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# Familiarizing the Art Historian with Technical Art History: On the Education on and Publication of Interdisciplinary Research: a Matter of Research Practices

Huijbrechts, Maartje

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# Familiarizing the Art Historian with Technical Art History

## On the Education on and Publication of Interdisciplinary Research

*A Matter of Research Practices*

**Master Thesis**

Arts and Culture: Art, Architecture and Interior before 1800
At Leiden University 2022/2023

By Maartje Huijbrechts

# Table of Contents

# Introduction

During the last two decades, scientific research on paintings has taken a leap. Major artists and works of art have been meticulously investigated using continuously innovating scientific methods. During the Rembrandt Research Project (RRP), Ernst van de Wetering insisted on performing object-based research, putting the artwork itself at the core of investigations. Moreover, images of art, made with different kinds of radiation, were produced and studied by the RRP on an unprecedented scale.[1] The Bosch Research and Conservation Project (BRCP) has contributed significantly to technological advancements in the art world as well; Luuk Hoogstede, conservator-researcher at the BRCP, said that "for the first time in art history, the entire oeuvre of a single artist has been visually documented, across the globe, using standardized methods".[2] Popular tv shows like *The Secret of a Master Painter*,[3] showcasing the public the ins and outs of scientific research on paintings, further contribute to the idea that scientific research can no longer be ignored in today's art world. Yet, this kind of research is still not widely adopted by art historians.[4] Art-historical research involving scientific findings, which will be referred to as *technical art history*, has but a small part within art history. Many factors play a part in this; such as the art world being set in its ways,[5] and the fact that scientific research is often expensive.[6]

In this research, however, another reason for the scarcity of technical art historic research is discussed, namely, the art historians' lack of familiarity with technical art history. This lack of familiarity makes the art historian either unaware of the added value of scientific investigations or

[1] Vincent Noce, "Rethinking Art History with Rembrandt Specialist Ernst van de Wetering," La Gazette Drouot, September 2, 2021.
[2] "The Netherlands: Bosch Research and Conservation Project receives Grand Prix," Europa Nostra, December 1, 2017, https://www.europanostra.org/netherlands-bosch-research-conservation-project-receives-grand-prix/.
[3] *The Secret of a Master Painter* is a Dutch show *(Het Geheim van de Meester*) broadcasted by AVROTROS between 2016 and 2022.
[4] Interview Arjan de Koomen, see Appendix B.
[5] Andrew W. Brainerd, *On Connoisseurship and Reason in the Authentication of Art* (Chicago: Prologue Press, 2007), 61. Brainerd speaks of his obligation to shed light on authenticating practices and the industry around it, commenting: "It is the simple, uncompromising *insistence that the doctrine of expert opinion remains intact. Connoisseurship* must in final analysis remain sacrosanct and unchallenged in its freedom, *by its word alone*, to authenticate and hence establish monetary value, without supervision or accountability to anyone to render whatever *opinion* it wishes to publish, and without which the key to that kingdom is hopelessly lost. And such *may* indeed remain the price of *truth in art.*"
[6] Antonino Cosentino, "Scientific Examination of Cultural Heritage Raises Awareness in Local Communities: The Case of the Newly Discovered Cycle of Mural Paintings in the Crucifix Chapel (Italy)," *Science Education and Civil Engagement* 8,1 (winter 2016): 17. Cosentino remarks: "scientific examination and documentation of art is notoriously expensive." Referring to the expensive equipment that is used and the experts needed to handle the machines and interpret the data.

unable to pose questions involving scientific findings, halting further interdisciplinary investigations.[7] Therefore, in 2005, Maryan Ainsworth, conservator at The Metropolitan Museum of Art (MET), promoted educating art historians in technical art history. In a short article, she steers toward educating art historians in interdisciplinarity in an earlier stage of their studies, involving object-based research; increasing the collaboration of universities and museums and she pleads for publishing more research that involves technical art history.[8]

**Research Question**

This research continues on the propositions by Ainsworth and seeks to map what has been done in the past two decades to establish a better understanding of technical art history among art historians, together with stipulating aspects that could still be improved in this respect. Eventually, the following question is answered: What aspects have been improved or could still be improved within the Dutch bachelor of art history and the dispersion of knowledge on technical art history, in order to familiarize the art historian with technical art history.

**Relevance**

Scientific investigation methods give researchers the ability to – literally – obtain more information than meets the eye, which opens an entirely new world within art history; art can be dissected and practices of artists uncovered. Scientific research on paintings does not only reveal forgeries, but it also shows underdrawings of painters, past restorations and alterations by the painter, or by others after him.[9] Thus, in their ability to create novel information, scientific methods prove themself to be invaluable for the future of academic art-historical research. Add to that the merits of science for conservation practices and technical investigation methods become indispensable for the future of the art world. [10]

However, when looking at the current Dutch art history curriculum, there is a meagre offer of courses teaching scientific investigation methods. Only recently, in 2015, a master's at the University

[7] Jehane Ragai and Tamer Shoeib, *Technical Art History: A Journey Through Active Learning* (London: World Scientific Publishing Europe Ltd., 2021), back cover and de Koomen, Appendix B.
[8] Maryan Ainsworth, "From connoisseurship to Technical Art History: The evolution of the Interdisciplinary Study of Art," *The GCI newsletter* 20, 1 (2005): 4,5.
https://www.getty.edu/conservation/publications_resources/newsletters/20_1/feature.html
[9] Emeline Pouyet, Kenneth Brummel, Sandra Webster-Cook, John Delaney, Catherine Dejoie, Gianluca Pastorelli and Marc Walton, "New insights into Pablo Picasso's La Miséreuse Accroupie (Barcelona, 1902) using x-ray fluorescence imaging and reflectance spectroscopies combined with micro-analyses of samples," *SN Applied Sciences* 2, 8 (2020): 1–6.
[10] Koen Janssens, Geert Van Der Snickt, Matthias Alfeld, Petria Noble, Annelies van Loon, John Delaney, D. Conover, J. Zeibel, and J. Dik, "Rembrandt's 'Saul and David' (c. 1652): Use of multiple types of smalt evidenced by means of non-destructive imaging," *Microchemical Journal* 126, (2016): 515–523.

of Amsterdam (UvA) has been established, entirely dedicated to the education of technical art history.[11] Still, this development does not provide every Dutch art historian with knowledge of technical art history. Technical art history and art history remain two separate fields, keeping the art historian in the dark on the added value of technical research. Hence, in order to familiarize the Dutch art historian with technical art history, the education within the bachelor of art history should be reformed. Furthermore, in order to keep the art historian continuously informed, also after his/her studies and allow for their involvement in technical art history, the dispersion of technical knowledge should be improved as well.

**Status Questionis**

Research performed by Matthew Long and Roger Schonfeld, both part of the Ithaka S+R, an organisation that supports cultural institutions in adapting and improving their education for future purposes, discussed the manner in which research practices for art historians could be improved while adapting to a more advanced and digital future. Their 2014 research, *Supporting the Changing research practices of art historians*, has a similar objective as the present research, the focus of the present research, however, will be on implementing technical art history, a subject only briefly touched upon by them.[12] Moreover, the present research focusses on practices in the Netherlands. Next to analysing the research method of an art historian, it is important to analyse the research practices of researchers during team collaboration; technical art history is often collaborative. On this matter, a research group led by Catherine Dillon, a research associate at University College London (UCL), published the work: *Mind the gap: rigour and relevance in collaborative heritage science research*, in 2014. This research is insightful when it comes to problems that arise during collaborative research endeavours involving academic researchers and so-called *users* (museum curators or conservators) of this research, which are exactly the people involved in technical art history. Another research on team collaboration, which is, furthermore, specifically focussed on technical art history in the Netherlands, is the work: *Inquiring Interdisciplinarity: Merging Art History and Art Technology in the Netherlands*,

[11] "Technical Art History," University of Amsterdam, accessed February 17, 2023, https://www.uva.nl/en/programmes/masters/conservation-and-restoration-of-cultural-heritage/study-programme/technical-art-history/technical-art-history.html; Arjan de Koomen, "Inquiring Interdisciplinarity: Merging Art History and Art Technology in the Netherlands," *Zeitschrift für Kunsttechnologie und Konservierung* 34, 2 (2021): 290.

[12] Matthew p. Long and Roger C. Schonfeld, *Supporting the Changing research practices of art historians* (Ithaka S+R, 2014); "Collaborative strategies and research for higher education and the arts," Ithaka S+R, accessed February 23, 2023, https://sr.ithaka.org/. On their site, Ithaka S+R states that it "helps academic and cultural communities serve the public good and navigate economic, technological, and demographic change. Our work also aims to broaden access to higher education by reducing costs and improving student outcomes."

by Arjan de Koomen.[13] By discussing various case studies, de Koomen points out problems that are faced during interdisciplinary team investigations. Moreover, he advises how students could become more involved with technical art history. Although the present research is more focused on the education of science to art history students in the *bachelor* curriculum and on the dispersion of knowledge on technical art history, the problems de Koomen identifies within team collaboration and how to tackle those problems through education are a central part of the present research.

**Method**

This qualitative research utilizes a wide spectrum of academic literary sources. Focus is put on improving art history education to accommodate technical art history practices in the Netherlands. Due to the scarcity of source material, literature that discusses research practices and education in the United States, as well as Western Europe, is used; this decision is justifiable when one considers that in the past two decades, technical art history has often been an international endeavour where universities and museums collaborated from all over the world. Hence, the current situation and state of awareness regarding technical art history are described throughout the Western world, while the more specific recommendations for educational improvements based on this description will be given for Dutch universities alone.

After Ainsworth's publication in 2005,[14] educating the art historian in technical art history has not often been the main topic of scholarly publications. Having the objective of improving current bachelor education to create a general understanding of technical art history among art historians, it is necessary to obtain knowledge of the current situation and problems faced in technical art history practices. The scarcity of sources prompted to complement the available literature with interviews. Two Dutch primary agents involved with technical art history have been interviewed: Arjan de Koomen, a former museum researcher & current university lecturer and Matthias Alfeld, a material scientist. Arjan de Koomen has, among other things, worked at the Rijksmuseum as a curator of sculpture and currently works at the UvA teaching both art history and technical art history students. Matthias Alfeld has developed a technical investigation technique for paintings, called Ma-XRF, and currently works at the University of Technology in Delft (TU) where he is involved with developing x-ray and other spectroscopic techniques for the investigation of cultural heritage objects. Both de Koomen and Alfeld give insight into technical art research practices and what problems are faced during collaborations. Furthermore, they comment on the difficulties of the dispersion of technical

[13] Koomen de, "Inquiring Interdisciplinarity."
[14] Ainsworth, "From connoisseurship to Technical Art History."

data and research results and how this affects technical art historic research. Herewith, they also provide us with problems that are faced for accommodating scientific research in current art history education. The reason for asking two different authorities has to do with the fact that technical art history is an interdisciplinary field. De Koomen and Alfeld, through their respective art-historical/museal and technical backgrounds, are able to shed light on how technical art-historical research is experienced by people from different disciplines. Next to that, de Koomen has already researched problems faced in technical art-historical team investigations as mentioned previously.[15] Matthias Alfeld filled in a questionnaire, while Arjan de Koomen has been interviewed. Both the questionnaire and interview are attached and can be read in appendices A and B respectively.

In this research, an emphasis is put on perspectives from authors and interviewees on *research practices* within art history as well as technical art history. This subject is discussed in the context of the development of technical art history, art education in the Netherlands and the dispersion of knowledge on technical art history.

Regarding the main question of this thesis, my hypothesis is that the unfamiliarity with technical art history could be tackled by educating the art historian on exactly the matters that made the fields of art history and technical art history diverge in the first place. To test this hypothesis and answer the main question, several sub-questions have been posed: the first two regarding the origin of the unfamiliarity and how it manifests itself and the second two on how to improve education in Dutch universities and the dispersion of knowledge on technical art history. These sub-questions are formulated to check the validity of Ainsworth recommendations back in 2005 to current-day education and research practices.

First of all, an overview is made of the development of technical art history in the Western world in the twentieth century, using only literature studies, to show the backdrop for Maryan Ainsworth's plea for better education in technical art history at the beginning of the twenty-first century. Moreover, by outlining the evolution of the scientific research of art, the separate development of scientific research and art history is explained. In the end, the following question will be answered: How could the unfamiliarity of art historians with the scientific research of art and the recommendations of Maryan Ainsworth for combating this unfamiliarity at the beginning of the twenty-first century be explained by looking at the evolution of the scientific research of art over the past century?

Hereafter, in chapter 2, the art historians' familiarity with technical art history during the past 20 years is discussed in order to pick up the discussion where Maryan Ainsworth left off. Existing

[15] Koomen de, "Inquiring Interdisciplinarity."

inquiries and interviews with art historians and technical art historians between the early 2000s and 2022 have been used to assess the familiarity of art historians with technical art history over the years. Insight into the current situation is, moreover, provided by an interview with Arjan de Koomen.[16] Eventually, this chapter will answer the question: How does a lack of familiarity with technical art history manifests itself and how could this be addressed?

In chapter 3, possibilities for adapting the current Dutch art history curriculum to accommodate technical art history are given. These recommendations have been given based on the knowledge gained in previous chapters, where the problem of a lack of familiarity with technical art history and how that originated and currently manifests itself has been sketched, combined with information obtained from literature on educational practices and interviews with Alfeld and de Koomen. In this chapter, two different approaches for teaching technical art history are discussed: The education of students on research methods and increased collaboration between universities and museums. The former, since looking at chapters one and two gives reason to believe that a lack of understanding of technical art history comes from a lack of understanding of its research methods, and the latter because museums are the main arena where technical art history research takes place. Also, an example is taken from the inherently interdisciplinary study of archaeology. The scientific and historical sides of archaeology have evolved together and simultaneously over the years and could provide a great template for a new, partly scientific, art-historical curriculum. At the end of this chapter, the following question will be answered: How can the Dutch art historian be educated in technical art history?

Education, however, does not stop with the studies of art history itself and, in order to inform art historians on technical art history, also the availability of source material on this matter should be addressed; this is done in chapter 4. In the first section, various reasons for a lack of collaboratively published technical art history research are given. Hereafter, the problems that arise through different publication standards, goals and concepts of knowledge in art history and technical art history are discussed. Furthermore, other limiting factors to the number of publications on technical art history, such as the lack of available data, are pointed out. By doing so, further reasoning is given as to why art historians are still unaware of the possibilities in technical art history. At the same time, recommendations are given on improving knowledge dispersion for gaining familiarity with technical art history. Herewith, this chapter aims to answer the question: How can an environment be established that allows for the continuous upkeep of technological advancements in art history?

Ultimately, this research seeks to provide the reader with an overview of problems that are faced by art historians when they start to get involved with technical art history, together with several

[16] Koomen de, see Appendix B.

recommendations on how to improve the art historians' familiarity through reforming art history education in the Netherlands and publish more research/data on technical art history. In doing so, this research aims to provide a stronger basis for future interdisciplinary technical art-historical research.

# H-1 Scientific Art Research at Museums and Universities: A Short History

In this chapter, a general overview will be given about the development of the scientific research of art during the past century, creating insight into the origin of the scientific research of art and past research trends. The purpose of this chapter is to answer the question of how the unfamiliarity of art historians with the scientific research of art can be explained and how this led to the recommendations of Maryan Ainsworth at the beginning of the twenty-first century.

