the keywords would only convey the general nature of the motif. Determining whether to focus on the primary or secondary level of meaning was more difficult. Medieval people attributed to motifs complex meanings. For instance, their approach to categorizing animals, which are common motifs on medieval seals, could take into account such aspects as their moral and spiritual significance (Crane, 2013, p. 72; Klingender, 1971, p. 329). Classification systems for visual materials, such as ICONCLASS and the Index of Christian Art, focus on the secondary (or conventional) level of meaning (Baca, 2004, pp. 147-148; Hourihane, 2002, pp. 1-10; Markey, 1988, pp. 159-161; Rafferty and Hidderley, 2005, pp. 103-108). Seal cataloguers commonly argue that the secondary level of meaning should be emphasized (Diederich, 1993, p. 51). However, SiMeW's keywords identify only the principal element of each motif at its primary level of meaning. The keywords correspond to the primary meaning rather than the secondary because all catalogue entries normally include information on a motif's primary meaning. Sadly, cataloguers cannot always identify the secondary meaning of a motif, as, for example in the case of representations of saints whose attributes are obscure or have been lost through damage to the seal impression. Furthermore, not all users have the knowledge or training in medieval visual culture and Christian iconography to effectively search at the secondary level. Markey (1986, pp. 7-9) argues that offering them the capacity to search at the primary level is advantageous. It must be underlined that in SiMeW's system a full textual description of each seal's motif, which can include information on its meaning at the primary and secondary level, is a standard part of each catalogue entry and users can search these textual descriptions in the same way they can in the Duchy of Lancaster catalogue. SiMeW's keywords only indicate a fraction of the meaning of the motifs, but they offer users an additional access point.

Designers of systems for the indexing and classification of visual materials can normally assume that the cataloguers will have full access to those materials. Yet many

seal impressions are broken, distorted or faint (Plate 4), and few survive in pristine condition, while seal matrices, particularly if they have been recovered from an archaeological context, can be corroded. It has been argued that when cataloguers index cases where the subject is uncertain, that terms for all the possibilities can be included in the catalogue entry (Baca, 2006, p. 209). However, the researchers associated with the SiMeW project intended to use the keywords to gather groups of seals with similar characteristics to compare them (Brilliant, 1988, pp. 122-23), and to study their geographical and temporal distribution (see, Figure 15). For this purpose, they needed the keywords to enable high-precision searches. Consequently, the keywords system was designed so that cataloguers could make partial identifications based on what they could say for certain about a motif. If the motif was only partially visible, the free text motif description field allowed the cataloguer to suggest an interpretation of the motif but also to outline his or her reasoning, and then to classify the motif in a broad class, such as "Bird". Although this avoided the problems associated with keywords searches resulting in misidentifications, this choice then had a large impact on the organization of the keywords.

Another important consideration in designing the keyword set was ensuring that it was cost effective to implement. The system had to be simple for the cataloguers to use because they had limited time to complete the catalogue. A system that required cataloguers to manually assign multiple keywords to catalogue entries, such as the one designed by Dalas-Garigues for the French Archives Nationales', was judged too time-consuming. It was also feared that if the system gave cataloguers considerable freedom to choose keywords, there would be inter-cataloguer inconsistencies (Hughes and Rafferty, 2011). A classification system was thus created and used to control and automate the process of keyword assignation. A set of keywords was associated with each class. When the cataloguer assigned a motif to a class, the data management system automatically inserted the associated keywords into the catalogue entry. As most medieval seals from the British Isles have conventionalized motifs and the classification system includes classes for common motifs, cataloguers could deal swiftly with typical cases. When the cataloguers found they need a new class they could create one and assign to it a set of keywords. Thus the classification system developed as cataloguers encountered new material.

The classification system's structure reflects the form of the motifs to enable seal cataloguers to make partial identifications. SiMeW, like ICONCLASS, has a hierarchal "tree" structure in which the upper levels contain broad classes and the lower levels specific ones. Each upper level class (a parent class) is associated with a number of lower level ones (child classes). In SiMeW's system, the classes at each level are mutually exclusive; each motif can only be assigned to one branch of the tree and fall into one class at each level. Ones with similar appearances are grouped together. For example, in the "Animal" division all representations of an animal head fall under the same parent class. A consequence of this policy is that motifs that express similar ideas at the secondary level can appear in several classes: representations of the *Virgin and Child* can be found under *Seated Woman Holding Child* (Figure 6), *Half-Length Woman Holding Child*, and *Standing Woman Holding Child*. Moreover, motifs with similar forms are closely associated in a manner which might at first glance seem arbitrary or idiosyncratic. For example, some medieval thinkers placed domestic animals and legendary creatures (Figure 7) in separate conceptual categories. However, working solely from their appearance, seals with these motifs can be difficult to distinguish when they are in bad condition. In the SiMeW classification system,



Source: Based on Saint Bartholomew's Hospital Archives, HC/1/37

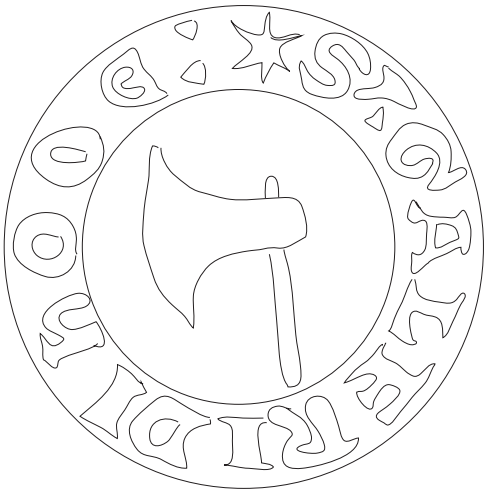
Figure 6.
Seated woman holding child

Source: Based on London Metropolitan Archives, CLA/007/EM/02/C/039

Figure 7.
Griffin

therefore, both fall under "beast". In a similar fashion, plants are often represented in a way which makes them difficult to distinguish from more abstract and ornamental motifs (Dalas-Garrigues, 1993, p. 74). Consequently all these motifs are grouped together in the "Device" class[6]. Where possible, the classes are organized so that motifs that express-related ideas are grouped together. For example, "Axe" (Figure 8), "Hammer", and "Shears" all fall within the "Tool" class. However, the most important consideration is the form of the motifs. Cataloguers rely on what they can see to take the identification of each motif as far as they can. If further examples subsequently appear which offer additional information (which is always a possibility), then the classification can be updated. In the meantime, the cataloguer leaves users to contend with the various possibilities in ambiguous cases and to reach their own conclusions. Thus, the hierarchical system of classification enables cataloguers to classify motifs even when the seal impression or matrix is damaged or faint.

