

The Cranach Digital Archive: Objectives and opportunities for interdisciplinary and inter-institutional research resources

GUNNAR HEYDENREICH*

Museum Kunstpalast
Düsseldorf, Germany
Cologne Institute of Conservation Sciences
Cologne, Germany
gunnar.heydenreich@fh-koeln.de

HELEN SMITH-CONTINI

Museum Kunstpalast
Düsseldorf, Germany
cda@smkp.de
www.smkp.de

JÖRG STAHLMANN

Museum Kunstpalast
Düsseldorf, Germany
cda-admin@smkp.de

DANIEL GÖRRES

Museum Kunstpalast
Düsseldorf, Germany
daniel.goerres@smkp.de

JANA HERRSCHAFT

Cologne Institute of Conservation Sciences
Cologne, Germany
jana.herrschaft@fh-koeln.de
www.cics.fh-koeln.de

INGO SANDNER

Museum Kunstpalast
Düsseldorf, Germany

*Author for correspondence

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ABSTRACT

In recent decades the systematic study of the painting materials and techniques of Lucas Cranach the Elder has generated new insights regarding attribution, authenticity, dating, display and function, as well as changes in appearance of his works. However, only a small fraction of the rich technical documentation has been published. Despite strong interest in accessing these resources, it remains difficult for scholars to consider this important body of material. In October 2009, nine museums in Europe and the United States began working together on a pilot project to establish methodologies for interdisciplinary collaborative research, sharing knowledge and providing access to art historical, technical and conservation information on paint-

INTRODUCTION

One of the greatest and most versatile artists of 16th-century Europe, Lucas Cranach the Elder (c. 1472–1553) served as court painter to three successive Saxon electors for almost five decades, demonstrating extraordinary artistic creativity. He invented numerous pictorial narratives and iconographies to reflect the new age of Humanism and Protestant theology, and established one of the most efficient and productive workshops of his time. Today, more than 1500 paintings by Cranach and his workshop are known, and they represent only a small fraction of the works originally produced.

Despite the best efforts of several generations of scholars to gain a deeper understanding of his art and to catalogue his widely dispersed oeuvre of paintings, drawings and prints, Cranach still poses a considerable number of questions and challenges for future art historical research:

- The only comprehensive research resource – the catalogue raisonné by Max J. Friedländer and Jakob Rosenberg – was last revised in 1979 and is now out of date. Reliable information about the oeuvre, let alone good photographic records of the works, many of which are housed in churches or private collections, is extremely difficult to assemble, and many works remain undocumented.
- Although the systematic study of Cranach's materials and techniques in recent decades has generated new insights as regards attribution, authenticity, dating, display and function, as well as changes in the appearance of his works, little of this research has actually been published. In addition, a considerable amount of new material continues to be generated, much of it in digital form. However, as yet there are no established mechanisms or collaborative research alternatives employing analogue technology through which it can be easily and reliably shared.
- Cranach paintings are well represented in almost all major museums. This situation provides an ideal background for networked research. There is a highly motivated community of contributors and users in numerous museums who are interested in sharing large quantities of documentary material and in investing in the success of the cda.
- The recent major Cranach exhibitions in Chemnitz (2006), Frankfurt (2007), London (2008), Berlin (2009), Brussels (2010), Rome (2010),

ings by Lucas Cranach the Elder and his workshop. The project Cranach Digital Archive (cda) is funded by the Andrew W. Mellon Foundation as part of a larger initiative to develop new kinds of research tools to facilitate the transmission of art historical and conservation information across institutions and international borders in order to advance scholarship and learning. This paper discusses related challenges, experiences and perspectives.

Paris (2011) and Munich (2011) were highly successful and attracted millions of visitors. They also raised many questions, and indicated the need for further research.

- Recent improvements in both visible and infrared imaging technology now make it possible to capture and share high-resolution images at an unprecedented level of clarity in the electronic environment: a particularly important consideration for Cranach scholarship, where comparison of details and close analysis of underdrawings are essential.
- Given these considerations, it has become clear that an ever-growing digital repository of art historical and technological, conservation and scientific information would be an especially appropriate resource for the study, understanding and appreciation of this important artist; the cda was born out of this necessity.