## *1.1 The scientific research of art before WWII*

Although there were already notions of the use of technical instruments to research paintings before 1900,[17] it was only in 1927 that the first scientific laboratory was installed in a museum. This American museum, the Fogg Art Museum, was under the direction of Edward Forbes, a capital figure in the creation of interdisciplinary research in art as we know it today.[18] Here Forbes investigated paintings with scientific methods, in particular X-Ray radiography, after which he conservated them. He was, moreover, the instigator of making research of art a team effort. According to Forbes, scientists and art historians had to work together in order to get the most all-encompassing research results.[19] In 1928, Harvard University, to which Fogg Museum was affiliated, created the first independent department for conservation research. This resulted in establishing conservation science as an academic discipline.[20] Conservation science was then, as it is nowadays, an interdisciplinary field which is focused on preserving and understanding cultural heritage through scientific and social methods.[21] The field of conservation had from the start been more receptive towards scientific research

[17] Molly Faries, "Reshaping the Field: the contribution of technical studies," in *Early Netherlandish Painting at the Crossroads: A Critical Look at Current Methodologies* (New York: Metropolitan Museum of Art: Yale University Press, 2001), 70, 71.
[18] Marjorie B. Cohn, "Director's Foreword," in *Recent Developments in the Technical Examination of Early Netherlandisch Painting: Methodology, Limitations & Perspectives,* ed. M. Faries and R. Spronk (Turnhout: Brepols Publishers, 2003), VII.
[19] Cohn, "Director's Foreword," VII.
[20] Ron Spronk, "Standing on the Shoulders of Giants: The early years of conservation and technical Examination of Netherlandish paintings at the Fogg art museum," in *Recent developments in the technical examination of early Netherlandish painting: Methodology, Limitations & Perspectives,* ed. M. Faries and R. Spronk (Turnhout: Brepols Publishers, 2003), 39.
[21] Alison Heritage and Stavroula Golfomitsou, "Conservation Science: Reflections and future perspectives," *Studies in Conservation* 60, no 2 (2015): 3.

methods and,[22] hence, precedes art-historical investigations in the inclusion of scientific methods. In their work, 'Connoisseurship as Knowledge: An Introduction', professor emerita in art history at the University of Delaware, H. Perry Chapman, and professor in art history at Utrecht University, Thijs Weststeijn, referred to the acceptance of conservation as an academic discipline, as the point in time when scientific analysis of art really started to take shape.[23] The Fogg Art Museum served, therefore, not only as a museum but as a place of education, setting an example for other academic museums.[24] Another researcher that worked at the Fogg was Alan Burroughs; he carried out the first systematic, large-scale X-ray documentation project for the technical study of paintings.[25] In doing so, he has been pivotal in the development of X-ray methods to investigate art. Furthermore, Burroughs wrote the book *Art criticism from a laboratory* in 1938, which extraordinary professor in Hieronymus Bosch and early Dutch painting at the Radboud University, Ron Spronk, commented upon that the book remained a useful source when it comes to the methodological framework of merging scientific findings with typical art-historical analyses and how they could complement each other; describing how stylistic and archival research could be compared with results of scientific research. [26] Simultaneously, on the other side of the Atlantic, at the Mauritshuis, the process of conservation became more involved with science as well. Martin de Wild studied chemistry after having trained to become a conservator and wrote in 1928 his influential dissertation: *The scientific research on paintings* (*Het natuurwetenschappelijk onderzoek van schilderijen*). In his work, he discussed scanning methods such as X-ray radiography and UVF in combination with the chemical and microscopic analysis of pigments.[27] Hence, in Europe as well as America the field of scientific art research became of increasing interest. However, during WWII developments were halted, not only in Europe but also at the Fogg, which was the main institution involved in this field. After the war, Forbes & Burroughs retired. Progress continued, but the incredible speed of discoveries that were made by these men significantly decelerated after that.[28]

[22] Molly Faries, "Technical Studies of Early Netherlandish Painting: A Critical Overview of Recent developments," in *Recent developments in the technical examination of early Netherlandish painting, methodology limitations and perspectives* ed. M. Faries and R. Spronk (Turnhout: Brepols Publishers, 2003), 3.
[23] H. Perry Chapman and Thijs Weststeijn, "Connoisseurship as Knowledge: An Introduction," in *Netherlandisch Yearbook for History of art* 69, ed. P. Chapman, T. Weststeijn and D. Meijers (Brill: 2019), 16.
[24] Spronk, "Standing on the Shoulders of Giants," 40.
[25] "Alan Burroughs Collection of X-Radiographs," Harvard Art Museum, Accessed February 20, 2023, https://harvardartmuseums.org/tour/alan-burroughs-collection-of-x-radiographs.
[26] Spronk, "Standing on the Shoulders of Giants," 49.
[27] Petria Noble, Sabrina Meloni, Carol Pottasch and Peter van der Ploeg, *Bewaard voor de eeuwigheid: Conservering, restauratie en materiaaltechnisch onderzoek in het Mauritshuis* (Zwolle: Waanders Uitgevers, 2008), 26. And Martin de Wild. *Het natuurwetenschappelijk onderzoek van schilderijen*. 's Gravenhage: [s.n.], 1928.
[28] Spronk, "Standing on the Shoulders of Giants," 53.

*1.2 The scientific research of art after WWII – developments within the study of art history*

After WWII another series of events took place in the Netherlands that would prove influential for the art world and the development of scientific research of art: the Van Meegeren scandal. In order to be acquitted of treason – Han van Meegeren was thought to have sold important cultural heritage of the Netherlands to Nazi-Germany – van Meegeren confessed that he forged the painting he sold. Van Meegeren also confessed to having forged several other paintings, among which *Christ and His Disciples at Emmaus*; a painting that was up to that point seen as a work of Johannes Vermeer. In doing so, the trial of van Meegeren went from a treason case to a forgery case; a forgery case that caused the reassessment of the foundation of modern connoisseurship.[29]

A.B. de Vries, who had curated a catalogue of Vermeer's oeuvre in 1939, reassessed the catalogue after the Van Meegeren trial in 1948, accompanied with the statement "every attribution must be supported by evidence, insofar as one can provide proof in the thorny field of such conclusions". Which was, according to Anna Tummers, lecturer in early modern art history at Leiden University, at that point in time, an avant-garde insight.[30] Tummers proceeded with stating that there – already – were two opposing insights on what should be emphasized more during the process of attribution; the expert's intuition on one side opposed to "rational and communicable arguments" on the other. The two had always been the cause of some rivalrous bickering, however, after the Van Meegeren scandal, intuition alone was no longer acknowledged as sufficient proof.[31] This resulted in an ever-increasing demand for objectivity in authenticating practices as was stated by Tummers:

> "Although not all experts believed that attributions should entirely be based on rational arguments, in the first decades after the war attempts to objectify connoisseurship set the tone in the published sources."[32]

This new era, which heralded objective connoisseurship, was inaugurated with the completion of the Van Meegeren trial, where the de-attribution of *Christ and His Disciples at Emmaus* had not only been

[29] Anna Tummers, *The Eye of the Connoisseur: Authenticating Paintings by Rembrandt and his Contemporaries* (Los Angeles: J. Paul Getty Museum, 2011), 23-29.
[30] Tummers, *The Eye of the Connoisseur,* 29 and 'Het spreekt vanzelf, dat iedere toeschrijving door bewijzenmoet worden gestaafd, voorzover men deze althans kan leveren op het doornige terrein van dergelijke conclusies.' A.B. de Vries, *Jan Vermeer van Delft* (Amsterdam, 1939) (cited ed. Amsterdam, 1948), 71. The chapter is called "On some wrong or doubtful attributions and a number of forgeries."
[31] Tummers, *The Eye of the Connoisseur*, 30-32.
[32] Tummers, *The Eye of the Connoisseur*, 32.

objectively but scientifically determined by discovering a synthetic phenol-formaldehyde resin that was invented around 1900.[33]

Remarkably, instead of science and art history getting closer after the Van Meegeren trial, the appeal to objectify research resulted in academics becoming further removed from the object. New methods to investigate art, and the desire to create a more contextualised vision of art and its place in history, made the art historian increasingly literature oriented. Chapman and Weststeijn commented on this:

> "A backlash against connoisseurship, brought on both by its association with the market and by critical theory, led to a generation of art historians who were excellent critical readers and analysts of texts but who were less skilled in describing the visual-material presence of the object in situ."[34]

Arjan de Koomen also stipulated the negative effect of critical theory on object-based research within art history. From around the 70s and onward, art historians focussed on analysing art by regarding it as a result of social structures and the balance of power; hereby leaving out the factual, empirical and physical aspects of art. Meanwhile, scientific and object-based research was rising in museum surroundings; these advancements were completely overlooked by art historians.[35] Robert Sterling Clark Professor Emeritus of Art History at Williams College, Charles Haxthausen, noted that the change in the art history curriculum caused the focus of universities and museums to disperse. Universities did not deliver the object-minded connoisseurs and curators anymore but instead educated the scholarly recluse.[36]

[33] P.B. Coremans, *Van Meegeren's Faked Vermeers and De Hooghs: A Scientific Examination* (Nijmegen: G. J. Thieme, 1949), 20.
[34] Chapman and Weststeijn, "Connoisseurship as Knowlegde: An Introduction," 14.
[35] Koomen de, see Appendix B.
[36] Charles Haxthausen, "Introduction," in *Two Art Histories: The Museum and the University*, ed. C. Haxthausen (London: Yale University Press, 2002), xi and Chapman and Weststeijn, "Connoisseurship as Knowledge," 14,15.

*1.3 The scientific research of art after WWII – developments within museum surroundings*

Outside of universities, studying art with scientific means was steadily advancing. In Belgium, in 1949, the National Centre for Research of the Flemish Primitives was established, from which its members also included technical findings in their research.[37] In the Netherlands, in 1963, the Centraal Laboratorium (CL), was established in order to bring people from different disciplines together as well.[38] However, it was only in 1968, when the Rembrandt Research Project started, that unprecedented research in terms of scale and use of scientific research methods was embarked upon. Tummers remarked on the RRP:

> "The studies were particularly important for the way in which the authors incorporated relatively new scientific research methods and for the high degree of precision in the justification of their decisions."

Anne-Sophie van Radermecker, research associate and lecturer in Cultural Management at the Université Libre de Bruxelles, stated that from the start of the RRP:

> "[scholars] began to seriously consider cross-disciplinary collaborations with curators, restorers and conservation scientists, and to use new scientific technologies for the material and technical study of paintings in order to provide more 'rational and communicable arguments' to support their attributions."[39]

Accordingly, in the 70s, scientific research of art got a boost. This was enhanced by the simultaneous development of the method for infrared reflectography by physicist and professor J.R.J. van Asperen de Boer. Hereafter, more and more methods for scientific investigation were introduced and used in the world of art, such as dendrochronology, which was first applied in the mid-1980s.[40]

Another reason for the increased employment of scientific research could be the fact that researchers, involved with technical investigations, started to inform the rest of the art world about scientific research. The National Gallery in London started publishing a bulletin on the scientific

[37] Chapman and Weststeijn, "Connoisseurship as Knowledge: An Introduction," 16.
[38] Koomen de, "Inquiring Interdisciplinarity," 292.
[39] Anne-Sophie V.E. Radermecker, "The market reception of 'new connoisseurship': the impact of recent advances in art scholarship on the selling and buying of early Flemish paintings," in *Netherlands Yearbook for History of Art 69* ed. P. Chapman, T. Weststeijn and D. Meijers (Brill: 2019), 340, and Tummers, *The Eye of the Connoisseur*, 30-32.
[40] Ainsworth, "From connoisseurship to Technical Art History," 5.

investigation of paintings in 1977, named the *National Gallery Technical Bulletin* and at the Metropolitan Museum of Art, John Brealey was hired as the chair of the Paintings and Conservation Department. His mission was to educate art historians on conservation and the materiality of paintings, advocating technical art history and stimulating interdisciplinary research endeavours.[41]

Since then, more museums started to open scientific research departments. The National Gallery of Art in Washington was already operational in the 1950s but hired its first scientist in 1976;[42] in 1978, the Hamilton Kerr Institute was established, an institute entirely dedicated to "scientifically backed training and research in the conservation of easel paintings", as a part of the Cambridge University Fitzwilliam Museum;[43] the Getty Conservation institute opened its doors in 1985, with among its three top priorities, the application of scientific research and analysis.[44] Moreover, the scientific department at the Metropolitan Museum of Art was already up and going since the 70s, but in 1992 an entirely new facility was opened housing all its technical equipment.[45] The Mauritshuis performed technical investigations on almost every painting, before restoring them, since the mid-90s.[46]

Next to scientific departments that opened during the last quarter of the twentieth century, there were also foundations that were pivotal for the development of scientific research of art, such as the Andrew W. Mellon Foundation, the Kress Foundation and the Getty Foundation which are based in the United States. [47] These foundations were, and still are enabling education on the use of scientific research methods on art. Also, in the Netherlands, organisations like the Netherlands Organisation for Scientific Research (Nederlandse Organisatie voor Wetenschappelijk Onderzoek), in short NWO, have provided grants for technical research. The NWO, for example, sponsored the Molart and Mayerne programs, allowing the performance of chemical analysis during restorations in the Mauritshuis.[48]

The 1988 work of conservator, David Bomford and conservation scientist, Ashok Roy, *Art in the Making: Rembrandt* was raised by de Koomen who stated that here, for the first time, art historians realised: "hey there is something to tell, to learn and to understand about technical research!"[49] This

[41] Ainsworth, "From connoisseurship to Technical Art History," 2,3.
[42] "Scientific Research," National Gallery of Art, accessed March 5, 2023, https://www.nga.gov/conservation/science.html.
[43] Brainerd, *On Connoisseurship,* 547.
[44] Janet Bridgland, "The Getty Conservation Institute 1985-1995: A Retrospective," *The GCI newsletter 10, 2* (1995).
[45] Deborah Schorsch, "Caring for The Met: 150 Years of Conservation," The Metropolitan Museum of Art, accessed February 20, 2023, https://www.metmuseum.org/about-the-met/conservation-and-scientific-research/conservation-stories/history-of-conservation.
[46] This becomes evident from Noble et al., *Bewaard voor de eeuwigheid.*
[47] Ainsworth, "From connoisseurship to Technical Art History," 3,4.
[48] Noble et al., *Bewaard voor de eeuwigheid,11.*
[49] Koomen de, see Appendix B. Original Dutch quote: 'Hé er is iets te vertellen, te leren, iets te snappen van technisch onderzoek!'

trend continued and in 2000 W. Stanley Taft, Jr. and James W. Mayer even wrote an educational textbook on the scientific research of art: *The Science of Painting*.[50] In due course, the original form of tutoring the scientific research of art, educating it within museum surroundings, was starting to make its comeback. Yet, scientific research had still no place within the art history curriculum.

### *1.4 The Scientific research of art at the start of the twenty-first century*

It was around 2000, that researchers started to contemplate the method of investigation applied in the scientific research of art. Questions arose on how this new field should be adopted into the curriculum of art history studies and how it would fit in the already existing methodological framework of art research. In 2001, the symposium, *Early Netherlandish Painting at the Crossroads. A critical Look at Current Methodologies* was held. This symposium was dedicated to the contribution of scientific research to the world of art, next to its methodology.[51] After that, in 2003, another symposium organized by the Harvard University Art Museums, *Recent developments in the technical examination of early Netherlandish painting* was also entirely dedicated to the scientific research of art.[52] Interdisciplinary research endeavours and collaboration between universities and museums were not instantly running smoothly as became clear from a publication by Maryan Ainsworth, "From Connoisseurship to Technical Art History", which was published in the Getty Conservation Institute Newsletter in 2005. Here Ainsworth sketches the difficulties that arose during collaboration with researchers from different fields and the need for educational reform to accommodate scientific research. Her recommendations for educational reform included educating students early on in interdisciplinary research investigations and tackling the issue of unpublished scientific contributions; as was already mentioned in the introduction. She furthermore specified that, in order to improve education, the collaboration between universities and museums should be increased and object-based research should become a central aspect of art history studies.[53]

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[50] W. Stanley Taft and James W. Mayer, *The Science of Painting (New York: Springer-Verlag*, 2000).
[51] Maryan W. Ainsworth, *Early Netherlandish Painting at the Crossroads: A Critical Look at Current Methodologies* (New York: Metropolitan Museum of Art: Yale University Press, 2001).
[52] Molly Faries and Ron Spronk, *Recent Developments in the Technical Examination of Early Netherlandish Painting* (Turnhout: Brepols Publishers, 2003).
[53] Maryan Ainsworth, "From connoisseurship to Technical Art History: The evolution of the Interdisciplinary Study of Art," *The GCI newsletter 20, 1* (2005): 4,5.
https://www.getty.edu/conservation/publications_resources/newsletters/20_1/feature.html

*1.5 Discussion & Conclusion*

At the beginning of this chapter, the following question was posed: How could the unfamiliarity of art historians with scientific research and the recommendations of Maryan Ainsworth for combating this unfamiliarity at the beginning of the twenty-first century be explained by looking at the evolution of the scientific research of art over the last century? Here, the question will be discussed and answered by stipulating the historical cause-effect relationship.