Although SiMeW's cataloguers did elaborate the classification system during the cataloguing process, the main warranty for the classes is the system of seal description used in TNA's Duchy of Lancaster Collection catalogue. The author extracted key terms, and organized them in a conventional hierarchical fashion (Keshet, 2011, p. 145). However, some additional terms were needed for the purposes of collocation[7]. Here an important model was the Getty Research Institute's Art and Architecture Thesaurus (Rafferty and Hidderley, 2005, pp. 99-103)[8]. The result was a tree with five top-level categories: "Human", "Animal", "Object", "Device", "Undetermined" (Figure 9). Seals in the "Human" category are first subdivided according to how much of the key figure is displayed, and then based on the action of the figure (Figure 10). The "Animal" category has four subordinate categories: "Beast", "Bird", "Fish", and "Insect" (Figure 11). The "Object" category includes representations of all types of items (Figure 12). The "Device" category includes non-figurative visual elements such as stylized lilies (Figure 13). Badly damaged seals whose motifs are entirely obscure are assigned to the "Undetermined" category. This framework was the skeleton from which the SiMeW cataloguers gradually



Source: Based on Saint Bartholomew's Hospital Archives, HC/1/197

Figure 8.
Axe

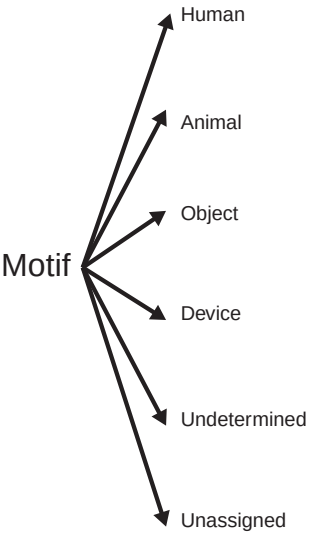


Figure 9.
Top level categories

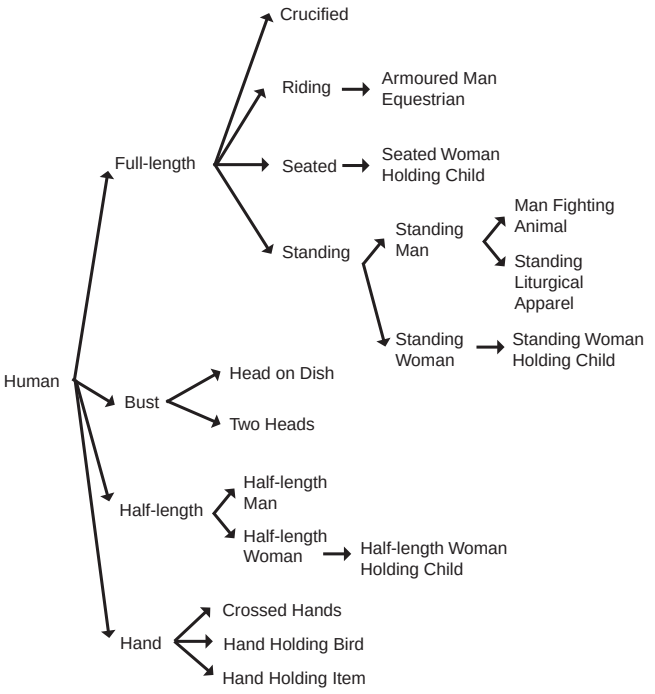


Figure 10.
Human category

elaborated the classification system, based on the seals they encountered during the recording process.

SiMeW's classification system includes specific classes for common motifs (see the Appendix), but rare motifs still need to be classified. Take, for example a seal whose