PROJECT AIMS

The Cranach Digital Archive (www.lucascranach.org) is a joint initiative of the Stiftung Museum Kunstpalast in Düsseldorf and the Cologne Institute of Conservation Sciences/Cologne University of Applied Sciences, in collaboration with nine founding partner institutions, 18 associate partners and many project contributors. In October 2009 the partners began working together on a pilot project to establish methodologies for interdisciplinary collaborative research, sharing knowledge and providing access to art historical, technical and conservation information on paintings by Lucas Cranach the Elder, his sons and his workshop in the electronic environment. The project is funded by the Andrew W. Mellon Foundation as part of a larger initiative to develop new kinds of research tools to facilitate transmission of art historical and conservation information across institutions and international borders in order to advance scholarship and learning.¹

The Cranach Digital Archive serves three main purposes:

- *Preservation:* The cda provides an opportunity for long-term storage of documentary material from museum and private archives such as reports, x-radiographs, colour slides and born-digital images. Such material, particularly in smaller museums and private archives, is in danger of being lost within a relatively short period of time.
- *Access:* The documentary material is recorded, catalogued and commented to provide most efficient access in the electronic environment. The cda serves as a platform from which all information currently housed in different institutions can be made accessible to the scholarly public.
- *Research and dissemination:* The cda not only provides access to historical documentary material and completed research, but also encourages new forms of interdisciplinary scholarly research and teaching. The project staff is actively involved in generating new documentary material, such as dendrochronological analysis and digital infrared-reflectograms. It is also linked with relevant projects (*Wege zu Cranach*², exhibition projects, etc.) that draw on the content in innovative and exploratory ways.

DOCUMENTATION

**THE CRANACH DIGITAL ARCHIVE:
OBJECTIVES AND OPPORTUNITIES
FOR INTERDISCIPLINARY
AND INTER-INSTITUTIONAL
RESEARCH RESOURCES**

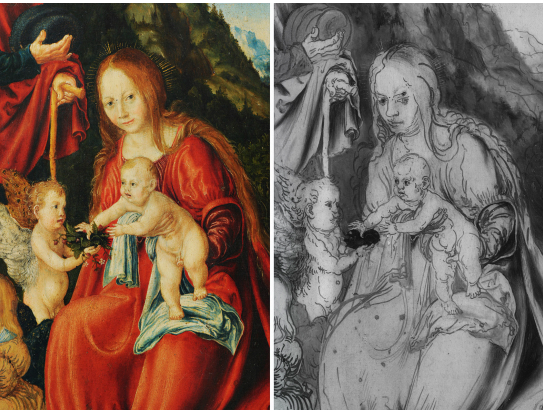


Figure 4
Lucas Cranach the Elder, *Holy Family (Rest on the Flight into Egypt)*, 1504. Panel, 70.8 x 52.9 cm. Staatliche Museen zu Berlin, Preußischer Kulturbesitz, Gemäldegalerie. Detail (left) and detail from infrared reflectogram (right)

The Cranach Digital Archive has been available online since January 2012 and currently provides information on more than 1000 paintings including c. 10,300 high-resolution images and documents from 127 contributing institutions in 23 countries, including major museums such as the Metropolitan Museum of Art in New York, the National Gallery in London, the Kunsthistorisches Museum in Vienna and the Alte Pinakothek in Munich (Figures 1–2). The archive contains over 900 infrared-reflectograms (Figures 3–4), 320 x-radiographs, numerous technical reports and a literature database with