The origin of the scientific research of art lies in the installation of the first laboratory in the Fogg Art Museum at Harvard in 1927. When *Conservation Science* was accepted as an academic discipline at the same institution in 1928, the combination of art and scientific research started to take proper shape. Hence, from its beginning, it can be seen that technical investigations of art were a combined effort of universities and museums and that the main purpose of it was to improve conservation methods.

After WWII, things changed with respect to connoisseurship through a demand for more objectivity in art research. Yet, exactly the appeal to objectify research, combined with the rise of critical theory, removed the art historian from the object. The focus was put on contextualising art and the art historian did so by becoming increasingly literature oriented. This caused the object-oriented museum to disperse from the university and from this point onward the scientific research of art developed separately from art history.

In the 70s, scientific research got a new boost. The RRP commenced, and with that technical and interdisciplinary investigations of an unprecedented scale. Furthermore, new scientific methods were discovered and a start was made with informing the rest of the art world about scientific art investigations. More museums opened scientific departments and foundations aided in funding scientific research and education. Still, scientific research methods did not become part of the art history curriculum.

At the beginning of the twenty-first century, Ainsworth wrote her paper on the need for educational reform. Next to recommending that more should be published on interdisciplinary research, she pleaded for more collaboration between universities and museums; to teach students early on in their studies about interdisciplinarity and focus on familiarizing the students with object-based research. These measures actually counteract the developments since WWII, for, as we just read, universities dispersed from the object, subsequently, dispersed from museums and, subsequently, dispersed from scientific research.

Hence, to answer the question stated above, the art historian became unfamiliar with technical research through the separately developed *research practices* within museums and universities, which are a direct consequence of the art historian losing touch with the art object at the beginning of the second half of the twentieth century. Ainsworth, with her recommendations to once again bring science and art history closer together, tried to reverse this course of history.

# H-2 Understanding Technical Art History

In the previous chapter, light was shed on the development of the scientific research of art, which has primarily taken place in museum surroundings.[54] Furthermore, insight into the reason behind the grown distance between the museum researcher, the academic researcher and their respective disciplines was provided. Richard Brilliant, professor of art history and archaeology at Columbia University, commented in 1992 on the gap that had arisen between museum and academic researchers due to the different duties and goals in their respective functions:

> "The activities of those careers seem to be taking their practitioners further and further apart. The demands of their respective roles, the arenas of their primary activity, and the public addressed by them in their professional capacity have become increasingly distinct."[55]

As previously mentioned, Ainsworth opted in 2005 to tackle this problem by once again increasing the collaboration between universities and museums. However, Brilliant's words were still echoed in 2014 by Dillon and others, who stated that a lack of understanding of each other's fields is the result of increased distinction between museum and academic researchers. [56] This chapter seeks to map how this lack of familiarity with the scientific research of art manifests itself among art historians and how that could be addressed.

## *2.1 Technical Art History, Ally or Foe?*

The previously mentioned Ainsworth was a pioneer in the field of technical art history and was ever enthusiastic about its potential. This enthusiasm was shared by many others at the start of the twenty-first century. In a collaborative essay, published in 1995, Ainsworth and James Coddington, chief conservator at the Museum of Modern Art (MoMA), explained the possibilities of technical art history by mentioning the merit of combining historical with scientific knowledge to gain new insights into the artwork. Moreover, they stipulated the importance of material knowledge for the conservator for

[54] Chapman and Weststeijn, "Connoisseurship as Knowledge: An Introduction," 16.
[55] Richard Brilliant, "Editorial Out of Site, Out of Mind," *Art Bulletin* 74, no. 4 (December 1992): 561.
[56] Catherine Dillon et al., "Mind the Gap: Rigour and Relevance in Collaborative Heritage Science Research," *Heritage Science* 2, no. 1 (2014): 1. https://doi.org/10.1186/2050-7445-2-11.

treating the painting properly.[57] However, ten years later in 2005, Maryan Ainsworth still mentions that there is a paucity of interdisciplinary collaborative investigations in the art world. [58]

The in 2004 published extensive work on connoisseurship, *The Expert Versus the Object: Judging Fakes and False Attributions in the Visual Arts*, is indicative of the uncomfortable attitude of art historians towards the scientific research of art. Authors Francis O'Connor, Robert Sterling Clark visiting professor of art history at Williams College, Peter Sutton, chief executive officer at the Bruce Museum of Arts and Science, and interviewee, art dealer Eugene Victor Thaw, all felt the need to point out the limitations of scientific research. In examples of their reasoning, to which I will shortly turn, it becomes apparent that, often, a black-and-white perspective is sketched; it is either the connoisseur *or* the scientist, meanwhile the possibility of working together is largely omitted. An example of the argumentation by O'Connor:

> "If the conservator's X ray reveals a nineteenth-century sketch of the Eiffel Tower under the alleged seventeenth-century Rubens; testing the paint underneath an alleged renaissance portrait proves it could only have been made in Brooklyn after 1920. Such luck, however is rare – as the 1995 "Rembrandt/ Not Rembrandt" exhibition at the Metropolitan Museum of Art indicated, and as Simon Schama brilliantly described in The New Yorker, the reality is that most paintings in need of authentication bring with them no particular openness to verification by scientific analyses."[59]

This rather coarse description of what the contribution of scientific analyses could be is then followed by the statement:

> "It is, therefore, folly to think that objective science can totally replace the connoisseur's eye, for both are equally inconclusive."[60]

This statement is, ironically, agreed upon by advocates of technical research, such as Robert Erdmann. He stated, more than a decade later in 2021, that computers will never be able to replace

[57] James Coddington and Maryan Ainsworth, "Conservation and Art History," *Art Journal* 54, 2 (1995): 16-17.
[58] Ainsworth, "From connoisseurship to Technical Art History," 4.
[59] Francis V. O'Connor, "Authenticating the Attribution of Art: Connoisseurship and the Law in the Judging of Forgeries, Copies, and False Attributions," in *The Expert Versus the Object Judging Fakes and False Attributions in the Visual Arts*, ed. R.D. Spencer (New York: Oxford University Press, 2004), 18; and Simon Schama, "The Art World: Did He Do It? Sleuthing at the Met's Rembrandt Show," *The New Yorker*, November 13, 1995, 114-18.
[60] O'Connor, "Authenticating the Attribution of Art," 18,19.

connoisseurship and believes in a supporting role of digitalization to help the connoisseur substantiate and defend his/her findings.[61]

There is, thus, a sense of miscommunication; O'Connor states that scientific research is rarely final and, therefore, concludes that paintings, in general, cannot be authenticated with the use of scientific analysis. Erdmann agrees with the former, however, does not follow up with the same conclusion, stating that science can aid in the process of authentication. In the same combined work, *Expert Versus the Object*, Peter Sutton also mentions the limitations of technical art history:

> "The general public often misunderstands how most decisions about authenticity have been made. Although scientific and technical studies (X rays, infrared photography, micrographs, nuclear autoradiography, pigment sampling, canvas research, investigation of grounds, dendrochronology, etc.) have advanced scholarship and can expose the material inconsistencies of latter-day forgeries, they have played a relatively small role in changing opinions about individual painting's authorship and authenticity. Material inconsistencies can exclude a work from Rembrandt's oeuvre, but scientific examination cannot provide a touchstone of proof that a painting is by the master. Nor can scientific examination assign a rejected work to one of his pupils or followers."[62]

Like O'Connor, Sutton's words are aimed at the "general public". They apparently feel the need to explain to *them* that technical art history is not all-encompassing and final. Sutton, however, also acknowledges the merits of technical art history:

> "In the process, our understanding of both the art and the science of connoisseurship will be refined, to the enjoyment and edification of all, not only in Rembrandt studies but for all art history."[63]

Since the combined work, *Expert Versus the Object* is furthermore engaged with liability issues of art experts, the reason behind this negative attitude towards the scientific research of art could have to do with the law being too focussed on scientific data in court cases. Experts might want to explain, therefore, that there still is no such thing as certainty when it comes to art authentication. That indeed

[61]Robert Erdmann, "A New View: Creating Tools to Access, Conserve, and Understand Visual Cultural Heritage," interview by Lisbet Tarp, *Passepartout* 23, no. 41 (2021): 220.
[62] Peter C. Sutton, "Rembrandt and a Brief History of Connoisseurship," in *The Expert Versus the Object Judging Fakes and False Attributions in the Visual Arts*, ed. R.D. Spencer (New York: Oxford University Press, 2004), 30.
[63] Sutton, "Rembrandt and a Brief History," 37.

there are people who think this is possible, was confirmed by the words of Erich Uffleman. The chemistry professor at Washington and Lee University, who taught a course back in 2007 on science in art, mentioned the obliviousness of students who thought that "definitive statements" could be made through scientific research on the attribution question of a painting.[64]

In a 2003 scientific collaboration on the *Infanta Maria Margarita* between a professor of art history at the University of California, Albert Boime, and head of the Department for Scientific Examination/Authentication of Works of Art at The State Hermitage Museum, Alexander Kossolapov, the following was stated:

> "Although art historians and art experts seem to be nervous about relying too heavily on the application of conservation science for authentication, in a case of this sort conservation science should be seen as the inevitable and necessary adjunct to sound connoisseurship."[65]

When once more regarding the previously discussed reasons why some art historians might be reluctant to the idea of scientific research, a certain trend could be distinguished. It appears to be all in the subtlety of the words; in the above quotation, the word *adjunct* makes all the difference. Many of the reservations about implementing scientific research, were actually substantiated by the same reasoning that was used by advocates of scientific research. The hesitant and reluctant researchers considered conclusions drawn by scientific research of art just as open-ended as conclusions drawn through stylistic analyses. Therefore, they concluded that scientific research is not the solution to attribution uncertainties. One of those researchers, Peter Sutton, did say that scientific research could be *a part* of the solution: by creating more data, and in doing so, creating more certainty, it can be *adjunct* to connoisseurship. Hence, the reserved Sutton is actually in agreement with the advocate Bomford who in acknowledging the limitations of scientific research, stated that "new school connoisseurship is old school connoisseurship with technology".[66]

Next to the misconception that scientific research is all-encompassing, there is the erroneous impression that scientific research only results in material knowledge. While at the time that *Expert versus the Object* was written, researchers such as Molly Faries, professor of Material Research of Art

[64]Erich S. Uffelman, "Teaching science in art: Technical examination of 17th-century Dutch painting as interdisciplinary coursework for science majors and non-majors," *Journal of Chemical Education* 84, 10 (2007): 1621.
[65] Albert Boime and Alexander Kossolapov, "Manet's Lost Infanta," JAIC 42, no. 3 (2003) https://cool.culturalheritage.org/jaic/articles/jaic42-03-003_2.html.
[66] Bomford, *Connoisseurship. The Rembrandt Paradigm,* 1:43:07, and Chapman and Weststeijn, "Connoisseurship as Knowledge: An Introduction," 17.

Objects at the Rijksuniversiteit Groningen, had already stipulated the use of IRR for stylistic and art-historical research, Eugene Victor Thaw, in an interview with Ronald D. Spencer, stated the following:

> RDS: "How important is scientific testing for you in the attribution of art?"
> EVT: "The more scientific toys made available for the examination of works of art, the more I am convinced that there is no substitute for a trained human eye. Scientific tools are very useful for examining and repairing the physical condition of artworks, and they are useful in dating components. But when it is not a matter of clearly fraudulent pigments or other materials, when the question of yes or no is based on subtle criteria, here there is no substitute for a connoisseur's eye."[67]

More than a decade later, in 2021, material scientist and professor in conservation and restoration at the UvA, Rob Erdmann, said in an interview that, indeed, there still is an "old guard" that questions the value of scientific tools. He gave several reasons for this, among others the "discomfort with technology", or that there is "already a way of doing things". Erdmann, also pointed out that scientific investigations may be received with moderate enthusiasm because it challenges the authority of connoisseurs, being able to disprove them. Despite the reservations towards scientific research from the older generation of art historians, Erdmann is positive about the future of scientific research, calling the acceptance of scientific methods a generational thing. He states that starting art historians are very enthusiastic about the possibilities that come with these innovative research tools.[68]

The "discomfort with technology", mentioned by Rob Erdmann, is affirmed by the words of art history professor Noah Charney, founder of the Association of Research into Crimes against Art (ARCA). In the foreword of the 2021 publication *Technical Art History: A Journey Through Active Learning*, Charney mentioned:

> "… 'hard sciences' were always mysterious to me, important but existing in some ether that I would likely never understand with any depth. The scientific texts that I'd encountered while researching for the course I teach every summer as part of the ARCA Postgraduate Program in Art Crime and Cultural Heritage Protection were always tough for me to get through. They were, essentially, written for peer scientists, penned by conservators addressing other

[67] Eugene Victor Thaw Interviewed by Ronald D. Spencer, "The authentic will win out" in *The Expert Versus the Object Judging Fakes and False Attributions in the Visual Arts*, ed. R.D. Spencer (New York: Oxford University Press, 2004), 76.
[68] Erdmann, "A New View: Creating Tools to Access, Conserve, and Understand Visual Cultural Heritage," 221.

> conservators, and full of arcane-looking equations, acronyms, and abbreviations that made my head spin. I might have just set them aside and, as a defence mechanism, thought to myself 'that's not important to me,' but I could tell perfectly well that it was important. My approach to telling the history of art crime through anecdotes was only going to be informed storytelling if I didn't grasp the techniques at play that helped forgers fool experts, and let experts unmask forgers."[69]

Until now, this section has primarily treated the reception of scientific research with respect to attribution questions. Primarily, because not a lot has been written on scientific research and its use for answering other art-historical questions. In an interview with Arjan de Koomen, new light was shed on this matter. De Koomen stated that a significant problem of interdisciplinary research projects is the fact that scientists run off with the research. He gives the Molart-project as an example. Here, lots of research has been done on the molecular composition of art and interesting finds with respect to materiality have been obtained. Yet, art historians did not understand the relevance of those findings anymore. Where, in the project, scientists focussed on the improvement of their machines, art historians felt too little attention was given to the art-historical significance of the findings. Consequently, the huge amount of money accompanied with projects such as the Molart-project is not really invested in art-historical research. De Koomen is, therefore, also sceptical when people say that they will bring together science and art history. A new attempt at collaboration was instigated by NICAS (2015), however, also here science dominated the composition of the board, funds and research goals. De Koomen stated that, as a consequence, art historians become reluctant to join these investigations.[70]

Despite the limited amount of successful collaborative investigations, the misconception about technical art history at the beginning of the twenty-first century seems, nowadays, a thing of the past. Young art historians are willing to get involved with technical art history and the *added* value of technical investigations seems to be acknowledged by them. Although de Koomen is also positive about the future of technical art history,[71] he, like Charney, insinuates that still, further actions have to be taken in order to familiarize the art historian with technical art history. The starting art historian has to be educated in technical art history, becoming able to pose questions involving technical findings. Moreover, literature aimed at *peer scientists* on technical art history should become readable for art

[69] Noah Charney, foreword to *Technical Art History: A Journey Through Active Learning*, edited by Jehane Ragai and Tamer Shoeib (London: World Scientific Publishing Europe Ltd., 2021), xii.
[70] Koomen de, see Appendix B.
[71] Koomen de, see Appendix B.

historians. Taking into account the words of Arjan de Koomen, it would also be of interest to change the focus of interdisciplinary research endeavours. For it is understandable that art historians are not aware of the merits of scientific research when these collaborative investigations are rarely used to answer art-historical questions.