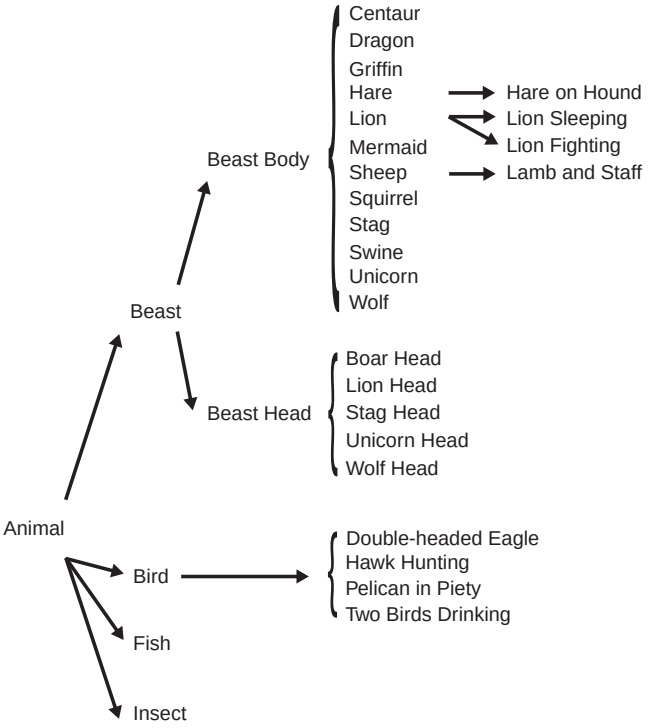


Figure 11.
Animal category

motif displays a man in a chariot drawn by horses (Plate 5), which is from a collection that SiMeW did not record. The seal matrix used to create this seal-impression may have incorporated an engraved gemstone of ancient origins. These precious or semi-precious stones, some of which may have been genuine survivals from the classical period whereas others were medieval creations, were set into a matrix and then used as a seal (Harvey and McGuinness, 1996, pp. 13-14; Henig, 2008). Classical motifs represent a major challenge for cataloguers of medieval seals as they do not necessarily conform to the normal medieval conventions of style or content. As SiMeW did not encounter examples of this particular motif the classification system does not include a specific class for it. Consequently a cataloguer using the SiMeW system to record this seal must first decide which of its existing general classes it fits. In this case there are three elements to the subject: the horses, the chariot, and the man. The cataloguer determines which one is the principal or key element, although in this case it is difficult. The cataloguer might consider classing the motif in the "Object" division under "Transport", because a chariot is an item of equipment used for transportation. Another possibility would be to locate the motif in the "Animal" division under "Beast-Body" based on the horses. A final possibility would be to place the motif in the "Human" division under "Riding", because of the man in the chariot. In ambiguous cases, the convention is that "Human" takes precedence over "Animal", "Animal" takes precedence over "Object", and "Object" takes precedence over "Device". Thus the man in a chariot would be classed in the "Human" division, then under "Full-length" (because it presents a full-length representation of a man) and finally under "Riding" (because of the man's action). In the event that the cataloguer found more examples of

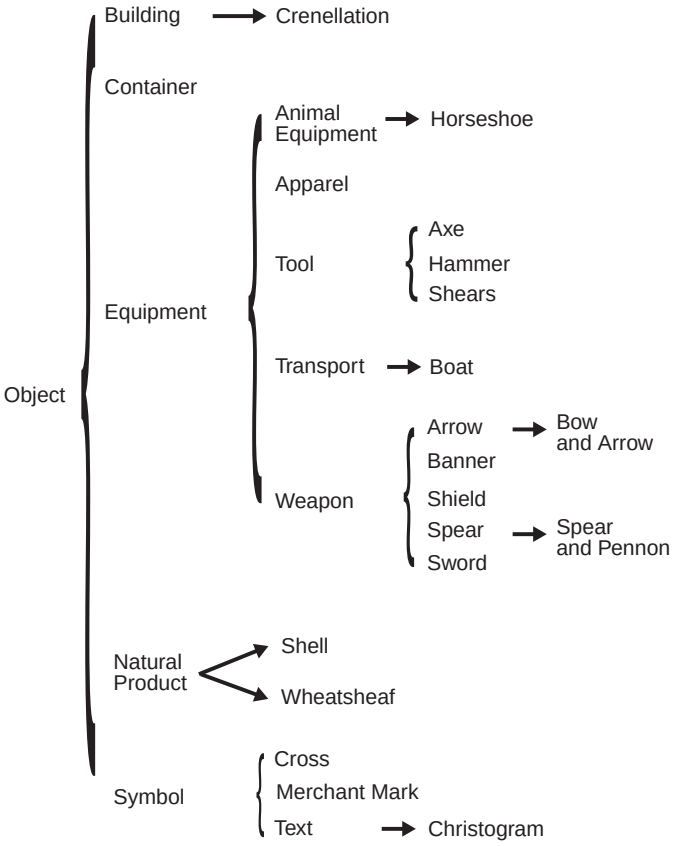


Figure 12.
Object category

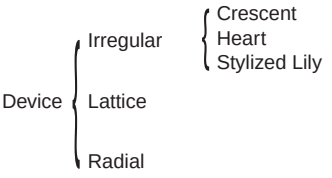


Figure 13.
Device category

this motif, then a new class could be added under "Riding". If the cataloguer encounters a case in which two or more classes within a division are appropriate, the convention is that the motif is assigned to the class with the lowest classmark. Thus in the case where the motif involves a lion fighting with a bird, the motif is classed under "Lion Fighting" because "Lion" (2.1.1.1) takes precedence over "Bird" (2.2). Thus a cataloguer classifies an exceptional case by following the hierarchy from the top down.

A hierarchically organized and mutually exclusive set of classes enables cataloguers to classify motifs in a methodical way, but it also has benefits for users. A way to demonstrate the potential of the keywords is to compare the search results of the textual descriptions of the motifs and those of the keywords. A user who wants to find the seals in SiMeW's data set (which contains approximately 2,500 seals) whose subject

Plate 5.
London metropolitan archives

Notes: By permission of the Dean and Chapter of St Paul's Cathedral, CLC/313/L/H/001/MS25121/471

is a stylized lily (Plate 1; Figure 14; also sometimes called the fleur-de-lys: Koch, 1982) has two options. The most direct approach is to use the keywords, which indicate that there are 141 examples. An alternative is to search the textual seal motif descriptions. To perform such a search, the user first needs to know that the correct search term is "stylised lily", because the cataloguers used this term rather than "fleur-de-lys" and employed British spelling conventions. Since "lily" can also appear in descriptions in the plural form "lilies", the user ought to search for both words. This set of searches returns 166 cases: a larger number than that obtained from the keyword search because it includes seals whose design includes a stylized lily as a minor element, as well as cases where the cataloguer described the motif as resembling in some respect a stylized lily. A user who is exclusively interested in seals whose principal element is the stylized lily then needs to examine each case individually and discard the irrelevant ones. The keywords are therefore more reliable and more efficient, as they enable users to quickly and reliably locate groups of seals with particular subjects. A system of keywords also offers users additional ways to locate relevant seals. As the number of keywords in the system is limited, the system can present new users with a concise list of options. As the classes have different degrees of precision, users who are unfamiliar with the material can start with a broad class, and then refine their search until they define their object. For instance, a user can search for "Tool" and discover that the data set contains motifs that include a sickle, shears, and an axe. Users can also use the classes to find types of motifs not specifically mentioned by the cataloguers in their descriptions. Take for example users interested in motifs where the principal element is an animal. A search of the descriptions yields 37 cases, but the keywords indicate there are 1,784. There is a substantial discrepancy in the search results because although the cataloguers encountered many motifs depicting animals, they rarely used the word "Animal" in their descriptions. Furthermore, researchers interested in specific

Source: Based on London Metropolitan Archives, CLA/007/EM/02/A/043

Figure 14.
Stylized Lily

types of motifs for which there is no specific class, such as representations of particular saints, can still use the classification system to narrow their search, and thus avoid browsing through the entire catalogue. Therefore cataloguers can offer users several powerful search methods if they classify seals according to their motifs using a system of mutually exclusive classes arranged in a hierarchical fashion.