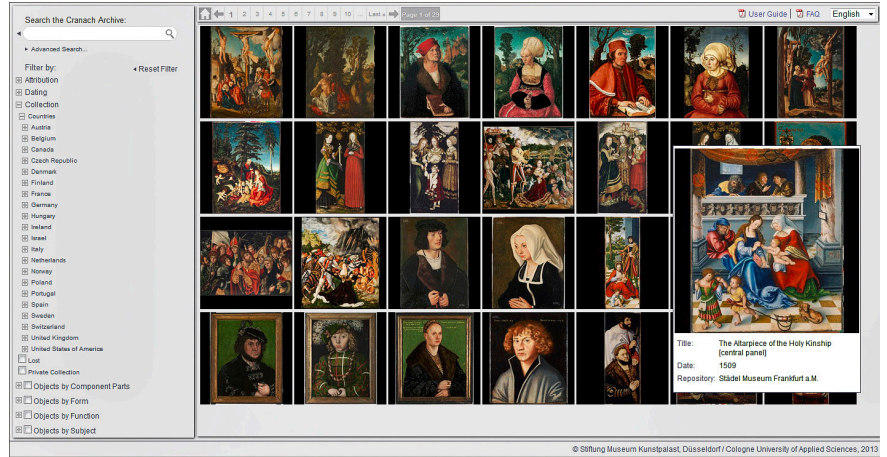


Figure 1
Screenshot of the overall view of the Cranach Digital Archive (November 2013)

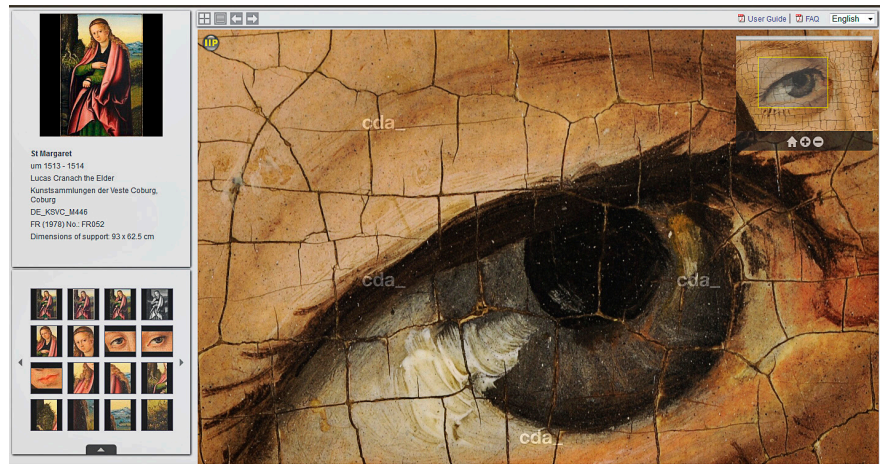


Figure 2
Screenshot illustrating the IIImage zoom function (November 2013)

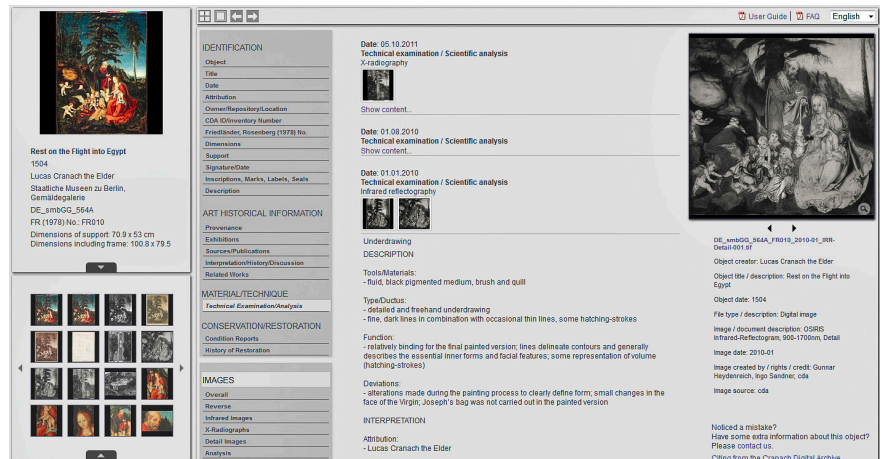


Figure 3
Screenshot which illustrates how complex technological information is presented in the cda (November 2013)

more than 2600 entries. Although the Cranach Digital Archive is primarily directed at a professional target group of conservators, curators, scholars, art historians and students, the website is freely accessible and may be consulted by anyone. Nearing the close of its second phase (2012–14), the project has built the foundations for an innovative, comprehensive and collaboratively produced repository of knowledge about Lucas Cranach and his workshop that is significantly different from the traditional model of the single-author catalogue raisonné.