### *2.2 Technical Art history, a Subfield?*

The problem of understanding technical art history, regarding the above-stated issue about its perception, is, in my opinion, partly a result of the unclear position of technical art history within the broader world of art investigation. A reason for the vagueness around technical art history might be the fact that technical art history is seen as a subfield of art history, a separate discipline, instead of a different method to investigate art. Brainerd mentioned in his *On Connoisseurship and Reason in the Authentication of Art* that the differences between classical art history and technical art history, and the problems that arise from that, are not so much a matter of substantial differences as they are methodological differences.[72] I would like to take his statement one step further by not only arguing that the largest differences are in the method, but that technical art history, just like literature studies or observations, *is a method*, for investigating *within* the field of art history. I will substantiate my statement by debating the following statement by Long and Schonfield:

> "Many of the transformative uses of technology in art-historical research have come in areas that can either be considered 'subfields' of art history or as related fields, such as archaeology, architectural history, and technical art history."[73]

Here, technical art history is placed next to archaeology and architectural history as being a subfield/related field to art history. Archaeology and architectural history are indeed closely related to art history in them having almost the same research methods and similar objects of research. Yet, when we look at technical art history, the objects being researched are exactly the same as the objects being researched in art history. Scientific methods can be used to research the same painting that can be researched with archival and literature research. Hence, it is not something that can be seen as separate from the study of paintings such as architectural history and archaeology. In fact, similar scientific

[72] Brainerd, *On Connoisseurship*, 57.
[73] Matthew P. Long and Roger C. Schonfeld, "Preparing for the Future of Research Services for Art History: Recommendations from the Ithaka S+R Report," *Art Documentation* 33, no. 2 (2014): 200.

analysis methods are used for archaeological findings as for art. Professor of Archaeology and Ancient Technology in the Department of Materials Science and Engineering at the Massachusetts Institute of Technology, Heather Lechtman, argued in like manner:

> "Art history is an intellectual pursuit that has had a long time to develop and that has a whole menu of methods brought to the intellectual enterprise. In art history, there are people who do philological studies, iconographic studies, or stylistic studies. And now there are people who do technical studies of one kind or another within this discipline. Those are all methodological approaches to a particular intellectual tradition. […] The use of terms like [...] technical art history tends to define some new kind of field, and the payoff is negative. I don't think that it's necessary to say more than "this group of people in this lab performs scientific analyses or technical studies on objects of art with the intent of illuminating historical issues."[74]

Therefore, if we do continue using the term *technical art history,* it is best described as a method of investigation within art history. As an example, we can look at the aim of the 2016 finalized *Bosch Research and Conservation Project* (BRCP). The questions they asked are of an art-historical nature:

> "What is a Bosch? Which paintings and drawings are by his hand? What relationships exist within his oeuvre? How reliable are the attributions? What did pupils and assistants contribute?"[75]

Yet, these questions are discussed and answered by making use of *the methodological framework* of technical art history. Hence, in order to involve technical art history in the academic art history curriculum, or improve interdisciplinary research practices, it is necessary to regard the current *method* of research. It is not about adding a course on technical art history, but about adding a research method to the curriculum of art history.

[74] Heather Lechtman Interviewed by Jeffrey Levin, "A Matter of Teamwork: A Discussion about Technical Studies and Art History," *Conservation Perspectives: The Getty Conservation Institute Newsletter* 20, no. 1 (2005): 11–16.
[75] Luuk Hoogstede et al., *Hieronymus Bosch: Painter and Draughtsman: Technical Studies* (New Haven: Yale University Press, 2016), 8.

*2.3 Conclusion*

In this chapter, the question of how a lack of familiarity with the scientific research of art manifests itself and how this could be addressed was discussed. It became clear that there was a vagueness surrounding the scientific research of art at the start of the twenty-first century. The interdisciplinary nature of technical art history makes it a difficult field to comprehend; the researchers involved have to understand scientific as well as art-historical analysis methods and museum as well as academic practices. In section *2.1*, it could be seen that a lack of familiarity manifested itself through art historians not seeing the *added* value of scientific research. Wary of the actual use of scientific tools, art historians seemed to be reluctant to collaborate in scientific research endeavours. Furthermore, scientific research has wrongly been regarded as just a tool to figure out the material properties of an art object, instead of being relevant to stylistic and art-historical analyses as well. The latter misunderstanding follows naturally when regarding the words of de Koomen, who said that collaborative interdisciplinary research is rarely focussed on art-historical questions. Still, nowadays, there is a greater acceptance of scientific methods as became apparent from the interview with Robert Erdmann; especially the younger generation is open to becoming acquainted with technical art history. However, in order to do so, several steps have to be taken, such as educating the art historian early on in his studies, as was already opted by Ainsworth; increasing the readability of scientific investigations on art for art historians and changing the focus of interdisciplinary research endeavours.

Furthermore, in my opinion, the process of making technical art history understood by the art world is exacerbated by the wrongly ascribed position of technical art history within art investigation. Hence, when one wants to address this lack of familiarity, it is necessary to properly define the position of technical art history within art history. In section *2.2*, it was explained that the possibilities and limitations of technical art history are far better to comprehend when one sees it as a method. A method that can be used to answer a lot of the same research questions that could be answered with classic art history methods, such as visual, literature and archival research. By redefining the way that technical art history is seen, in a way Heather Lechtman already pointed out back in 2005, I think that many of the current problems regarding the perception of technical art history could be resolved.

In short, the lack of familiarity with scientific research is manifested through art historians not seeing the *added* value of scientific research in art. Moreover, scientific research is wrongly said to be only of use for determining material properties. These problems could be addressed by teaching science already in the bachelor of art history, making scientific research of art understandable for art historians and shifting the focus of interdisciplinary research endeavours towards art-historical

questions. Moreover, the general use and aim of technical art history could be clarified by redefining it as a method of investigation.

# H-3 A Basis for Technical Art History

In the previous chapter, the issue of familiarity with technical art history among art historians has been discussed. It was determined that, among other things, art-historical education needed to be adjusted in order to teach technical art history in an early stage of the study and that the methodological framework of technical art history should be taught. Therefore, in this chapter, the question of how a proper basis for technical art history in art history studies could be established will be discussed. First, the research methodology and necessity for a framework in technical art history will be explained; after which its implementation in the art history curriculum is treated. After that, the importance of collaboration between museums and universities is stipulated.

## *3.1 A Framework for Interdisciplinary Collaboration and Teaching Technical Art History*

Next to Haxthausen and de Koomen, in 2005, also Lechtman mentioned the problem of art history students merely doing literary studies, being refrained from the object. She stated that "meaningful collaborations" between conservators, scientists, curators and academic researchers would not develop unless "dramatic changes" would be made in teaching the art historian.[76] Maryan Ainsworth, who got involved with an interdisciplinary research project on Rembrandt at the Metropolitan Museum of Art which was completed in 1982, insinuated in like manner that art historians could not be prepared in their studies for interdisciplinary research investigations:

> "I quickly learned that this confluence of different disciplines and new technologies could not be learned from books. […] It was strictly on-the-job training – a component, I came to understand, of any interdisciplinary project involving curators, conservators, and conservations scientists." [77]

In other words, merely theoretical art history studies could not support their students in learning about this new interdisciplinary development.

[76] Lechtman, "A Matter of Teamwork," 11–16.
[77] Ainsworth, "From connoisseurship to Technical Art History," 3.

The separation of science and art, at the beginning of the twenty-first century, became clear in an interview with cultural heritage scientist, Geert van der Snickt, who mentioned that, even when interdisciplinary research was done, it was without consulting one another. The chemist just acquired and processed the data after which he sent it to the museum. Thankfully, he added that that was no longer the case in 2015.[78] Still, a clear framework for interdisciplinary research endeavours is missing, as came forth from the research by Dillon and others. They held a survey among participants of interdisciplinary research, asking them on certain topics to rate "the level of achievement". Some goals like "knowledge exchange" and "taking part in research that is relevant for practice" were thought to be achieved by around 80% of the participants, while at the same time the goal of creating "standards and guidelines" was thought to be achieved only by 34% of the participants.[79]

From research performed by the National Academies in the U.S.A, came the result that many problems that arise in interdisciplinary research fields are due to a "lack of understanding and trust" between experts in different fields and their differences in research methods and interests.[80] In 2014 Dillon and others indeed mentioned that a success factor for interdisciplinary research in heritage science was understanding the needs and goals of one another, and having sound communication between researchers.[81] In their research, they distinguish collaborators in interdisciplinary research endeavours between *users* and *researchers.* Users are people that for example work as a curator in a museum – using the result of a research endeavour – and researchers are people attached to a university – having the goal of gaining new information, the research itself. She mentions that the two groups have different working practices, the users being practical and the researchers being process-minded. This caused problems during collaboration, for instance, the users considered academic research to take up too much time, and the researchers claimed that expectations from the users were unrealistic.[82] Yet, this gap between researchers and users is not merely indicative of the twenty-first century, as it happens, in the 70s John Brealey already addressed this problem. In his efforts to teach materiality to the curators and art historians and how they could discuss the state of a painting, better communication between art historians, curators and conservators was achieved.[83] This has been vital for the development of scientific research in art. The object-based field of technical art history is closely related to conservation science, so when Brealey bridged the gap between conservators and art

[78] Geert van der Snickt, "Curator's Interview," interview by Vanessa Paumen, *Codart eZine* 6 (Summer 2015), https://ezine.codart.nl/17/issue/53/artikel/geert-van-der-snickt-interviewed-by-vanessa-paumen/?id=295#!/page/1.
[79] Dillon et al., "Mind the Gap," 8.
[80] National Academy, *Overcoming barriers to collaborative research: report of a workshop* (Washington, DC: National Academy Press, 1999). in Dillon et al., "Mind the Gap," 2.
[81] Dillon et al., "Mind the Gap," 2,13.
[82] Dillon et al., "Mind the Gap," 11.
[83] Ainsworth, "From connoisseurship to Technical Art History," 2.

historians, the gap that had to be bridged between science and art became significantly smaller as well. However, there is still room for improvement in collaboration between universities and museums as stated by Dillon and others in 2014:

> "[..] expectations and cultures of different institutions and individuals could become barriers to effective collaboration. In particular, a wider view of the benefits of collaboration, beyond translating research into practice, may be useful."[84]

Understanding each other's disciplines and being able to communicate with one another would significantly help with the start-up of a new interdisciplinary research endeavour. Nowadays, it takes up quite some time for researchers to understand each other's use of methods and each time they have to develop their own 'shared languages or concepts.'[85] According to Emma Jansson, co-founder and editor at *Materia: Journal of Technical Art History*, "a shared methodological and theoretical language" could circumvent this problem and improve collaborative technical research on art.[86] In order to create such a 'language,' it is necessary to prepare the researcher already in his or her studies in interdisciplinary research methods. Naturally, scientific techniques keep developing, hence, this communicative problem cannot be avoided in its entirety. However, a fundamental framework that focuses on the communication between the disciplines and their methods, rather than specific research techniques, can intercept a majority of the collaborative issues. Clear communication between researchers starts with understanding their various working methods.

The diversity in methods and research subjects also makes it difficult to educate graduate students in their specific fields. A lot of students do not have a supervisor who is familiar with their research subject and/or method, causing students to be on their own in their research.[87] Long and Schonfeld, therefore, advise revising the art history curriculum to better fit the need of the students who have to deal with various and changing research methods. Many students are open to trying experimental research methods, however, it is not provided in class and therefore becomes difficult to do so.[88] Moreover, students are discouraged to pursue these experimental research methods; faculty members even said that they had advised students against it since it could be a risk for obtaining a tenure position.[89] Although the research by Long and Schonfeld focussed on art history studies in

[84] Dillon et al., "Mind the Gap," 21.
[85] Dillon et al., "Mind the Gap," 2.
[86] Emma Jansson, "Toward a "Theory" for Technical Art History," *Materia: Journal of Technical Art History* 1, no. 1 (2021), https://volume-1-issue-1.materiajournal.com/article-ej/#fn:3
[87] Long and Schonfeld, *Supporting research practices,* 48.
[88] Long and Schonfeld, *Supporting research practices,* 48.
[89] Long and Schonfeld, *Supporting research practices,* 40 and Long and Schonfeld, "Preparing for the future," 201.

general and was published almost ten years ago, Alfeld mentioned similar problems in 2023 regarding technical art history. He states that it is difficult to find the staff to teach technical art history. Moreover, he points out that there is no "reliable employment" for a trained technical art historian yet.[90]

Next to staff not being able to provide students with knowledge of technical art history, there is also a limited number of educational books on the subject. In 2021, *Technical Art History: A Journey Through Active Learning,* written by Jehane Ragai, Emeritus Professor of Chemistry at the American University of Cairo (AUC), and Tamer Shoeib, member of the AUC Department of Chemistry, was published by the motivation of "the fact that no textbook dealing with technical art history is currently available to teachers and undergraduate students."[91]

I asked de Koomen, what curricular changes he considered to be necessary to improve the integration of technical art history within art-historical research. He stated that it is important to 'layer' information that is given to students. De Koomen proceeded that there is a good foundation within the first year of the bachelor curriculum at the University of Amsterdam, however, regrets that these lessons are not continued in the following years. In agreement with Ainsworth, de Koomen stated that for proper integration of technical art-historical research, lab sessions should be pursued and internships should become available. Currently, technical research on art is explained, however, it is not linked to art-historical research. Hence, students having a bachelor's degree are still not equipped to answer art-historical questions using technical findings.[92]

The necessity for a standard framework in technical art history and for understanding researchers from different disciplines and their research methods, demands a change in the way art historians are trained. Courses on various research methods and practical sessions have to be provided, preferably continuously, in the bachelor curriculum. Yet, the lack of staff, job opportunities and information on technical art history, keep radical improvements from happening.

### *3.2 Better to Steal Something Good than to Invent Something Bad: How to Learn from the Study of Archaeology*

In the previous section, the necessity for change in current art history studies in order to teach technical art history practices has been discussed. However, changing a curriculum and the way it is taught, without losing essential parts of the current curriculum, is not an easy task. Therefore, it is necessary

[90] Matthias Alfeld, see Appendix A.
[91] Ragai and Shoeib, *Technical Art History: A Journey Through Active Learning*, xv.
[92] Koomen de, see Appendix B.

to look at other fields and learn how in those studies different research methods are taught parallel to substantive courses.

The research performed by Long and Schonfeld on the research practices of art historians resulted in them drawing up a recommendation report. One of their recommendations was implementing method-specific training programs, which would result in graduate students being "open to greater experimentation in collaborative research methods".[93] This advice of providing method-based education and encouraging collaboration among scholars seamlessly connects to the findings in the previous section on how to accommodate technical art history in the art history curriculum. Long and Schonfeld continue their recommendation by stating that models for this kind of education are already employed in archaeology and that it could be beneficial to apply them in art history as well.[94] Indeed, the rise of technical art history and object-based studies, have a lot in common with archaeologic studies. It was Rembrandt authority, Ernst van de Wetering, who already wrote in 1997:

> "The work of art as a material object is increasingly used in art-historical research as an important source of evidence about itself. Whereas in the past the painting was mainly used as a source of stylistic and iconographic features, an "archaeology" of art work is now developing."[95]

Archaeology is, moreover, more advanced with the use of scientific methods than art history. Molly Faries, states in 2001 that it was "archaeology, where technical investigation always has received a greater acceptance than in art history".[96] Archaeology is also structured like a technical study, while art history is structured like a humanities study. The courses given in archaeology provide bachelor students with a skill toolbox: a student of archaeology learns *how* to research and gets taught all different kinds of research *methods,* just like an engineering student. In a bachelor of engineering, the theory of mathematics and physics is given, teaching engineering students all the basics they need. Engineering and archaeology students in the Netherlands only specialize in a specific subject later on in their master's. Art history does focus on methodology as well, however, it does not cover the entire scope, as was mentioned earlier. Instead, the bachelor of art history provides the students with more in-depth knowledge of art forms and movements throughout history. This in-depth knowledge that would be given on, for example, 17$^{th}$-century tapestries is something less prevalent in archaeology.