Classifying the motifs is also crucial for helping users to understand their significance. For example, as already mentioned, the SiMeW data set includes 141 examples of seals with the stylized lily motif, which represent approximately 6 per cent of the total. By comparison, the 340 seals that present a shield motif (which normally present a heraldic or pseudo-heraldic symbol: Lillich, 1991, p. 45) make up approximately 14 per cent. By that measure, the stylized lily would seem to be significantly less popular than the shield. However, when the chronological distribution of the motifs is traced, it becomes clear that the popularity of the stylized lily waxed and waned. 24 per cent of the seals from the period 1200-1249 present this motif, but in the fourteenth century its popularity plummeted (Figure 15). By contrast, the apogee of the shield motif was in the second half of the fourteenth century, when 31 per cent of the seals present it. The history of the popularity of these motifs only becomes apparent when the motifs have been classified and the metadata about the motif's class linked to the date information in the catalogue. It is important to scholars to know when individual motifs were popular, but their history will only become apparent if cataloguers provide scholars with metadata that enables them not only to find examples of particular motifs, but also to establish precisely how many there are within a particular collection or data set.

Hundreds of thousands of medieval seals in repositories and museums in the UK remain to be recorded, but tens of thousands have already been recorded. Conducting

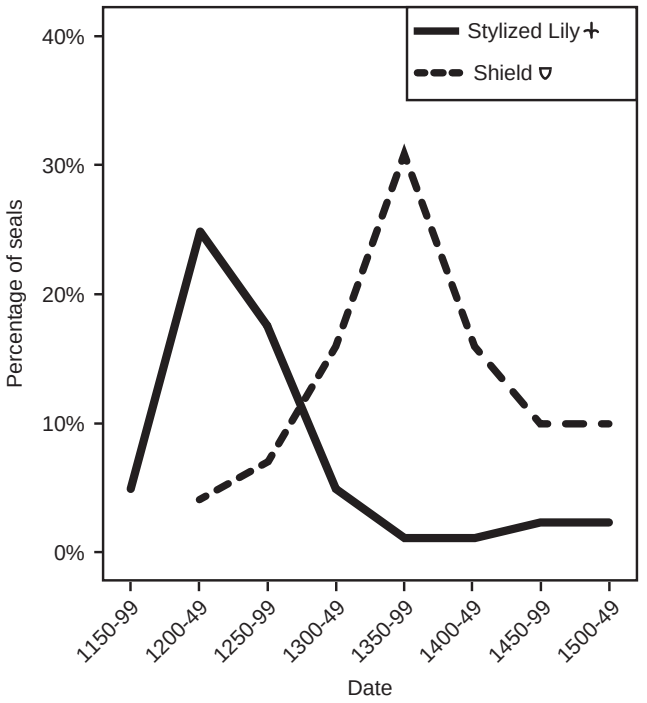


Figure 15.
Percentage of seals with the keywords "stylized lily" and "shield" in SiMeW data set by date

any search of the published seal catalogues for seals with particular motifs is laborious, as researchers have to examine each catalogue separately (Cooper, 2002, p. 189) and, in many cases, browse them in their entirety, if they lack a suitable index of the motifs. Re-cataloguing these seals is not practical, but it is possible to enhance existing catalogue entries with additional metadata. If the catalogues were digitized and keywords added to each entry, the catalogues could be linked together and searched through a single portal. SiMeW's approach could be used to improve access to existing catalogues.

Finally, it must also be reiterated that in any full catalogue entry for a seal, whether in the SiMeW system, the Duchy of Lancaster system, or in their predecessors, information about each seal's motif forms only part of the seal's record in the catalogue. A full catalogue entry for a seal will also include information about such things as its date and owner (Figure 1). In 1981 Michel Pastoureaux presciently observed that one day computers would revolutionize seal catalogues by enabling cataloguers to offer users the opportunity to search from a number of perspectives (Pastoureau, 1981, p. 61). Today users can search digital catalogues based on several types of data, both singly and in combination. In a digital seal catalogue containing a full range of data, users should be able to gather together seals with a particular motif and then determine when and where those seals were used; conversely, a user should be able to impose a set of temporal and geographical parameters for a search and identify the types of motifs favoured within that place and time. Thus the SiMeW classification scheme makes a useful addition to the established and conventional template for archival and museum seal description.

Conclusion

The shift to digital seal catalogues offers an important opportunity to cataloguers who want to enable users to search for particular motifs. A computer can sort through thousands of entries, but if a search is to return reliable and useful results, cataloguers must include appropriate metadata in their catalogue descriptions. During the last century, cataloguers made considerable progress in surveying and recording medieval seals in British collections, but they did not establish an efficient system to enable users to search their catalogues for seals with particular motifs. However, by refining their recording conventions, cataloguers laid foundations for a system of seal classification. The SiMeW classification scheme presented above builds on the work of previous cataloguers to provide an effective and implementable system of recording seal motifs to enable flexible and powerful searches of catalogue entries and reliable and efficient creations of new seal catalogues. The thousands of medieval seals that have been catalogued are only a fraction of those that exist, and recording previously uncatalogued material is a priority. As few institutions can devote substantial resources to cataloguing their seals, the cataloguing system employed in this task must make minimal demands on the cataloguers, and thus it is important that the process of assigning keywords is automated as far as possible. In the SiMeW system, seal motifs are classified according to their general and primary meaning, and then the keywords corresponding to these classes are automatically embedded in the catalogue descriptions. SiMeW's classification system therefore offers cataloguers a set of classes for some major types of medieval seals, a workflow for addressing exceptional cases, and the ability to classify motifs with different degrees of precision, which is critical because so many seal impressions and matrices are damaged or faint. Moreover, because most seals have yet to be recorded, it is difficult to anticipate their content. SiMeW's extensible system can grow in response to the nature of the material as it comes progressively to light. Users need metadata to enable them to search for seals with particular motifs, but that metadata can only exist if cataloguers can generate it. Consequently the physical characteristics of seal impressions, matrices, and casts, together with the economics of paying cataloguers, need to be taken into account. SiMeW's system offers cataloguers an example of an approach that they can use in new and existing seal catalogues, to generate metadata that can help make seals, which are a key component of the cultural legacy of the Middle Ages, more accessible to users.