ARCHIVES WITHIN THE CDA

As an interdisciplinary cooperation tool of both the sciences and the humanities, the cda brings together different archives providing material from areas like history, conservation, wood science and art history. At present, the cda staff members continuously add additional archive material to provide an opportunity to gain a deeper understanding of Cranach's work. The following archives are incorporated within the Cranach Digital Archive or will be in the near future:

- *Max J. Friedländer Archive:* Being one of the authors of the catalogue raisonné on Cranach paintings, the German art historian Max J. Friedländer built up a rich collection of annotated photographs that is preserved in the Rijksbureau voor Kunsthistorische Documentatie (Netherlands Institute of Art History) in The Hague. The revised edition of the catalogue raisonné by Max J. Friedländer and Jakob Rosenberg was published in 1978 with 452 illustrated main entries and additional subentries without images. The photographs from the Max J. Friedländer Archive are useful to visualise all these paintings and to derive additional information from the annotations on the verso of each image (e.g. for provenance research).
- *Dieter Koepplin Archive:* Ever since his PhD thesis on the humanist portraits of Johannes Cuspinian and his wife (Koepplin 1973), and the groundbreaking 1974 exhibition on Cranach's paintings, drawings and prints in Basel (Koepplin and Falk 1974), the Swiss art historian Dieter Koepplin is one of the most renowned Cranach specialists. In decades of research Koepplin assembled an enormous archive of images and text information that brings together Cranach data from museums, private collections and auctioneers. The Cranach Digital Archive was able to digitise this archive in total by generating more than 6000 scans. Although much data is still under copyright protection, the Koepplin archive serves as a rich resource to gain, for example, provenance information about paintings which are not stored in museums and are therefore often not accessible to the public. Based on this information current owners can be contacted and asked for images and additional information.
- *Peter Klein Archive:* The biologist Peter Klein is a leading expert on dendrochronology who worked for many years at the Hamburg University Institute of Wood Sciences and examined hundreds of wooden supports, not only of Cranach paintings. The examination results are recorded in reports and provide a rich source of information on the wood species

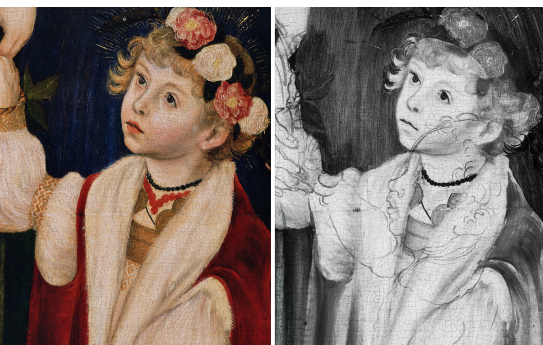


Figure 5
Lucas Cranach the Elder, *Altarpiece with the Martyrdom of St Catharine*, 1506. Left wing panel, 121.4 x 64 cm. Dresden, Staatliche Kunstsammlungen. Detail (left) and detail from infrared reflectogram (right); image by Christoph Schölzel

used in the Cranach workshop and on dendrochronological dating of the wooden supports.

- *Archives with historical records*: Cranach served as court artist for the Saxon electors and he became one of the wealthiest citizens of Wittenberg and member of the city council as well as burgomaster. In cooperation with the Thuringian State Archive (Thüringisches Hauptstaatsarchiv) and the municipal archives of Kronach and Wittenberg (Stadtarchiv Kronach, Städtische Sammlungen Wittenberg), the cda will present more than 1000 digitised primary documents like letters, invoices and inventories that refer to Cranach or his workshop to document his activities. The scans will be complemented by recent transcripts and annotations by the historians Monika and Dietrich Lücke.