[93] Long and Schonfeld, "Preparing for the future," 199, 200.
[94] Long and Schonfeld, "Preparing for the future," 199, 200.
[95] Ernst van de Wetering, *Rembrandt: The Painter at Work* (Amsterdam: Amsterdam University Press, 1997), xiii.
[96] Faries, "Reshaping the Field," 71.

The study of archaeology is introduced on the site of Leiden University as a discipline combining skills and knowledge of varying fields where both theoretical and practical aspects are taught. Its inclusion of scientific methods is evident from the site:

> "[…] Where possible, you use historical sources, like a historian, but you also explore whether you can use high-tech methods from the natural sciences. Archaeology can therefore always be found at the interfaces between history and the social and natural sciences. […]"[97]

Archaeology is, as such, a field that requires multi-disciplinary education and, therefore, the students are educated in a broad methodological way in their bachelor education. This also allows archaeology students to collaborate in interdisciplinary research, despite having different specialisations. Art history, on the other hand, is focused on contextualising art around the world and how this has influenced our "social, political and spiritual life".[98] It is the object, archival research and literature which together form the source material for the art historian. Archival and literary research is methodologically similar, and research pace and quality improve with the amount of knowledge already possessed by the researcher. Art historians are, therefore, trained in knowing the in-depth *context* of art instead of alternative research methods.

Although the scope of art research is too broad to cover in one study – hence the separate studies of art history, conservation and technical art history – still, for collaborative purposes, it would be beneficial to learn the basics of each discipline within art history studies. In other words, it may prove useful to focus more on the various disciplines and their use of research methods at the expense of teaching a variety of subjects, as is done in the study of archaeology. Although the different objectives of the study of archaeology and art history make substituting the archaeological for the art-historical framework in its entirety not viable, their framework could be adopted just for the education on technical art history. The method of investigation used in technical art history will then be taught in the bachelor curriculum, making every art historian familiar with it. Moreover, art historians could see how investigation methods could be combined to answer art-historical questions, just like combining visual and literature studies, now they can combine those methods with technical studies as well.

[97] "Archeologie: Heritage and Society," Universiteit Leiden, accessed March 20, 2023, https://studiegids.universiteitleiden.nl/studies/8609/archeologie-heritage-and-society#tab-1.
[98] "What is Art History?" Carleton University, accessed March 11, 2023, https://carleton.ca/aah/about/whatis/.

*3.3 Universities and Museums*

As became clear from the first chapter, scientific research has primarily taken place in museum conservation departments.[99] Therefore, the collaboration between museums and universities is of great importance for educating research practices involving technical art history.

The activities at museums are inherently more interdisciplinary than those at universities; having to study, preserve and present a collection of objects. In creating an exhibition, for example, many researchers from different fields can be consulted. It is a collaborative effort of museum staff, conservators, researchers from universities and specialists from other museums.[100] One of the most significant interdisciplinary exhibitions in this respect has been the *Hieronymus Bosch – Visions of Genius* in Het Noordbrabants Museum in 2016. In addition to exhibitions resulting from an interdisciplinary effort, the exhibition itself also has an interdisciplinary nature. This was stated by the interviewees of the Long and Schonfeld survey who said that museums have "unique access to scholarly expertise and library resources in other disciplines".[101] In other words, it is inherent to the activities of a museum to bring art historians, curators and conservators together. Herewith, the museum forms an ideal platform for interdisciplinary research. This was also stipulated by H. Perry Chapman who even introduced a new feature in *The Art Bulletin* on museum exhibitions. In this feature, review essays would be written about exhibitions, discussing the entire process of their creation; curatorial, academic and scientific. She hoped that this would aid in bringing museums and universities closer together as it "acknowledges the importance of exhibitions as sites of innovative art-historical scholarship".[102]

Another aspect that makes museums important for technical art history is the fact that laboratories for investigating art are more often part of a – select group of prominent – museums than of universities. These laboratories were initially only focused on the conservation of paintings. Nowadays, however, they have become centres for research in the field of technical art history.[103] A new Department of Scientific Research at the Metropolitan opened its doors in 2003, bringing scientists from previously independent conservation departments together. Since then, increased collaboration between conservators and scientists, but also of different departments (like textiles and painting) is stimulated.[104] A similar organisation can be seen today in the restoration studio of the

[99] Michael Yonan, "Technical Art History and the Art Historical Thing," *Materia: Journal of Technical Art History* 1, no. 1 (2021), https://volume-1-issue-1.materiajournal.com/article-my/.
[100] Long and Schonfeld, *Supporting research practices,* 26.
[101] Long and Schonfeld, *Supporting research practices,* 27.
[102] H. Perry Chapman, "Editor's Note," *Art Bulletin* 82, no. 3 (September 2000): 406.
[103] Chapman and Weststeijn, "Connoisseurship as Knowledge," 6.
[104] Schorsch, "Caring for The Met."

Mauritshuis in Den Haag.[105] The Amsterdam Ateliergebouw, furthermore, not only houses the conservation department of the Rijksmuseum but also the former Centraal Laboratorium, now called National Heritage Agency. Moreover, it has educational facilities for students from the master of *Conservation and Restoration of Cultural Heritage*.[106] Indeed, with paintings at hand and art laboratories at their disposal, museums were and are the perfect place for educating technical art history.

Not only do the activities and facilities that can be provided by the museum make museums of interest to technical art history, but also the museum's curator and conservator who, together with the scientist, have the know-how on researching a painting with scientific methods, are of great importance for the future of technical art history. Maryan Ainsworth noted that their busy daily schedule, however, limits them from doing proper in-depth research. It is only during "special projects" that they get this opportunity.[107] Moreover, a German museum director mentioned in an interview with Charles Haxhausen in 2002 that matters like fund-raising and attracting the public are issues that take up time and are prioritized, which prevents museum staff from doing scholarly work. He proceeded by stating that "He could not think of any examples of a 'profound collaboration' between the museum and university"; a statement further emphasized by Haxthausen himself in his introduction to the work *The Two Art Histories: The Museum and the University*.[108] This is once more echoed by Long and Schonfield who found that, despite the interconnected nature of art history as a discipline, not all institutions are as well connected. Long and Schonfield gave the same advice as 12 years before, that the collaboration and sharing of knowledge in art history could greatly improve by "collaborative planning" of museums, libraries and universities, as not one single institution holds all the expertise, but also primary and secondary sources necessary for research.[109]

It is here that we stumble upon a problem: all aspects of collaboration with universities that were previously mentioned, need to be supported financially. When focussing on the larger museums – in which technical research is most often done – it is evident that financial difficulties have increased over the years. Even before Covid-19 hit the Netherlands, 46 % of the larger museums were overdrawn during normal operation.[110] The making of an exhibition, furthermore, has become increasingly expensive. The cost of transporting works on loan and designing exhibitions has significantly risen

[105] Quentin Buvelot en Edwin Buijssen, *Annual Report Mauritshuis 2012* (Amsterdam: Drukkerij Mart Spruijt, 2012), 44-55.
[106] Koomen de, "Inquiring Interdisciplinarity," 292.
[107] Ainsworth, "From connoisseurship to Technical Art History," 3.
[108] Haxthausen, "Introduction," xi.
[109] Long and Schonfeld, *Supporting research practices,* 43,44.
[110] *Museum Cijfes 2019*, Amsterdam: Stichting Museana, 2020, 34, "https://www.museumvereniging.nl/media/museumcijfers2019_def.pdf.

over the years.[111] And, since museums are still working with cutbacks as they recover from the pandemic, investing in integrating university curriculum with museum practice to improve scientific research in art, might not be on the top of their agenda. Museums are essentially companies that need profit to keep afloat, having other interests than universities. In this respect, it can be seen that compromises need to be made.[112] Closer collaboration between museums and universities is, however, not only beneficial to the university, but it would also serve the museum. For example, Richard Stone mentioned that a specialised academic researcher could offer information that is often not in the possession of permanent staff within the museum.[113] Moreover, Matthias Alfeld commented that exhibitions, made with the inclusion of technical art-historical research, are great for publicity. All things considered, Alfeld recognizes museums as being open towards technical art history.[114] Hence, despite financial difficulties within museums, technical art history and museums seem to become more integrated.

Not only the bond between museums and technical art history is growing, but also the bond between museums and art history studies is improving. Until recently, art history students were kept away from a museum career, as such a career was seen as inferior in the PhD programs. This negative affiliation has advantageously vanished and universities are more and more focussed on training their students to become employed at museums,[115] having greater attention to object-based education. Chapman and Weststeijn note that these changes result in an "increased cross-pollination between scholarship, practical expertise, and science.[116]. Dutch universities in Amsterdam, Groningen and Leiden offer master's degrees in curatorship; at Leiden University, for example, two new master's specializations started at in September 2022, specifically focussing on the collaboration between universities and museums. One specialisation *Art History* focuses more on academic practices and students get to learn how to work with museums. The other specialisation *Museum Studies* is the other way around.[117] The objectives of the master's specialization look promising: it focuses on interdisciplinary research between museums and universities and is taught by researchers as well as curators from institutions like the Rijksmuseum Amsterdam, the Frans Hals Museum, the Museum

[111] *Corona, Cultuur en Gemeenten deel 2*, Den Haag: VNG, 2022, 44, https://vng.nl/sites/default/files/2022-01/Gids%20Corona%2C%20cultuur%20en%20gemeenten%20deel2.pdf?utm_campaign=F22T&utm_medium=email&utm_source=Revue%20newsletter.
[112] Alfeld, See Appendix A.
[113] Richard Stone Interviewed by Jeffrey Levin, "A Matter of Teamwork: A Discussion about Technical Studies and Art History," *Conservation Perspectives: The Getty Conservation Institute Newsletter* 20, no. 1 (2005): 11–16.
[114] Alfeld, See Appendix A.
[115] Long and Schonfeld, *Supporting research practices*, 41.
[116] Chapman and Weststeijn, "Connoisseurship as Knowledge," 15.
[117] Universiteit Leiden, "Arts and Culture," accessed April 15, 2023, https://www.universiteitleiden.nl/en/education/study-programmes/master/arts-and-culture.

Volkenkunde, the National Museum of Antiquities and the RKD.[118] Still, technical art history is not yet featured in this new specialization offered at Leiden University. On the other hand, at the UvA, students have already the possibility to follow the track *Technical Art History*, which is part of the previously mentioned conservation master's, housed in the Ateliergebouw.[119] Nevertheless, all above-mentioned studies are master's programs. Hence, although the bond between museums and universities improves, their collaboration in bachelor education has yet to be strengthened.

In 2021 a publication by the American Chemical Society (ACS) treated the education of chemistry using art and archaeology. Although written from the perspective of teaching chemists rather than art historians and using the research of art more as a means for education than an actual objective, the publication pays much attention to how interdisciplinary courses involving art and science should be taught. One theme that prevails throughout the collection of papers is "context-based" education. In the preface, Kevin L. Braun and Kirsten Jansen Labby mention that lecture-based education is not the proper way to get students involved in chemistry and proceed with recommending context-based learning methods. This not only aids in students becoming more engaged with chemistry but also helps students master the material more quickly.[120] Courses treated in the paper involve case studies and/or museum visits to teach the basics of chemistry, adapting learning by doing.

All things considered, improved collaboration with museums seems a good start for the involvement of technical art history in the art history curriculum of universities in the Netherlands. Even more so since the few universities which are involved with the scientific research of art already actively work together with museums. For example, the Art and Archaeology department at Delft University of Technology and the Master's of Conservation and Restoration of Cultural heritage at the University of Amsterdam, work frequently together with museums in and outside of the Netherlands.[121]

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[118] "Art-History," Universiteit Leiden, accessed April 15, 2023, https://www.universiteitleiden.nl/en/education/study-programmes/master/arts-and-culture/art-history.
[119] "Conservation and Restoration of Cultural Heritage," University of Amsterdam, accessed February 17, 2023, https://www.uva.nl/en/programmes/masters/conservation-and-restoration-of-cultural-heritage/conservation-and-restoration-of-cultural-heritage.html.
[120] Kevin L. Braun and Kirsten Jansen, "Preface," in *Contextualizing Chemistry in Art and Archaeology: Inspiration for Instructors* ed. K.L. Braun and K. Jansen (Washington DC: ACS Books, 2021), xii.
[121] Which becomes visible from their site. All collaborations between the department and various museums are pointed out. From "Collaborations," Tu Delft, accessed April 30, 2023, https://www.tudelft.nl/3me/over/afdelingen/materials-science-and-engineering/research/art-and-archaeology/collaborations and on the site of the master at the UvA active collaboration with museums is stipulated "Conservation and Restoration of Cultural Heritage."

*3.4 Conclusion*

At the beginning of this chapter, I mentioned that there is not yet a proper foundation for doing interdisciplinary research involving scientific research. Art historians are not used to cooperating in interdisciplinary investigations and are not familiar with the scientific methods applied in technical art history. Therefore, I opted to answer the question of how a proper basis for technical art-historical investigations can be created by altering the art history curriculum. The first part of my dual answer included the education of students in methodology and creating a research framework to improve collaboration efforts. The second part discussed the importance of improving collaboration between universities and museums.

Lechtman stated in 2005 that "dramatic changes" needed to be made to the curriculum to create meaningful collaboration among researchers. This statement originates from the fact that researchers do not understand each other's fields and methods. Consequently, interdisciplinary collaborations where the art historian's exploratory and contextualising research had to be combined with the scientist's empirical research did not prove to be a simple process. Each new interdisciplinary investigation required the development of a shared language or concepts. The necessity of a standard framework and education on technical art history, hence, became evident. On this matter, the active cooperation of universities in the process of innovating is inevitable. A start has been made in educating the art history student with the publication of a textbook on technical art history by Ragai and Shoeib in 2021. Furthermore, Arjan de Koomen advised that, in order to incorporate scientific methods in the bachelor of art history, it should be taught in "layers". Like Ainsworth he stipulated the importance of practical sessions and internships becoming available for art history students. Yet, without professors being able to teach technical art history and support students in innovative research fields, the advancement of technical art history remains a slow-moving process.

Next to the difficulty in finding the staff to teach technical art history, the question remains how a study can be reformed to fit new methodological research forms without losing its identity. Long and Schonfield advised looking at the collaborative and methodologically diverse study of archaeology. The object-based approach in archaeology, moreover, fits seamlessly with technical art history. The fact that archaeology is much further in using – the same – scientific tools as are used in technical art history, makes taking the archaeology curriculum into account inevitable for reforming art history studies. The archaeology study mainly focuses on teaching various research *methods* instead of different *subjects* in the bachelor curriculum, making archaeologists more capable of collaborating with researchers having different specialisations. Here it differs greatly from art history, where courses are more focussed on providing in-depth knowledge of a subject and less focused on providing a

variety of research methods. Although art history is a discipline where fundamentally more knowledge of context is required, significant improvement in interdisciplinary research investigations could be made by teaching art history students various research methods as well.

Museums are often the base for interdisciplinary research endeavours. The laboratory work and the creation of exhibitions allow and even demand collaboration between experts. Furthermore, museum-affiliated researchers, such as curators and conservators, are object-minded. Nonetheless, the interest of the museum and the academy differ from one another and current financial difficulties faced by museums could impede such a collaboration between universities and museums. However, museums are willing to collaborate and universities do increasingly start to educate their students to become more involved in museum activities. Still, these novel developments are solely taking place in master's specialisations. In order to reach every art history student, the bachelor curriculum should be accommodating technical art history as well, adopting context-based learning principles in museum surroundings. Furthermore, the small research departments that work on scientific investigations of art are, already much involved with museums. Therefore, when closer collaboration is established between museums and the study of art history, museums could function as a middleman between the two until now still rather separate fields.