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Notes

1. Scholars have also used the term "seal" to refer to both the matrix and the impressions of it (Jenkinson, 1968, p. 3; Bautier, 1990, p. 44; Harvey and McGuinness, 1996, p. 1). To avoid confusion, these three distinct senses of the term will be distinguished in this paper. The term "seal" will be reserved for the graphic elements, including all epigraphy and iconography

displayed by the seal which form the mark, and the terms "seal matrix" and "seal impression" for these respective objects.

2. The precise number of medieval seal impressions is unknown because they have never been systematically counted. Paul Harvey (1996, p. 29; 2000, p. 207) has estimated that the National Archives (TNA) hold 50,000 examples and that in the nation there could be several hundreds of thousands. Only a fraction of the seals have been catalogued or published, which impedes researchers' access (Jenkinson, 1968, p. 6; McGuinness, 1995, pp. 166-167).
3. SiMeW, 1,200-1,500, funded by the AHRC (AH/G010994/1): principal investigator, Phillipp Schofield; co-investigator, Sue Johns; senior research officer, Elizabeth New, and research officer, John McEwan.
4. The National Library of Wales was a major contributor, but other repositories included the British Library, Chester Record Office, and Hereford Cathedral Archives.
5. Available at: www.nationalarchives.gov.uk/records/research-guides/seals.htm (accessed 21 August 2013). When TNA made the dataset available online in 2009, the designers of the interface offered users the capacity to search a number of fields in the catalogue including the "design" field. This page can be accessed in an archival version: http://webarchive.nationalarchives.gov.uk/20101011085453/www.nationalarchives.gov.uk/documentsonline/seal.asp (accessed 21 August 2013); http://webarchive.nationalarchives.gov.uk/20101011085453/www.nationalarchives.gov.uk/documentsonline/browse-refine.asp?CatID=47&searchType=browserefine&pagenumber=1&query=*&queryType=1 (accessed 21 August 2013).
6. Classifying ambiguous cases under multiple possible headings is not allowed in the SiMeW system, but it can be done in ICONCLASS (Togneri, 1999, p. 264).
7. A similar problem was also encountered during the design of the Art and Architecture Thesaurus (Petersen, 1990, p. 650).
8. Available at: www.getty.edu/research/tools/vocabularies/aat (accessed 21 August 2013).

References

Baca, M. (2004), "Fear of authority?", *Cataloging & Classification Quarterly*, Vol. 38 Nos 3/4, pp. 143-151.

Baca, M. (2006), *Cataloging Cultural Objects: A Guide to Describing Cultural Works and Their Images*, American Libraries Association, Chicago, IL.

Bautier, R.H. (1990), *Vocabulaire International de la Sigillographie*, Ministero per i beni culturali e ambientali, Rome.

Bedos-Rezak, B. (1988), "Seals and sigillography, western European", in Strayer, J.R. (Ed.) *Dictionary of the Middle Ages*, Scribner, New York, NY, pp. 123-131.

Besser, H. (1990), "Visual access to visual images: the UC Berkeley image database project", *Library Trends*, Vol. 38 No. 4, pp. 787-798.

Birch, W.D.G. (1887), *Catalogue of Seals in the Department of Manuscripts in the British Museum*, Longman and Co., London.

Brilliant, R. (1988), "How an art historian connects art objects and information", *Library Trends*, Vol. 37 No. 2, pp. 120-129.

Burford, B., Briggs, P. and Eakins, J.P. (2003), "A taxonomy of the image: on the classification of content for image retrieval", *Visual Communication*, Vol. 2 No. 2, pp. 123-161.

Chan, L.M. (1989), "Inter-indexer consistency in subject cataloguing", *Information Technology and Libraries*, Vol. 8 No. 4, pp. 349-358.

Cooper, J.E. (2002), "Some thoughts about the computerization of seals", *Studies in Byzantine Sigillography*, Vol. 7, pp. 189-196.

Crane, S. (2013), *Animal Encounters: Contacts and Concepts in Medieval Britain*, University of Pennsylvania Press, Philadelphia, PA.

Crouch, D. (1992), *The Image of Aristocracy in Britain, 1000-1300*, Routledge, London.

Dalas-Garrigues, M. (1993), "L'inventaire informatique de sceaux: un essai aux archives nationales a Paris", *Janus: Revue Archivistique*, Vol. 1 No. 1, pp. 69-81.

Diederich, T. (1993), "Reflexions sur la typologie des sceaux", *Janus: Revue Archivistique*, Vol. 1 No. 1, pp. 48-68.

Ellis, R.H. (1978-1981), *Catalogue of Seals in the Public Record Office: Personal Seals*, HMSO, London.

Elmhirst, E.M. and Dow, L. (1959), *Merchants' Marks*, Publications of the Harleian Society, Vol. 108, Harleian Society, London, available at: www.worldcat.org/title/merchants-marks/oclc/5505077.

Fabre, M. (2001), *Sceau Medieval: Analyse d'une Pratique Culturelle*, L'Harmattan, Paris.

Goodrum, A.A. (2000), "Image information retrieval: an overview of current research", *Informing Science*, Vol. 3 No. 2, pp. 63-67.

Harvey, P.D.A. (1991), "Personal seals in thirteenth-century England", in Loud, G.A. and Wood, I.N. (Eds), *Church and Chronicle in the Middle Ages: Essays Presented to John Taylor*, The Hambledon Press, London, pp. 117-127.

Harvey, P.D.A. (1996), "Computer catalogue of seals in the public record office, London", *Janus: Revue Archivistique*, Vol. 2 No. 2, pp. 29-36.

Harvey, P.D.A. (2000), "Seals and the dating of documents", in Gervers, M. (Ed.), *Dating Undated Medieval Charters*, Boydell, Woodbridge, pp. 207-210.

Harvey, P.D.A. and McGuinness, A.F. (1996), *A Guide to British Medieval Seals*, British Library and Public Record Office, London.