RESEARCH WITH THE CDA – TWO CASE STUDIES

Examinations employing infrared reflectography

Radiodiagnostic examinations make it possible to generate knowledge about an artwork, which would otherwise remain hidden to the naked eye. By employing infrared imaging, underdrawings of paintings can be made visible. The earliest published infrared photographs of paintings by Cranach date back to the early 1970s (Riemann 1972), but it was not until the 1990s, with the development of infrared reflectography, that the number could be considerably increased (Sandner 1998). Today, digital infrared reflectography has simplified the process allowing to capture a large quantity of images in a relatively short period of time. The cda team saw these new technological possibilities as an opportunity to establish an infinitely expandable database. Within the last three years, 751 paintings were examined in 61 institutions.³ These were supplemented by images and reports provided by the project partners.

Each of the images is complemented by a brief descriptive text in an attempt to reconstruct the stages of the creative process from the rough initial design to the final version, to identify alterations as well as methods used to transfer the design. Observations are entered under ‘Description’ and loosely categorised under the following subheadings: tools/materials, type/ductus, function and deviations. Additional interpretative information appears in the section entitled ‘Interpretation’ under ‘Attribution’ or ‘Comments’.

Although it must be assumed that the more than 1500 paintings which are known from the Cranach workshop represent only a fraction of the actual production, the cda shows that it is possible to achieve a more comprehensive overview of the working practice within the workshop. For the first time, it permits precise assertions to be made about the working practice of the master and his assistants, and shows how its evolution reflects changes in the workshop constellation or the type of contract. Moreover, it gives insight into the drawing tools and the methods used to transfer the design⁴ where templates were employed not only for serial production, but also as an efficient means of standardising reproduction within the workshop. In other cases, changes in composition during the production process are disclosed (Figure 5). The identification of characteristics of the underdrawing specific to Cranach or to individual workshop members

has led to reattributions (Heydenreich 2013), an increased understanding of the division of labour⁵ and indeed the re-evaluation of less competently executed works.⁶

A series of articles assessing the material will be posted on the website as PDF documents to download. The first part, which presents research results from Cranach's early paintings, is already available (Sandner and Heydenreich 2013). Assessment of this material is an ongoing process and, as the material continues to grow, new perspectives will be presented allowing further re-evaluation. It is hoped that the high-resolution images and the evaluation, as well as a first interpretation, will stimulate scholars and encourage them to consider this material in their future assessment of Cranach's oeuvre.

The paintings of the *Suicide of Lucretia*

Within Cranach's oeuvre the Lucretia theme received much attention. Thirty-five versions of the pagan heroine who became exemplary of a Christian-moral society are listed in the catalogue raisonné by Friedländer and Rosenberg (1978). In fact, twice as many versions are now known and research for the database collated works created by Lucas Cranach the Elder, Lucas Cranach the Younger, their workshop, followers or copyists of later centuries, as well as forgeries. Forty-three paintings are currently presented in the cda, giving an overview of several versions from half-length to full-length figures, either dressed or nude, standing or sitting, with embellished or uncombed hair, with either a dark background or a landscape (Figure 6). Conspicuous is the continuous modification of the theme which guaranteed the avoidance of repetition. Even the variation of little details ensured that no two paintings were the same.