So, how can the Dutch art historian be educated in technical art history? Firstly, a standard framework for interdisciplinary investigations should be adopted in the art world. Students should then be educated throughout the bachelor education on technical art history, building up knowledge layer by layer. Technical art history should, moreover, be taught as research method that could be combined with other methods of investigation as well. Despite collaboration between universities and museums already steadily improving, bachelor students still do not have the opportunity to actively get involved with museums.

# H-4 Problems on the Dispersion of Knowledge on Technical Art History

In the previous chapters, we discussed how unfamiliarity with technical art history and limited education in this discipline prohibits active involvement of art historians in interdisciplinary research investigations. However, there is another aspect of great importance for creating general knowledge on technical art history: its documentation. Once technical research on art becomes widely published, the art historian will be continuously updated with the latest progressions in the field of technical art history. Unfortunately, Ainsworth noted that much research involving technical art history was not published. Although this was the case in 2005, a more recent publication by Emma Jansson in 2021 mentioned this as well.[122] Therefore, in this chapter, I will discuss the problem of limited publications on technical art history, and what could be changed in this respect, in order to establish an environment that allows art historians to be continuously informed on the technological advancements within technical art history.

## *4.1 The Unpublished Collaborative Research*

When an interdisciplinary research endeavour is initiated, it is not always followed by a collective publication or even a publication at all. The 1995 exhibition of *Rembrandt/Not Rembrandt* resulted, for example, in two separate publications due to diverging opinions.[123] But, where the team of the *Rembrandt/Not Rembrandt* exhibition chose to publish two works to accompany diverging opinions, a lot of research teams simply choose to not publish at all. Hence, next to a lack of academic prospects which was briefly touched upon in section *3.1*, academic bickering in interdisciplinary research results in scarce publications. This problematic state of affairs was already noticed by Maryan Ainsworth and James Coddington in 1995. They dreaded the fact that highly informative knowledge was obscured and, herewith, scholarly integrity abandoned due to "heated rhetoric" in restoration projects.[124] De Koomen stipulates another reason for the limited number of collaborative publications. Both in his work *Inquiring Interdisciplinarity: Merging Art History and Art Technology in the Netherlands,* as in

[122] Jansson, "Toward a "Theory" for Technical Art History," and Ainsworth, "From connoisseurship to Technical Art History," 4,5.
[123] Ainsworth, "From connoisseurship to Technical Art History," 4.
[124] Coddington and Ainsworth, "Conservation and Art History," 17.

the interview, he mentioned the problem of "glory". Researchers want to publish the results of collaborative research as their own in the pursuit of academic prestige.[125]

In 2005, Maryan Ainsworth blamed publishing houses for not recognising the pivotal role of technical art history in future conservation practices and curatorship. She opted that "institutions should take a more aggressive lead in publishing the results of joint projects in art history and conservation" and stated that outside the museum, many art historians and students do not have the opportunity to come in direct contact with this kind of knowledge.[126] Unfortunately, Jansson still encountered this problem in 2021:

> "[..] as will no doubt be familiar to both conservators and researchers who use technical analysis as a method of inquiry, too often are our contributions limited to either an appendix or technical entry at the back of a publication, or otherwise remain inaccessible in the form of an unpublished conservation report."[127]

Thus, a lack of collaborative technical art history publications is a result of various factors. Researchers either not agreeing with one another or wanting to take all the credit are one part of the problem. Another part is the apparently limited value assigned to technical findings when publishing. A direct solution, other than a changed mindset among researchers, is hard to find for these issues. Yet, as was mentioned in chapter *2*, by improving the familiarity with technical art history among art historians, that mindset might change.

### *4.2 Standardised Investigation Methods: Overcoming Different Publication Standards, Goals and Concepts of Knowledge in STEM and Humanities*

In the previous section, the lack of publications following an interdisciplinary research endeavour was discussed. Part of the reason that complicates publishing interdisciplinary research is the different publication standards, procedures and goals among different disciplines. The problem of different procedures and goals among researchers collaborating in technical art-historical investigations was already discussed in section *3.1*, where the necessity for a standardized framework was mentioned. Although this section was focused on teaching students about technical art history rather than

[125] Koomen de, "Inquiring Interdisciplinarity." And Koomen de, see Appendix B.
[126] Ainsworth, "From connoisseurship to Technical Art History," 5.
[127] Jansson, "Toward a "Theory" for Technical Art History."

publishing about it, the same need for standardization applies to improving the publication of interdisciplinary research.

Generally, research papers in humanities and STEM (Science, Technology, Engineering and Mathematics) studies are structured very differently and have different objectives. The introduction of a STEM publication is similar to that in humanities; introducing the subject and explaining the relevance of the research and how it is structured. The body, however, of a STEM publication is different. STEM studies work towards empirical results and a big part of the paper is used to explain how those results could be reproduced. This is done through a thorough discussion of the method used to obtain the data. After the method is discussed, the results are published. To this point, every piece of data provided by the scientist is purely objective. It is only in the discussion of the results that interpretations of these data are provided, which necessarily involves some subjectivity. In the conclusion, a summary and recommendations for future research are given.

Almost all STEM papers are experimental research papers, creating new information through empirical research. In humanities, there is far greater variation in research papers; yet, it is not often experimental.[128] In humanities, for example, case studies, literature studies or surveys are done. Even more so, previously, I mentioned that art historians do not follow *a clear pattern* when investigating; they rather use *various tools* and combine obtained knowledge in their research.[129] This variety in information, where for example surveys are combined with literature studies, asks for a more fluid paper structure as well. Taking the rigid form of an experimental research paper into consideration, it becomes difficult to reconcile the two publication formats of art history and science.

It is not only the format of publication that differs between STEM and humanities but also the concept of knowledge. For the scientist, creating knowledge entails making observations from experiments, while for the art historian creating knowledge entails contriving new interpretations of art and finding significant connections.[130] Emma Jansson wrote in 2021 that collaboration would be improved when scientists, within interdisciplinary research collaborations, became familiar with the research practice that in humanities "'objective' data are translated into broader human or contextual meaning". Similarly, she noted that art historians would do well to "check" their work, in a more objective way, "particularly in those instances where the boundary between subjective interpretation and recorded fact begins to wear thin".[131]

[128] Willie van Peer, Frank Hakemulder, and Sonia. Zyngier, *Scientific Methods for the Humanities* (Amsterdam: John Benjamins Pub., 2012), xxi.
[129] Long and Schonfeld, *Supporting research practices,* 10.
[130] Koomen de, see Appendix B.
[131] Jansson, "Toward a "Theory" for Technical Art History."

At first, different publication formats seem to be a surmountable obstacle. However, when taking into account that these formats are shaped to guide the reader towards the significant findings of a research, the problem becomes more complicated. The significant contributions in the eye of a material scientist differ greatly from that of an art historian. For example, scientists want to show off the capabilities of their machines, while art historians want to publish novel findings about the artwork.[132] Hence, because of the different publication standards and concepts of knowledge, art historians and material scientists are not always able to publish the significance of their findings equally in a paper. When I asked if this was problematic for collaborative writing endeavours, Matthias Alfeld did not consider it as much of an issue by stating that the target audience of the journal was leading:

> "In all my experience it was always clear at which journal/audience a publication was aimed. Consequently, a lead author from that field designed the text and the other authors provided detailed sections."[133]

De Koomen mentioned that research could also end up being divided into an art-historical and a technical part. However, he added that the limiting factor of this state of affairs is that you lose the connection between the technical findings and their art-historical significance.[134]

Indeed, a source of information that finds itself on the boundaries of technical innovation and art-historical significance is lost. An interesting example of this kind of information is the work by Ricciardi and others.[135] Here they sought to find the best instrument for detecting small amounts of smalt in a smalt-ultramarine mixture. In doing so, they compared an XRF line scan of a laboratory sample of a smalt-ultramarine mixture with a 15$^{th}$-century Venetian manuscript. Since the natural colouring strength of smalt is smaller than that of ultramarine, smalt particles are generally ground less fine than ultramarine. Hence, when XRF scanning with a small enough step size, a cobalt peak is expected at the spot of smalt pigment grains. This was indeed the case with the laboratory-made smalt-ultramarine mixture, however, not in the manuscript. The presence of cobalt was steady over the entire line that was scanned. A magnification of the manuscript revealed that there were no larger particles

[132] Koomen de, see Appendix B.
[133] Alfeld, see Appendix A.
[134] Koomen de, see Appendix B.
[135] Paola Ricciardi, Kathryn A. Dooley, Douglas MacLennan, Giulia Bertolotti, Francesca Gabrieli, Catherine Schmidt Patterson and John K. Delaney, "Use of standard analytical tools to detect small amounts of smalt in the presence of ultramarine as observed in 15th-century Venetian illuminated manuscripts," *Heritage Science* 10, 38 (2022). https://doi.org/10.1186/s40494-022-00671-z

that would indicate smalt. Smalt appeared to be used in a different form than was expected, having a very fine grain size. Ricciardi and others reasoned that this could be the case if a merchant tried to get better money for their ultramarine by mixing it up with smalt, or merchants/painters were at the beginning of the use of smalt oblivious to how it should best be used. The latter seems the most logical to them since the Co-containing ultramarine was mainly found in the less important areas of the painting. This find could only be noticed by having both art-historical and technical knowledge available. The researchers had to know how smalt was used and that smalt is an inferior pigment compared to ultramarine, moreover, they had to be aware of the limitations of the XRF-scanner and understand its settings. Ricciardi and her team, through the use of science, obtained information that has great art-historical significance with respect to the use of smalt in 15th-century Venice.

To continue work on the dividing lines between art history and technology, it is very important to reconcile publication formats and knowledge concepts. A start has been made in 2016 by the BRCP. The research done by Hoogstede and others for the BRCP resulted in meticulous documentation of the method which is closely related to publishing in STEM studies. It was one of their goals to create a standardized, comparable research procedure which could be used by scholars in the future; giving open access to their data and methodology. [136] Hoogstede and others stated about their approach:

> "An undertaking such as this one can only be of value insofar as all the works to be documented are dealt with under the same reproducible conditions and with standardized procedures."[137]

Also, the images obtained with light at different wavelengths – using IRR, X-RAY and UVF – were made using a fixed procedure; holding onto standard lighting, resolution and method, to make the procedure as comparable and reproduceable as possible.[138] Nevertheless, they faced technical difficulties and organisational problems, which caused a not completely homogenous result. When getting insights into the intricate imaging methods that are necessary to get similar results from one painting to another, it becomes clear that it is very difficult to get similar results when two different researchers are working on the same painting, even if they used the same camera. However, when focussing on the broader picture of collaborative research standardization instead of the obtaining of data, the standardized procedure that is applied in the BRCP is a great start for creating a research method for technical art history on a global scale.

[136] Hoogstede et al., *Hieronymus Bosch*, 11.
[137] Hoogstede et al., *Hieronymus Bosch*, 15.
[138] Hoogstede et al., *Hieronymus Bosch*, 29.

*4.3 Creation of a Digital Platform*

In section *4.1* the lack of publications on technical art history was discussed, together with an explanation of how this prohibits (technical) art historians to be informed on technical art history. Yet, since technical art history is based on data from for example imaging methods, not only publishing papers is of importance, but also the experimental results, the images/data from the painting, have to be published in order to inform fellow researchers. Molly Faries and Henry Lie, director of conservation at the Center for Materials Research in Archaeology and Ethnology (CMRAE), talked already in 2003 about the merits of digitalizing images for technical art history. They stated that by digitalizing technical images, researchers could not only compare the images – obtained with different kinds of radiation – to one another, but the images would be widely available for scholars, improving the way technical art history could be taught, as well.[139] With (high definition) image sharing, researchers who did not contribute directly to a collaboration effort could work with data obtained through scientific research as well.

Accessibility of data is not only about digitalization, as became clear from the Long and Schonfeld study. Scholars sometimes have to "work through layers of bureaucracy" in order to get the sources they need from institutions abroad.[140] Thankfully, there are museums that provide open access to their high-resolution digitalized source material such as the National Gallery of Art, the Yale Center for British Art, the J. Paul Getty Trust and The Rijksmuseum. Some museums only make the sources partially available, by demanding it being used for mere private/educational purposes, such as the Metropolitan Museum of Art and the Victoria and Albert Museum.[141] In 2007, the Mauritshuis started to set up a database for scientifically obtained material information on Rembrandt, indeed with the objective that conservators and art historians alike could access this knowledge via their computers.[142] It becomes once more visible how important the role of museums in the development of technical art history is.

[139] Henry Lie, "Digital Imaging for the Study of Paintings: Experiences at the Straus Center for Conservation," in *Recent developments in the technical examination of early Netherlandish paintings,* ed. M. Faries and R. Spronk *(*Turnhout: Brepols Publishers, 2003), 117 and Faries, "Technical Studies of Early Netherlandish Painting," 33.
[140] Long and Schonfeld, *Supporting research practices,* 29.
[141] Long and Schonfeld, *Supporting research practices,* 39, and Erdmann, "A New View: Creating Tools to Access, Conserve, and Understand Visual Cultural Heritage," 214.
[142] Noble et al., *Bewaard voor de eeuwigheid, 33.*

The BRCP, in their research prior to the 2016 exhibition on Hieronymus Bosch, also created a well-documented collection of images of paintings; including visual light photography as well as photography through infrared, ultraviolet and x-ray radiation. Besides making their own images, they sought to digitize existing x-ray films. In the end, making the images available in a way that everyone could access and compare the different pictures.[143] On the digitalization and sharing data matter, The BRCP set a new standard by not only publishing their extensive research reports, but also publishing high-resolution images, both accessible and free to everyone interested, on the site www.boschproject.org.[144] Another novelty that was initiated during the BRCP, is the *Curtain Viewer* (Fig 1). The, by Robert Erdmann developed, software enables the art historian to see several pictures, each made with a different type of radiation, next to each other. This software is easy to use and makes it possible for researchers to see miniscule differences between for example the IRR and the VIS when changes have been made to the original design by the painter.[145] Furthermore, it enables researchers to investigate the painting and work together "from a distance". Plus, the software is open source. The *Curtain Viewer* software, on its own, facilitates collaboration between scientists and art historians, remote teamwork and easy free access to anyone interested. Only making technical images available, however, does not suffice, as was pointed out by Fowler. She mentions that often images are being published without proper context and without information on how to interpret them. Something necessary to inform the untrained scholar.[146]

*Fig. 1 The Curtain Viewer,* in Erdmann, "A New View," 217, ILL. 2 B.