Henig, M. (2008), "The re-use and copying of ancient intaglios set in medieval personal seals, mainly found in England: an aspect of the renaissance of the 12th century", in Adams, N., Cherry, J. and Robinson, J. (Eds), *Good Impressions: Image and Authority in Medieval Seals*, British Museum, London, pp. 25-34.

Heslop, T.A. (1984), "Seals", in Zarnecki, G., Allen, J. and Holland, T. (Eds), *English Romanesque Art, 1066-1200*, Weidenfeld and Nicolson, London, pp. 298-319.

Hourihane, C. (2002), "'They stand on his shoulders': morey, iconograph and the index of christian art", in Hourihane, C. (Ed), *Insights and Interpretations*, Princeton University Press, Princeton, NJ, pp. 1-16.

Hughes, A.V. and Rafferty, P. (2011), "Inter-indexer consistency in graphic materials indexing at the National Library of Wales", *Journal of Documentation*, Vol. 67 No. 1, pp. 9-32.

International Council on Archives (2000), "ISAD (G): general international standard archival description", available at: www.icacds.org.uk/eng/ISAD(G).pdf (accessed 5 July 2014).

Jenkinson, C.H. (1968), *A Guide to Seals in the Public Record Office*, HMSO, London.

Keshet, Y. (2011), "Classification systems in the light of sociology of knowledge", *Journal of Documentation*, Vol. 67 No. 1, pp. 144-158.

Klenczon, W. and Rygiel, P. (2014), "Librarian cornered by images, or how to index visual resources", *Cataloguing & Classification Quarterly*, Vol. 52 No. 1, pp. 42-61.

Klingender, F.D. (1971), *Animals in Art and Thought: to the End of the Middle Ages*, Routledge and K. Paul, London.

Koch, R.A. (1982), "The origins of the fleurs-de-lis and the lilium candidum in art", in Roberts, L.D. (Ed.), *Approaches to Nature in the Middle Ages*, Center for Medieval & Early Renaissance Studies, Binghamton, NY, pp. 109-130.

Krause, M.G. (1988), "Intellectual problems of indexing picture collections", *Audiovisual Librarian*, Vol. 14 No. 2, pp. 73-81.

Lillich, M.P. (1991), "Early heraldry: how to crack the code", *Gesta*, Vol. 39 No. 1, pp. 41-47.

Linenthal, R.A. and Noel, W. (2004), *Medieval Seal Matrices in the Schøyen Collection*, Hermes Publishing, Oslo.

McGuinness, A.F. (1995), "Non-armigerous seals and seal-usage in thirteenth-century England", in Coss, P.R. and Lloyd, S.D. (Eds), *Thirteenth Century England. Vol. 5: Proceedings of the Newcastle on Tyne Conference 1993*, Boydell, Woodbridge, pp. 165-178.

Mai, J. (2011), "The modernity of classification", *Journal of Documentation*, Vol. 67 No. 4, pp. 710-730.

Markey, K. (1986), *Subject Access to Visual Resources Collections: A Model for Computer Construction of Thematic Catalogues*, Greenwood Press, New York, NY.

Markey, K. (1988), "Access to iconographical research collections", *Library Trends*, Vol. 37 No. 2, pp. 154-174.

New, E.A. (2001), "Digital imaging of British medieval seals: report on a six-month pilot project", *Archives*, Vol. 26 No. 104, pp. 11-17.

New, E.A. (2010), *Seals and Sealing Practices*, British Records Association, London.

Olson, H.A. and Wolfram, D. (2006), "Indexing consistency and its implications for information architecture: a pilot study", ASIS&T Information Architecture Summit, Vancouver, available at: www.academia.edu/3026365/Indexing_Consistency_and_its_Implications_for_Information_Architecture_A_Pilot_Study (accessed 8 August 2015)

Panofsky, E. (1939), *Studies in Iconology; Humanistic Themes in the Art of the Renaissance*, Oxford University Press, New York, NY.

Pastoureau, M. (1981), *Les Sceaux*, Brépols, Turnhout.

Petersen, T. (1990), "Developing a new thesaurus for art and architecture", *Library Trends*, Vol. 38 No. 4, pp. 644-658.

Rafferty, P. and Hidderley, R. (2005), *Indexing Multimedia and Creative Works: The Problems of Meaning and Interpretation*, Ashgate, Aldershot.

Ranger, F. (1960), *A Catalogue of Medieval Seals Contained in six Accumulations in the Archives Department of Leicester Museum*, Diploma in Archive Administration, University of London, London.

Shatford-Layne, S. (1994), "Some issues in the indexing of images", *Journal of the American Society for Information Science*, Vol. 45 No. 8, pp. 583-588.

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*, Vol. 45 No. 8, pp. 600-606.

Svenonius, E. (2000), *The Intellectual Foundation of Information Organization*, MIT Press, Cambridge, MA.

Togneri, C. (1999), "ICONCLASS and its application to primary documents", in Hourihane, C. (Ed.), *Image and Belief: Studies in Celebration of the Eightieth Anniverary of the Index of Christian Art*, Princeton University Press, Princeton, NJ, pp. 259-270.

Williams, D.H. (1993-1998), *Catalogue of Seals in the National Museum of Wales*, National Museum of Wales, Cardiff.

Further reading

Ellis, R.H. (1986), *Catalogue of Seals in the Public Record Office: Monastic Seals*, HMSO, London.