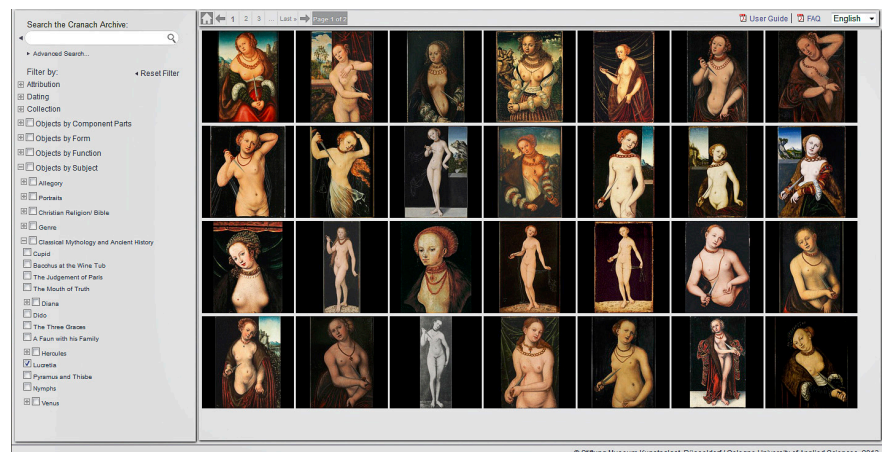


Figure 6 Screenshot which shows a selected number of Lucretia paintings in the cda (November 2013)

Stylistic comparison illustrates the contemporary variation of specific elements: between 1528 and 1530 the Cranach workshop created several very elegant Lucretia paintings in which she wears her hair pinned up beneath a net bonnet with pearls. The backgrounds are dark, but a window with a view into a landscape indicates that Lucretia is standing in a room (e.g. Nationalmuseum Stockholm,⁷ Grunewald Hunting Lodge⁸). Another pictorial type showing Lucretia as a half-length figure with the dagger in her lowered right hand and her left hand resting in her lap, often with a piece

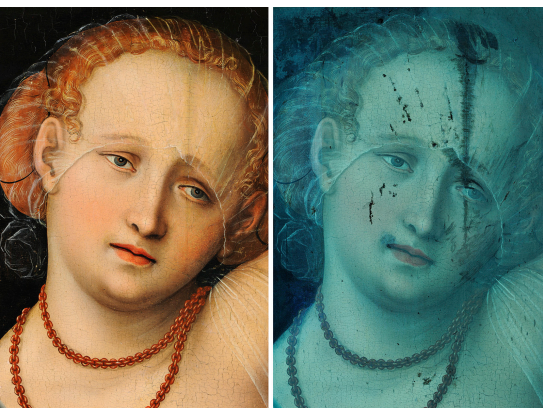


Figure 7
Lucas Cranach the Elder, *Lucretia*, c. 1530. Panel, 194 x 75 cm. Munich, Alte Pinakothek. Condition before 1919 (left) and present condition (right)

Figure 8
Lucas Cranach the Elder, *Lucretia*, c. 1535–40. Panel, 79 x 64 cm. Basel, Kunstmuseum. Detail (left) and detail from ultraviolet fluorescence photograph (right)

of clothing or with her hand in front of her vulva, was frequently repeated in the Cranach workshop during the 1530s as is documented by at least five other paintings of this type (e.g. Niedersächsisches Landesmuseum Hannover,⁹ Muzeum Palac w Wilanowie, Warsaw,¹⁰ Kunstsammlungen der Veste Coburg¹¹). Standing half- or three-quarter-length figures predominate within the numerous versions, but there are also a few full-length figures mostly executed between 1530 and 1540 and all nude (Alte Pinakothek, Munich,¹² Staatliche Museen zu Berlin¹³) except one which had been attributed to Cranach the Younger (private collection¹⁴). About 1540/45 a series of representations of Lucretia shows her as a half-length figure wearing a richly decorated and fur-trimmed coat with her left arm raised to her head (e.g. Schloss Gottorf, Schleswig¹⁵). These panels differ from former versions and tend to be attributed to Lucas Cranach the Younger.

In addition to the analysis of stylistic variations and related questions of attribution the cda provides rich information on changed conditions of these paintings: for example, in the early 17th century the Lucretia in the Bayerische Staatsgemäldesammlungen was adjusted according to the taste of the Bavarian duke and elector Maximilian I and a dress covered the naked body until this was removed in 1919 again (Schawe 2011, Figure 7), as documented with photographs. UV-imaging provides information on the condition of paintings (Figure 8). Furthermore, the cda includes hundreds of conservation reports.