The problem also extends itself further than merely the digitalization of images made with IRR, XRR or UV. There was a very limited database regarding the physical aspects of paintings or simply access to raw data. Molly Faries mentioned in 2001 that material knowledge of paintings is scarce. The process of creating new information is slow and costs a lot of effort. Moreover, since mainly individual works are being researched, it is often difficult to test the plausibility of the results. [147] Hence, there is a need for a database, holding physical evidence of paintings, that can be used as a reference, aiding in verifying the results with respect to various disciplines; both art-historical findings could be evaluated and the correctness of the test performed (or interpretation of data) at the scientific

[143] Hoogstede et al., *Hieronymus Bosch.*
[144] Hoogstede et al., *Hieronymus Bosch,* 11.
[145] Erdmann, "A New View: Creating Tools to Access, Conserve, and Understand Visual Cultural Heritage," 216-218.
[146] Fowler, "Technical Art History as Method," 11.
[147] Faries, "Reshaping the Field," 76,77.

end could be tested.[148] Yet, there is a long way to go before such a database would be fully functional as mentioned by Sharon Flescher in 2004. As an example, she uses the Rembrandt Research Project, which took thirty years on an almost limitless budget, to create a database on one artist only.[149] And this was still the case in 2017 when Harth and others, in their investigation on van Dyck, mentioned that there are two steps to be taken before one can help to attribute a painting based on scientific investigations. First, one has to determine the master's "fingerprint," in other words, the painter's use of materials and techniques in general. Only then, when the pigments and techniques used in the painting of interest are determined as well, one can make a sound consideration.[150] In agreement with Flescher and Harth and others, Alfeld also takes interest in making such a database, while stipulating several obstacles. Among other things, the fact that creating new data is not necessarily academically interesting, stating that "[…] a Journal of Irrelevant Case Studies (JICS) might not be a desirable journal to publish in."[151]

The problem of the availability of RAW data is still apparent in 2022 as Chopp and others remark that XRF data is barely published, limiting the development of new data evaluation algorithms.[152] Alfeld states several reasons why it is difficult to alter this state of affairs: In the first place there are legal issues, museums that own such technical data can be reserved about sharing it. Secondly, even if you would want to make data available, there needs to be a proper basis to do so. And where could you store such large datasets and in what format should you store them? Finally, the dataset, as it is obtained from the machine, is not directly interpretable. Various pre-processing steps have to be taken before one can evaluate the data. Then the question arises, should we publish the RAW data or the pre-processed data? The RAW data can change heavily based on the machine settings, which could be compensated by pre-processing, however, the pre-processed data has already been subjected to human interpretation.[153] In other words, there is no direct solution for the limited amount of data available.

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[148] Faries, "Reshaping the Field," 76,77.
[149] Flescher, "The International Foundation for Art Research," 98,99.
[150] Astrid Harth et al., "The Young Van Dyck's Fingerprint: a Technical Approach to Assess the Authenticity of a Disputed Painting," *Heritage Science* 5, no. 22 (2017): 1. https://doi.org/10.1186/s40494-017-0136-3; And Maryan Ainsworth, "What's in a Name? The Question of Attribution in Early Netherlandish Painting," in *Recent developments in the technical examination of early Netherlandish paintings,* ed. M. Faries and R. Spronk *(*Turnhout: Brepols Publishers, 2003), 10:137; And L. Sheldon and G. Macaro, "Materials as markers: how useful are distinctive materials as indicators of master or copyist?," in *European paintings 15th–18th century. Copying, replicating and emulating*, ed. E. Hermens. (London: Archetype Publications Ltd; 2014), 105–12.
[151] Alfeld, See Appendix A.
[152] Henry Chopp, Alicia McGeachy, Matthias Alfeld, Oliver Cossairt, Marc Walton and Aggelos Katsaggelos, "Image Processing Perspectives of X-Ray Fluorescence Data in Cultural Heritage Sciences," IEEE BITS the Information Theory Magazine, 2022: 10,11. https://doi.org/10.1109/mbits.2022.3197100.
[153] Alfeld, See Appendix A.

Hence, the availability of digital images, physical aspects and raw data of paintings is improved since the beginning of the twenty-first century, however, still difficulties are faced. Even if these limitations would become less obstructive, there is always the remark by Fowler, that images (and, accordingly, all sorts of data) should be contextualised. When asking Alfeld how, ideally, a database for material knowledge on paintings should be constructed he described it as follows:

> "It would be an online repository, searchable by artist, epoque and image content. It would have for each painting a high-resolution photograph, X-ray radiograph and any other scientific technique applied to the painting in raw form and evaluated form. So, anyone can download the data and re-evaluate them for education or enjoyment. The data base would link to all publications on the painting and a written summary of the findings. In best case the repository would contain a moderated comment system in that the general public can contribute. Of course, contributions to such a repository needs to be moderated to not be abused for art fraud. A reduced version might be a repository where the technical raw data are stored offline and provided as download link upon request."[154]

### *4.4 Conclusion*

In this chapter, various reasons for the limited dispersion of knowledge on technical art history were pointed out. Due to scientific contributions not being published, difficulties in reconciling STEM with humanities and limited available data, there is a scarcity of available knowledge.

First, a problem that is a direct cause of the limited number of publications on technical art history was discussed. Due to "heated rhetoric" during team investigations, groups have often decided to disband and not publish anything at all. Moreover, academic prestige can be a reason for researchers to take credit for group work. Also, the importance of scientific contributions is not recognised. This problem is topical as became clear from the words of Jansson in 2021; she explained that sometimes entire conservation reports are not published. And, when scientific contributions are published, they are somewhere at the back of a publication or in the appendix.

Part of the issues stated above arise from the difficulties in reconciling the methods of investigation used by STEM and humanity studies; there is no standardised method for collaborative investigations. Researchers from STEM and humanity studies have different concepts of knowledge

[154] Alfeld, See Appendix A.

and different goals; accordingly, different publication formats that allow them to best show the significance of their respective research are applied. Once researchers from respective studies have to collaborate, finding a publishing format in which both their knowledge can be properly combined is challenging. Hence, researchers should familiarize themselves with other concepts of knowledge and create a standardised method of investigation, in order to publish their significant findings collaboratively. The BRCP, with its objective to create a standardized comparable research procedure, made a great start in this respect.

Lastly, there is the problem of limited data/material knowledge available. Not only research has to be published, but also the experimental results of technical art history have to be published in order to get researchers involved and informed on technical art history. Fortunately, the digitalization of primary sources is slowly taking pace. Museums and research groups such as the BRCP put a lot of effort into making high-definition photos of the art publicly and online available. The difficult navigation through source material also becomes resolved by searching tools being developed. However, this mainly involves the digitalization of photographs made with IRR, UVF, XRR and visual light. Yet, raw data and even simple material knowledge, such as elements/pigments found in certain paintings, are not always available. This is, however, difficult to change due to legal issues and the lack of a digital platform. Also, the fact raw data can actually not be published for use without certain knowledge of the specific process of obtaining it, complicates matters. If raw data and images would be made available, on a platform where the data is properly contextualised, this could result in more researchers being able to work with the same data.

Hence, to answer the question of how an environment can be established that allows for the continuous upkeep of technological advancements, it is necessary to look at individual researchers and institutions alike. Researchers should familiarize themselves with other concepts of knowledge and create a standardized method of investigation. The latter could aid in creating a standardized publication format as well. Therewith, institutions could put greater effort into making a contextualised digital platform for distributing raw data and material knowledge on paintings. The more researchers have access to this data, the more can be published with the help of scientific research, and the more can be learned about technical art history.

# Conclusion

Although incredible discoveries have been done by involving science in art-historical research, the collaboration between art historians and scientists is still not common practice. Various factors are of influence on this matter, however, this research focussed on one in particular: the unfamiliarity of art historians with technical art history. At the basis of this research, is the presumption that unfamiliarity with technical art history results from a lack of understanding of scientific research methods and that this could be solved by better informing the art historian. Maryan Ainsworth contributed to the discussion of how art historians could be informed on technical art history with her 2005 publication "From Connoisseurship to Technical Art History: The Evolution of the Interdisciplinary Study of Art in Conservation". In this research, Ainsworth steers toward educating art historians in technical art history early on in their studies and toward publishing more on interdisciplinary research endeavours in order to familiarize the art historian. To verify if after almost two decades her recommendations are still valid, four sub-questions have been formulated which eventually led to the answer to the question: What has been done in the past two decades to establish a better understanding of technical art history among art historians and what aspects could still be improved when looking at education within the Dutch bachelor of art history and the dispersion of knowledge on technical art history?

The first sub-question that was posed was: How could the unfamiliarity of art historians with the scientific research of art and the recommendations of Maryan Ainsworth for combating this unfamiliarity at the beginning of the twenty-first century be explained by looking at the evolution of the scientific research of art over the last century? The initially mainly conservation-oriented scientific research on paintings developed quickly in the museum surrounding, but came to a halt during WWII. After WWII, the Van Meegeren scandal resulted in a plea for more objectivity which, together with the rise of critical theory, resulted in art historians becoming more literature-oriented, refraining themselves from the object. This caused art historians to lose touch with the object-oriented museum researchers. Consequently, the universities lost sight of the object-based, museum-situated scientific research of art. This resulted in museums and universities developing separate research practices and art historians being unfamiliar with the scientific research of art at the beginning of the twenty-first century. To once again reconcile art history with science, in 2005, Ainsworth gave four recommendations: Art historians should be educated early on in their studies; more focus should be given to object-based research; museums and universities should collaborate more and more

interdisciplinary research should be published. Interestingly, her first three measures can be seen as to rewind history to some extent.

The second sub-question was as follows: How does a lack of familiarity with scientific research manifests itself and how could this be addressed? It was found that, at the beginning of the twenty-first century, there were several misconceptions on scientific methods such as the idea that scientific research of art was there to replace connoisseurship or science was only useful for determining the materiality of a painting. Yet, part of these misconceptions is attributable to the mainly science-oriented interdisciplinary research endeavours. Consequently, art historians were reluctant towards scientific research. Although currently more positive accounts are given by art historians, still measures are necessary to properly inform them on scientific research. Art historians need to be educated and the readability of scientific papers for art historians needs to be improved. Furthermore, the focus of interdisciplinary collaborations needs to change, treating more art-historical questions. Another measure, which could help the reconciliation of art history with science is redefining the position of technical art history. Nowadays it is seen as a separate field, while its value and limitations are much better understood when technical art history is seen as a method that could also be used to answer art-historical questions.

The third sub-question was: How can the Dutch art historian be educated in technical art history? From the previous sub-question, it became clear the possibilities of the scientific research of art were not understood and, therefore, among other things, art historians had to be educated on the matter. In the first place, to properly educate the art historian on technical art history, a standard framework for interdisciplinary research needs to be created. Next to that, scientific research of art has to be taught as being another research method, requiring art historians to become familiar with STEM research. On educating art historians in methodology, an example was taken from the study of archaeology. Here, method specific training is given in the bachelor program, which allows archaeology students to collaborate in interdisciplinary research, despite having different specialisations. Even though within art history the focus is put on creating in-depth knowledge in order to contextualise art, the education of several methods in the bachelor curriculum is something which could be implemented for the sake of improved collaboration. De Koomen, furthermore, mentioned that providing the knowledge on scientific research in layers, throughout the bachelor program, was the best way of getting art historians involved with and informed on technical art history. Besides creating a standard framework for interdisciplinary research and teaching on methodology, the bond between museums and universities has to be improved. As was already mentioned by Ainsworth, the museum is indeed well suited to provide students with the context-based learning, necessary to familiarize the art historian on scientific methods.

The fourth and last sub-question that was treated in this paper was: How can an environment be established that allows for continuous upkeep of technological advancements in art history? In order to continuously inform the art historian on advancements in technical art history it is necessary to publish research results. This is, however, complicated due to scientific research on art not being published or scientific contributions being stuffed away somewhere in the appendix of a publication. The reason for the latter might have to with there being no proper way of merging scientific findings with art-historical ones. STEM and humanity studies not only have different methods of investigations but also different concepts of knowledge and goals. Therefore, a publication format has to be developed that allows for art historians and scientist to publish together; showing the significance of their respective research. Furthermore, besides limited publications, there is a problem with access to results of technical research such as material knowledge and raw data. It would be difficult to inform researchers on development in the field of technical art history if they could not check research results on their own. Therefore, the matter of digitalization of research results and making these results publicly and easily accessible needs to be tackled as well. Yet, this is difficult to realise because of legal issues and the lack of a proper publication platform. In the case that a platform was to be realised, Alfeld stated that the data should be properly contextualised. Having contextualised raw data and material knowledge available, together with proper format for collaborative publishing, would not only keep art historians continuously informed on the progress within technical art history, but even make them able to contribute themselves.

In the end, a multifaceted approach is necessary in order to make the art historian familiar with technical art history. Understanding technical art history, seeing the merits of it, and eventually being willing and able to collaborate in an interdisciplinary research endeavour, starts with being educated in this field and remains by improving the dispersion of knowledge on technical art history. Hence, education in the methodology of technical art history together with closer collaboration between museums and universities is necessary. Next to that, to continuously inform the graduated art historian, a greater emphasis should be put on publishing research as well as raw data and material knowledge. Not to mention, for improving both education and publication of interdisciplinary research standardization is necessary: a standard for research and a standard for publishing. In the past two decades, great advancements have been made by bringing more focus on technical art history in the master of art history and by making more data available. However, still improvements could be made in terms of education and publications. Particularly in the education of students early on in their studies and creating a more contextualised database.

When comparing the results of this research to the recommendations given by Ainsworth back in 2005, it can be seen that Ainsworth's words are still valid today. The closer collaboration between

museums and universities is already going well and, therefore, also the more object-based research. Yet, educating art historians early on in their studies, herewith providing object-based training already in the bachelor curriculum, and publishing more on technical art history, are issues that still need more attention.

*To Be Researched*

An interesting angle for investigation, that happened to be outside of the scope of this paper, is the importance of associations, fellowships and funds for technical art-historical research such as the Netherlands Institute for Conservation + Art + Science+ (NICAS), the Migelien Gerritzen Fellowship at the Rijksmuseum, the Kress Foundation and the Getty Foundation. Also developments in education on technical art history were made possible by the Andrew W. Mellon Foundation, which funded seminars on technical art history offered at Yale,[155] technical art history workshops given at New York University,[156] but also a fellowship at the Rijksmuseum focussed on object-based research.[157] However, fundings like the Kress Paired Fellowships for Research in Conservation and the History of Art and Archaeology and Getty Trust were still "underutilized" as was said by Maryan Ainsworth in 2005.[158] If this is still the case, it would be interesting to research what the impact of these kind of institutions and foundations has been on technical art history, moreover, the growth of this impact in recent years, or what the impact could be if properly utilized.

[155] "Grants Database, Yale University: Technical Art History Seminars," Mellon Foundation, 2012, https://mellon.org/grants/grants-database/grants/yale-university/21200715/.
[156] "Grants Database, New York University: Technical Art History Workshops – Phase II," Mellon Foundation, 2013, https://www.mellon.org/grants/grants-database/grants/new-york-university/21300675/.
[157] "Mellon Fellowship: For Research in Art and Cultural History," Rijksmuseum, accessed February 14, 2023, https://www.rijksmuseum.nl/en/education/university-education/fellowship/andrew-w-mellon-fellowship.
[158] Ainsworth, "From Connoisseurship to Technical Art History," 5.

# Appendix A

## Questionnaire Matthias Alfeld

*Maartje Huijbrechts:*
*Do you consider the added value of technical art history to be recognised by the contemporary art world? What is in your opinion indicative of this (lack of) recognition?*

Matthias Alfeld:
I think that the "contemporary art world" recognises the (potential) value of technical art history. I have seen technical art history being integrated into exhibitions by several museums. How it is integrated is often a compromise, but this is the nature of exhibitions that are constraint by budget, space, content, and interest of various parties. They have also found the technical investigation of paintings to be a publicity venue as it is at times featured in public media. Finally, museums tend to be open to discuss authenticity with regard to findings of technical art history, within the expected reservations.
Professional art dealers recognize the potential of enhancing an objects value by a positive technical study. However, the high price of an investigation and the risk of lowering the value of an object make it less attractive.
Collectors are in general discouraged by the high price of technical investigation, but there are exceptions.
Auction houses and trade fairs do hire experts in technical art history, but their degree of influence and extend of their work is unknown to me.

*Maartje Huijbrechts:*
*What obstacles are, in your opinion, faced by researchers(art historians, curators, material scientists, conservators) within interdisciplinary research?*

Matthias Alfeld:

In French a professional training is a “formation professionnelle”. It allows one to be qualified for a job, but brings with it the “deformation professionnelle”, which is the mental deformation gained from learning a profession and learning a certain way of thinking.

Consequently, each of the groups comes with different ideas of what “normal” is, how one should work together and what goals and time scales are. Publishing strategies differ. Should a result be published in a conference proceeding this year, a journal paper next year or an upcoming book in five years? For a professor this may not matter that much, but PhD students might be more affected by it.