Corresponding author

Dr John Alexander McEwan can be contacted at: john.a.mcewan@gmail.com

Table AI.
Classes and keywords used by the SiMeW project

Classmark	Class	Definition	Keyword(s)
1	Human	Motif consisting of a humanoid	Human
1.1	Full-length	Motif consisting of a full-length representation of a humanoid	Human – full-length
1.1.1	Crucified	Motif consisting of a crucified full-length humanoid	Human – full-length – crucified
1.1.2	Riding	Motif consisting of a riding full-length humanoid	Human – full-length – riding
1.1.2.1	Armoured man equestrian	Motif consisting of a riding full-length humanoid in armour	Human – full-length – riding – armoured man equestrian
1.1.3	Seated	Motif consisting of a seated full-length humanoid	Human – full-length – seated
1.1.3.1	Seated woman holding child	Motif consisting of a seated full-length woman holding a child on her lap	Human – full-length – seated – seated woman holding child
1.1.4	Standing	Motif consisting of a standing full-length humanoid	Human – full-length – standing
1.1.4.1	Standing man	Motif consisting of a standing full-length man	Human – full-length – standing – standing man
1.1.4.1.1	Man fighting animal	Motif consisting of a standing full-length man fighting with an animal	Human – full-length – standing – standing man – man fighting animal
1.1.4.1.2	Standing liturgical apparel	Motif consisting of a standing full-length man wearing liturgical apparel	Human – full-length – standing – standing man – standing liturgical apparel
1.1.4.2	Standing woman	Motif consisting of a standing full-length woman	Human – full-length – standing – standing woman
1.1.4.2.1	Standing woman holding child	Motif consisting of a full-length woman holding a child	Human – full-length – standing – standing woman – standing woman holding child
1.2	Bust	Motif consisting of the head or head and shoulders of a humanoid	Human – bust
1.2.1	Head on dish	Motif consisting of a human head on a dish	Human – bust – head on dish
1.2.2	Two heads	Motif consisting of a pair of heads	Human – bust – two heads
1.3	Half-length	Motif consisting of a half-length representation of a humanoid	Human – half-length
1.3.1	Half-length man	Motif consisting of a half-length representation of a man	Human – half-length – half-length man
1.3.2	Half-length woman	Motif consisting of a half-length representation of a woman	Human – half-length – half-length woman

(*continued*)

Table AI.

Classmark	Class	Definition	Keyword(s)
1.3.2.1	Half-length woman holding child	Motif consisting of a half-length woman holding a child	Human – half-length – half-length woman holding child
1.4	Hand	Motif consisting of the arm or hand of a humanoid	Human – limb
1.4.1	Crossed hands	Motif consisting of a pair of clasped hands	Human – limb – crossed hands
1.4.2	Hand holding bird	Motif consisting of the upper limb of a humanoid supporting a bird	Human – limb – hand holding bird
1.4.3	Hand holding item	Motif consisting of a hand holding an item	Human – limb – hand holding item
2	Animal	Motif consisting of animate creatures, excluding humanoids	Animal
2.1	Beast	Motif consisting of animate creatures, excluding humanoids, birds, fish, and insects, but including reptiles and fabulous creatures	Animal – beast
2.1.1	Beast body	Motif consisting of full-length animate creatures, excluding humanoids, birds, fish and insects, but including reptiles and fabulous creatures	Animal – beast – beast body
2.1.1.1	Centaur	Motif consisting of a creature with the head, trunk, and arms of a man, joined to the body and legs of a horse	Animal – beast – beast body – centaur
2.1.1.2	Dragon	Motif consisting of a terrible reptile, with claws and generally wings	Animal v beast – beast body – dragon
2.1.1.3	Griffin	Motif consisting of a creature having the head and wings of an eagle and body and hind-quarters of a lion	Animal – beast – beast body – griffin
2.1.1.4	Hare	Motif consisting of a hare (a rodent of the genus *Lepus*)	Animal – beast – beast body – hare
2.1.1.4.1	Hare on hound	Motif consisting of a hare (a rodent of the genus *Lepus*) astride a dog (a domesticated carnivorous mammal, *Canis familiaris*)	Animal – beast – beast body – hare – hare on hound
2.1.1.5	Lion	Motif consisting of a lion (a carnivorous quadrupedal animal of the genus *Felis leo*)	Animal – beast – beast body – lion
2.1.1.5.1	Lion fighting	Motif consisting of a lion (a carnivorous quadrupedal animal of the genus *Felis leo*) fighting another animal	Animal – beast – beast body – lion – lion fighting
2.1.1.5.2	Lion sleeping	Motif consisting of a sleeping lion (a carnivorous quadrupedal animal of the genus *Felis leo*)	Animal – beast – beast body – lion – lion sleeping
2.1.1.6	Mermaid	Motif consisting of a creature with the head and trunk of a woman and tail of a fish	Animal – beast – beast body – mermaid

(*continued*)

Table AI.

Classmark	Class	Definition	Keyword(s)
2.1.1.7	Sheep	Motif consisting of a sheep (an animal of the genus *Ovis*)	Animal – beast – beast body – sheep
2.1.1.7.1	Lamb and Staff	Motif consisting of a sheep (an animal of the genus *Ovis*) with a cross-tipped staff bearing a pennon	Animal – beast – beast body – sheep – lamb and staff
2.1.1.8	Squirrel	Motif consisting of a squirrel (a rodent of the genus *Sciurus*), having a long bushy tail and furry coat	Animal – beast – beast body – squirrel
2.1.1.9	Stag	Motif consisting of a male deer (member of the family *Cervidæ*)	Animal – beast – beast body – stag
2.1.1.10	Swine	Motif consisting of a wild or domestic pig (an animal of the member of the family *Suidae*)	Animal – beast – beast body – swine
2.1.1.11	Unicorn	Motif consisting of an animal having the body of a horse with single horn projecting from its forehead	Animal – beast – beast body – unicorn
2.1.1.12	Wolf	Motif consisting of a wolf (an animal of the genus *Canis Lupus*)	Animal – beast – beast body – wolf
2.1.2	Beast head	Motif consisting of the heads of animate creatures, excluding humanoids, birds, fish, and insects, but including reptiles and fabulous creatures	Animal – beast – beast head
2.1.2.1	Boar head	Motif consisting of the head of a wild or domestic pig (an animal of the member of the family *Suidae*)	Animal – beast – beast head – boar head
2.1.2.2	Lion head	Motif consisting of the head of a lion (a carnivorous quadrupedal animal of the genus *Felis leo*)	Animal – beast – beast head – lion head
2.1.2.3	Stag head	Motif consisting of the head of a male deer (member of the family *Cervidæ*)	Animal – beast – beast head – stag head
2.1.2.4	Unicorn head	Motif consisting of the head of an animal having the body of a horse with single horn projecting from its forehead	Animal – beast – beast head – unicorn head
2.1.2.5	Wolf head	Motif consisting of the head of a wolf (an animal of the genus *Canis Lupus*)	Animal – beast – beast head – wolf head
2.2	Bird	Motif consisting of a bird (any member of the Aves class of vertebrates)	Animal – bird
2.2.1	Double-headed eagle	Motif consisting of an eagle having a double-head	Animal – bird – double-headed eagle
2.2.2	Hawk hunting	Motif consisting of a bird of prey taking another animal	Animal – bird – hawk hunting
2.2.3	Pelican in piety	Motif consisting of a bird perched on a nest feeding its young with its own blood	Animal – bird – pelican in piety
2.2.4	Two birds drinking	Motif consisting of two birds drinking from a cup	Animal – bird – two birds drinking

(*continued*)

Table AI.