TECHNICAL CHALLENGES AND SOLUTIONS

With the cda team members and in collaboration with the Digital Art Archive Düsseldorf (d:kult) a data model and standards for data registration and exchange were developed. A collection management system, The Museum System (TMS), was customised for use as an interim data repository. The task was then to unite the various existing structures, which included TMS, a lot of additional information in the form of Word and PDF documents and a large number of images in various formats and sizes to create a user-friendly web database.

The collection management software acts as a version control system, giving the possibility to structure the data provided by the project partners and entered or generated by the cda team before publishing it. The use of controlled vocabularies and thesauri in TMS support the search and filter options in the online database. From TMS all data is exported in four different reports in XML format. An application written in Java parses the documents and inserts or updates the data in the online database.

For the infrastructure, the cda decided to use a locally hosted server due to the fact that the data and images would create an immense amount of traffic if uploading was carried out via the Internet. The server system is based on Ubuntu (long-term support version) and the Apache web server; however, on the basis of performance, a switch to Zend Server is being considered. The cda works with a standard open-source database and with IIPImage, an advanced high-performance imaging server and client for web-based streamed remote visualisation of ultra-resolution scientific imagery. The IIPImage server system allows the user to view, navigate

and zoom the high-resolution images in real time. Combined with tiled multi-resolution TIFF images it is a reasonable tool to comfortably and efficiently remotely browse the high-resolution images. These were batch converted using a shell script, on a basis of the free-image processing system VIPS. Compared to most image processing libraries, VIPS requires little memory and runs quickly and efficiently, especially on parallel multi-processor machines.

Although the prototype of the Cranach online resource fulfils all basic requirements concerning access and research, the infrastructure of the technology requires further development in order to improve analysis, collaboration and publication tools. This can only be tested and further adapted as the number of partners and the corpus of material grow. The SQL web database will be developed further, while at the same time other models will be explored in close collaboration with the projects ResearchSpace (www.researchspace.org) and Rembrandt Database (www.rembrandtdatabase.org).

CONCLUSION

The comprehensive Cranach research resource should allow professionals and the public to gain a deeper understanding of Cranach's art. In the future, it will assist researchers in questions of attribution, dating and workshop organisation. The cda serves to safeguard and provide access to documentary material in museum archives; it actively promotes collaborative research and it generates new high-quality documentary material and tools to explore new research possibilities in the electronic environment. The cda has taken on the many challenges presented and looks forward to the success of the project, which will be an important response to the opportunities afforded by digital technology and changing research methodologies, and one which supports further collaboration between art history, technical art history and conservation sciences.

ACKNOWLEDGEMENTS

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NOTES

- ¹ Raphael Research Resource (<http://cima.ng-london.org.uk/documentation/>), The Rembrandt Database (<http://www.rembrandtdatabase.org/Rembrandt>), ResearchSpace (<http://www.researchspace.org>). For further information read 'Issues in conservation documentation' on the Mellon Foundation's website (<http://mac.mellon.org/issues-in-conservation-documentation>).
- ² <http://wege-zu-cranach.de/wege-zu-cranach.html> (accessed 4 November 2013).
- ³ The majority of these images were captured with an Osiris-infrared camera with a spectral sensitivity between 900–1700 nm.
- ⁴ A few examples where it can be assumed that the design was transferred by tracing it from a template: DE_KSW_G6; DE_SHLM_NONE-005; DE_smbGG_618; DE_GNMN_Gm1570; DE_MdbKL_1849. The cda identification numbers are given. The cda-ID includes: country code_initials_of_repository_inv. no. (search the archive at <http://www.lucascranach.org/digitalarchive.php>).
- ⁵ DE_AGGD_7a; DE_AGGD_7b; DE_AGGD_7c.
- ⁶ DE_SKK_0107.

- 7 SE_NMS_1080.
- 8 DE_SPSG_GKI30187.
- 9 DE_NLMH_PAM775.
- 10 PL_WPM_Wil1749.
- 11 DE_KSVC_M160.
- 12 DE_BStGS_691.
- 13 DE_smbGG_1832.
- 14 PRIVATE_NONE-P025.
- 15 DE_SHLM_1998-12.

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