Classmark	Class	Definition	Keyword(s)
2.3	Fish	Motif consisting of a vertebrate animal provided with fins and destitute of limbs that lives exclusively in water	Animal – fish
2.4	Insect	Motif consisting of an insect (a small invertebrate animal)	Animal – insect
3	Object	Motif consisting of discrete visual or material things produced by human endeavour that can be touched or seen	Object
3.1	Building	Motif consisting of a built structure	Object – building
3.1.1	Crenallation	Motif consisting of a built structure with battlements	Object – building – crenellation
3.2	Container	Motif consisting of a receptacle	Object – container
3.3	Equipment	Motif consisting of an object used in activities	Object – equipment
3.3.1	Animal equipment	Motif consisting of equipment used by animals	Object – equipment – animal equipment
3.3.1.1	Horseshoe	Motif consisting of U-shaped metal plates nailed to a horse's hoof to protect it from being injured by hard or rough surfaces	Object – equipment – animal equipment – horseshoe
3.3.2	Apparel	Motif consisting of clothing	Object – equipment – apparel
3.3.3	Tool	Motif consisting of a mechanical instrument for working upon something, as by cutting, striking, rubbing, or other process	Object – equipment – tool
3.3.3.1	Axe	Motif consisting of an instrument of chopping	Object – equipment – tool – axe
3.3.3.2	Hammer	Motif consisting of an instrument having a hard solid head set transversely to the handle, used for beating, breaking, driving nails, etc	Object – equipment – tool – hammer
3.3.3.3	Shears	Motif consisting of an instrument of shearing	Object – equipment – tool – shears
3.3.4	Transport	Motif consisting of vehicles designed to carry or convey merchandise, materials, or passengers across a distance	Object – equipment – transport
3.3.4.1	Boat	Motif consisting of a vessel for travelling on water	Object – equipment – transport – boat
3.3.5	Weapon	Motif consisting of an instrument of war	Object – equipment – weapon
3.3.5.1	Arrow	Motif consisting of a slender pointed missile that can be shot from a bow	Object – equipment – weapon – arrow
3.3.5.1.1	Bow and arrow	Motif consisting of a slender pointed missile with a weapon for shooting	Object – equipment – weapon – arrow – bow and arrow
3.3.5.2	Banner	Motif consisting of a piece of cloth, attached by one side to the upper part of a long pole or staff	Object – equipment – weapon – banner

(*continued*)

Classmark	Class	Definition	Keyword(s)
3.3.5.3	Shield	Motif consisting of a shield (an implement of defensive armour carried in the hand or attached by a strap to the arm) or a shield-like surface upon which a coat of arms is depicted	Object – equipment – weapon – shield
3.3.5.4	Spear	Motif consisting of a thrusting weapon consisting of a wooden staff of some length, on which a sharp-pointed head is fixed	Object – equipment – weapon – spear
3.3.5.4.1	Spear and pennon	Motif consisting of a spear with a long narrow flag	Object – equipment – weapon – spear – spear and pennon
3.3.5.5	Sword	Motif consisting of cutting or thrusting weapon with a handle or hilt with a cross-guard, and a straight or curved blade	Object – equipment – weapon – sword
3.4	Natural product	Motif consisting of a thing generated or produced by, or as if by, nature or a natural process	Object – natural product
3.4.1	Shell	Motif consisting of the covering of a crustacean, mollusc, or other invertebrate	Object – natural product – shell
3.4.2	Wheatsheaf	Motif consisting of a bundle of wheat after reaping	Object – natural product – wheatsheaf
3.5	Symbol	Motif consisting of an object produced to transmit an informational message	Object – symbol
3.5.1	Cross	Motif consisting of two or more intersecting bars, with many variations in the shapes of the radii	Object – symbol – cross
3.5.2	Merchant mark	Motif consisting of a type of mark conventionally known as a “merchant mark” (Elmhirst and Dow, 1959)	Object – symbol – merchant mark
3.5.3	Text	Motif consisting of one or more letters	Object – symbol – text
3.5.3.1	Christogram	Motif consisting of an abbreviation of the name of Jesus	Object – symbol – text – christogram
4	Device	Motif consisting of a decorative design element	Device
4.1	Irregular	Motif consisting of an asymmetrical device or a device which is symmetrical on only one axis	Device – irregular
4.1.1	Crescent	Motif consisting of a crescent	Device – irregular – crescent
4.1.2	Heart	Motif consisting of a stylized heart	Device – irregular – heart
4.1.3	Stylized lily	Motif consisting of a decorative motif in the form of a stylized iris or lily, usually with three curled petals, but occasionally with five, one of which forms the central axis to the symmetrical design	Device – irregular – stylized lily
4.2	Lattice	Motif consisting of a pattern of perpendicular and/or horizontal bars	Device – lattice
4.3	Radial	Motif consisting of two or more intersecting branches, leaves, or lobes	Device – radial
5	Undetermined	Motif that cannot be classified	Undetermined
6	Unassigned	Motif that has not been classified	Unassigned

Table AI.

The above table lists the classes and keywords in use in the SiMeW system at the time of publication. The first field is the classmark. For the location of each class in the hierarchy, please see the attached figures. The second field is the class's name. The third field contains the class definition. The definitions are adapted in many cases from the *Oxford English Dictionary* and the Getty Research Institute's Art and Architecture Thesaurus. The fourth field are the keyword(s) associated with the class.