Every field of research has its rules and different consequences. A chemist might not realize the effect of casual statements about pigment use (s)he makes based on a casual interpretation of data on a conference, as it can still be corrected in the paper later. The same way an art-historian needs to avoid the scientists in the team cringing if (s)he tries to explain a scientific method in a talk or present their very own interpretation of findings that defies physics.

It is getting even more complicated in international collaborations as one needs to not only deal with professional, but also national deformations. The Netherlands are a land of flat hierarchies, but other European nations are different.

My personal conclusion is that an interdisciplinary project starts mostly with an elaborate alignment of goals and expectations. Being open about that early on can reduce the problems considerably.

*Maartje Huijbrechts:*

*Art historian Maryan Ainsworth was a member of the interdisciplinary research team at the Metropolitan Museum of Art in 1982. She remarked on her experiences:*

> *“I quickly learned that this confluence of different disciplines and new technologies could not be learned from books. […] It was strictly on-the-job training – a component, I came to understand, of any interdisciplinary project involving curators, conservators, and conservations scientists.”*[159]

*Do you still consider technical art history to be a practice solely learned “on-the-job”? And why?*

[159] Maryan Ainsworth, “From connoisseurship to Technical Art History: The evolution of the Interdisciplinary Study of Art,” *The GCI newsletter 20, 1* (2005): 3.

Matthias Alfeld:

I believe that a true understanding of any matter requires more than reading a textbook. And this is why university degrees matter. Also, practice cannot be replaced by books, as all the unwritten rules and practical details are very difficult to be put in a book.

There are many books that are good to read for a professional in this field, as they can bring a perspective far beyond what is used in one's direct surroundings. No institution in the world has all techniques available for hands on training and this would also be excessive. But I am not aware of any one book that provides more than the basics of technical art history. On the one hand as few people have the knowledge to write such a book, and, on the other hand, as it is difficult to properly estimate the entry level of readers and take their previous knowledge into account.

Why can one not study it? In my experience, the teams I worked with contained people with strong core knowledge of one field, as in my case spectroscopic imaging, and more cursory knowledge on the other fields in the project. Persons with moderate knowledge in all fields of the project currently do not exist and their role would need to be found.

In a different project, where physicists used X-rays to investigate plants, I jokingly explained my role as a chemist as "the person that understands half the problem and half the solution as the physicists understand the solution but not the problem and the biologists do the opposite." Such a role might be taken by a studied art scientist, but one might wonder where in the field such a scholar would find a position. And as a teacher at an engineering faculty, I strongly believe that we have to be careful to offer studies that do not lead reliably to employment.

Finally, gathering the academic staff to teach technical art-history on an encompassing and representative level is a challenge.

*Maartje Huijbrechts:*

*Emma Jansson stated the following in 2021:*

> *"[..] as will no doubt be familiar to both conservators and researchers who use technical analysis as a method of inquiry, too often are our contributions limited to either an appendix or technical entry at the back of a publication, or otherwise remain inaccessible in the form of an unpublished conservation report."*[160]

[160] Emma Jansson, "Toward a "Theory" for Technical Art History," *Materia: Journal of Technical Art History* 1, no. 1 (2021), https://volume-1-issue-1.materiajournal.com/article-ej/#fn:3

*How could the problem of a limited amount of (properly) published results of technical art-historical research be solved according to you? Could the implementation of a publication standard, where both technical and art-historical findings can be shared, be helpful? And why, or why not?*

Matthias Alfeld:
One the one hand, I would say that we already have too many publications. There is a deluge of papers that are of limited value and mainly serve to explain the existence (and employment!) of a researcher but make little contribution to the field. So, more regular publications on case studies should not be the goal. However, one can still innovate on the data science regarding large collections of data and put the art-history in the background. But not all conservators and researchers that do technical analysis have time and opportunity for that.
On the other hand, it would be fascinating to just pull all the technical investigations of the paintings of one artist and compare them. Having a repository for studies of different art works, each with a summary of the findings would be of interest but run into the same problems discussed in question 5. Further, a *Journal of Irrelevant Case Studies (JICS)* might not be a desirable journal to publish in.

I think that for an art-historical study the data should be made available to everyone, best as Digital Support Information or with the painting on the museum's homepage. And making this a condition for publication would be a *publication standard*/

*Maartje Huijbrechts:*
*Can you explain why certain data, such as the RAW-data from MA-XRF scans, are not publicly available?*

Matthias Alfeld:
There are three levels of problems:
- Legal: Who owns the data? Museums can be reserved about photographic reproduction of their works and with technical imaging that is not obtainable this can be even more an issue.
- Infrastructure: If one publishes data in an academic session the longevity needs to be ensured, so that the data is still available in 5, 10, 15 years. Further, these data sets are large, several GB, thus requiring a significant investment in servers and maintenance. The TU Delft is providing such services for its employees to make raw data available, but this is only for data related to published articles.
The file formats are also an issue. One needs to convert all data to a common format that is easily readable also in the future, so binary data files or HDF5 might be a solution, but the proper storage of

meta data needs to be discussed. Even minor variations can be code breaking. One of my programs ran into trouble as the manufacturer changed the capitalisation of certain attributes in the header file. In order to achieve such a standardization a strong institution would need to take the lead, also by providing sufficient content to serve as a fundament for further sharing.

- Technology: It is common practice to be positive about ones work and the way the data was acquired. It is commonly one or two sentences, like "use was made of instrument XXX and parameters YYY and so the entire data was acquired in ZZZ hours." The problem is that this raw data is often not directly interpretable. It needs to be normalized and maybe pre-treated before evaluation, i.e. to remove oversaturated pixels, correct for dead time or correct for delayed detector triggers and shifted pixels or even lines. In case of XRF this can also be done in a post processing step. Also, to investigate an entire painting also commonly several scans are stitched. So, which data set should be published? The raw detector output? Or the pre-treated data? The first would be much harder to analyse but be untampered by the expectations of the experimentalists.

Also, there are different instruments out there with different configurations that influence the data and relative intensities of peaks. The users need to be aware of this. Amateurs that are not aware of this and try to "prove" their pet idea are a scary thought.

With all these obstacles one also has to ask: Why publish the data? It would make the entry into the field easier, allow people to reproduce results and result in a limited number of additional citations for the original publication. However, while all these things are a benefit, researchers tend to have a high workload and will most likely not prioritize them as there is little incentive to doing this. Consequently, only very few data sets are available.

*Maartje Huijbrechts:*

*According to you, how would ideally a database for material knowledge on paintings be constructed?*

Matthias Alfeld:

It would be an online repository, searchable by artist, epoque and image content. It would have for each painting a high-resolution photograph, X-ray radiograph and any other scientific technique applied to the painting in raw form and evaluated form. So, anyone can download the data and re-evaluate them for education or enjoyment.

The data base would link to all publications on the painting and a written summary of the findings. In best case the repository would contain a moderated comment system in that the general public can

contribute. Of course, contributions to such a repository needs to be moderated to not be abused for art fraud.
A reduced version might be a repository where the technical raw data are stored offline and provided as download link upon request.

*Maartje Huijbrechts:*
*Technical research is often empirical and a standardized paper format is used to publish its results. Art-historical research is characterized by a wider variety of research methods and, therefore, a wider variety of writing styles is adopted. Does this difference in publishing style complicate collaborative writing endeavours?*

Matthias Alfeld:
No. In all my experience it was always clear at which journal/audience a publication was aimed. Consequently, a lead author from that field designed the text and the other authors provided detailed sections. This sometimes required several meetings and discussions but was compared to other professional deformations seldom an issue. Inexperienced lead writers, like PhD students (I was one), were sometimes not up to the task of managing their co-authors.

# Appendix B

## Interview Arjan de Koomen

*Maartje Huijbrechts:*
*Tegen welke problemen wat betreft samenwerking (bijv. communicatie, vaststellen onderzoeksdoelen, vastleggen onderzoeksresultaten etc.) lopen onderzoekers (kunsthistorici, curatoren, materiaal technische onderzoekers, restauratoren) naar uw mening aan binnen een interdisciplinair onderzoek?*

Arjan de Koomen:
Ik heb meerdere soorten samenwerkingen gezien, onder andere binnen het NICAS en de samenwerking die ik beschreef in mijn onderzoek "Inquiring Interdisciplinarity: Merging Art History and Art Technology in the Netherlands".[161] Het kan uiteraard mooie resultaten opleveren, maar interdiscilpinair samenwerken kent ook specifieke problemen. Tijdens het samenwerken loopt men tegen verschillende dingen aan. Een probleem welke ik onder meer beschrijf in mijn onderzoek is de manier hoe de wetenschap in elkaar zit, dat er gescoord moet worden. Je moet laten zien dat je iets te brengen hebt in dit veld. Daardoor is er soms niet het geduld, of te veel scoringsdrift, om dingen gezamenlijk aan te bieden. Ook zie je dat mensen binnen een samenwerkingsproject met de vlag ervandoor gaan. Hieruit blijkt dat samenwerking wel een 'vehicle' is om iets interessants te doen, maar dat gezamenlijkheid niet het doel is en blijft.

Een ander problematisch aspect van samenwerking is het samenwerken *an sich*. Samenwerking met een gelijkgestemde kan al lastig zijn. Binnen je eigen vakgebied kan je bijvoorbeeld al andere visies hebben. In samenwerking met andere disciplines kan dat nog lastiger zijn.

Kortom, wetenschap wordt gestuurd door prestige. Alhoewel prestige sowieso een slechte raadgever is, wordt het ook nog in samenwerking met verschillende disciplines en zodoende verschillende prestigepunten, moeilijk om elkaar echt te verstaan.

[161] Koomen de, "Inquiring Interdisciplinarity."

*Maartje Huijbrechts:*
*Hoe uit deze samenwerkingsproblematiek zich in de praktijk?*

Arjan de Koomen:
Een interessant voorbeeld komt van onze studenten die we op fieldwork sturen. Tijdens dit fieldwork doen ze mee aan een interdisciplinair onderzoeksproject en hierbij concluderen studenten bijna altijd dat zulke projecten van de buitenkant heel wat lijken, maar dat het vooral vaak wachten is. Mensen stappen heel vaak in projecten zonder dat er eigenlijk de tijd voor is en zonder dat er een duidelijke lijn of onderzoeksvraag is. Er is dan ook dikwijls wel de wil om in iets interessants te stappen, maar niet de organisatie om het te doen. Daar ben ik zelf ook tegenaan gelopen.

Verder is een heel klassiek probleem dominantie binnen samenwerking. Een goed voorbeeld is het MOLART-project; hier is veel onderzoek gedaan naar de moleculaire samenstellingen en eigenschappen van kunst. Materiaalkundig zijn er interessante dingen gevonden, maar kunsthistorici begrepen op een gegeven moment niet meer waar die informatie relevant voor was. De vragen die worden gesteld binnen de kunstgeschiedenis zijn namelijk van een heel andere aard dan vragen binnen de materiaalkunde. Kunsthistorici vonden toen nogal eens dat scientists er met ‘de pot geld vandoor gaan’, zonder dat ze überhaupt een goede onderzoeksvraag hebben.

Ik zeg niet persé dat ik dat ook altijd vind. Het is gewoon heel interessant dat die enorme investeringen, die met het Molart en De Mayerne Project gepaard gaan, eigenlijk nauwelijks iets te maken hebben met de academische kunstgeschiedenis. Je hebt dan wel een claim van, ‘We gaan die werelden bij elkaar brengen,’ maar in de praktijk zijn die werelden helemaal niet bij elkaar gebracht en is zelfs, in bepaalde zin, de afstand tussen beide vergroot. Bij het NICAS is er een nieuwe poging gedaan om science en kunst bij elkaar te brengen, maar dan nog zag je weer dat science, qua samenstelling van het bestuur, prestige en fondsen, heel dominant was. In dat geval is het vrij lastig om kunsthistorici er nog bij te betrekken. Daarbij speelt mee dat kunsthistorici niet geëquipeerd zijn om een vraag te stellen die beantwoord kan worden met dit soort technisch onderzoek. En andersom geldt hetzelfde. Kortom, er zijn enorm veel aspecten waar men tegenaan loopt en het is maar goed dat de bestuurders, geldgevers en de buitenwereld vaak niet de achterkant zien van deze projecten.

*Maartje Huijbrechts:*
*U zegt dus ook dat kunsthistorici niet geëquipeerd zijn om vragen te stellen die gebruik maken van technisch onderzoek. In die lijn volgt mijn volgende vraag. Deze gaat over de mogelijkheid voor studenten om o.a. af te studeren, gebruik makende van experimentele onderzoeksmethoden (zoals technische kunstgeschiedenis):*

*Volgens Matthew Long en Roger Schonfeld, onderdeel van de Ithaka S+R organisatie, maakt de verscheidenheid aan methoden en onderwerpen die kunstgeschiedenis omvat het moeilijk om sommige studenten te ondersteunen tijdens hun afstuderen. Niet alle scriptiebegeleiders zijn bekend met hun onderwerp/onderzoeksmethode waardoor studenten er alleen voor staan tijdens hun onderzoek. Daarom adviseren Long en Schonfeld om het huidige curriculum van kunstgeschiedenis te herzien ten behoeve van studenten die zich willen verdiepen in veranderende onderzoeksmethoden en onderwerpen. Veel studenten staan namelijk, volgens Long en Schonfeld, open voor experimentele onderzoeksmethoden, maar omdat ze er niet mee in aanraking komen tijdens hun studie wordt het ingewikkelder om dit na te streven.*[162] *(Met experimentele onderzoeksmethoden hebben Long en Schonfeld het voornamelijk over digitale methoden, waar bijvoorbeeld kwantitatief onderzoek naar grote datasets kan worden gedaan, maar volledigheidshalve zou je hier technische kunstgeschiedenis ook tussen kunnen scharen).*

*Is het probleem wat Long en Schonfeld schetsen voor u herkenbaar? Zo ja, wat zou u eraan kunnen/willen doen? Zo nee, wat draagt er volgens u aan bij dat het binnen uw instantie niet het geval is?*

Arjan de Koomen:

Waar je naar mijn mening kunsthistorici op traint is moeilijk te omschrijven. Je leert een hoop, maar wat leer je nou eigenlijk? Ik zou het formuleren: je leert een kunsthistoricus om tussen een accumulatie van kennis die je meegeeft significante relaties aan te wijzen. Zoals een relatie tussen een kunstwerk en -zeg- de Reformatie of artistieke idealen, bijvoorbeeld. De kunst van het leggen van dergelijke significante relaties is iets waar een scientist niet op getraind is. Een goede kunsthistoricus kan dingen met elkaar in verband brengen en kennis speelt daarin een belangrijke rol. Het is eigenlijk een zogeheten *erudition-based* vakgebied. Je moet kennis tot een bepaald niveau hebben en dan kan je er pas mee gaan spelen. Daarom gebeurt het ook zelden, zoals Einstein liet zien bijvoorbeeld, dat je op je twintigste al een briljant kunsthistoricus bent. Het is een stapelproces waarin je steeds makkelijker tussen kennis en fenomenen de overtuigende verbanden weet te leggen.

Het empirische en cognitieve heeft een vrij geringe rol in de opleiding. Ik zou zeggen, té gering. Dat heeft ook te maken met wat er met de geesteswetenschappen is gebeurd; überhaupt het feit dat wij kunstgeschiedenis indelen onder geesteswetenschappen, wil zeggen dat we kunst zijn gaan beschouwen als het product van de menselijke geest. We zijn hierbij min of meer vergeten dat het iets

[162] Matthew p. Long and Roger C. Schonfeld, *Supporting the Changing research practices of art historians* (Ithaka S+R, 2014), https://doi.org/10.18665/sr.22833, 48.

is wat gemaakt is, dat het een fysiek object is en dat fysieke eigenschappen heeft en waar de totstandkoming ervan in de eerste plaats een fysieke uitdaging is geweest. Kunsthistorici kijken naar kunst of het alleen een spiritueel vraagstuk is; alsof die kunst bij wijze van spreken komt neerdalen uit een soort ideeënwereld. Dat is niet zo vreemd, want een bekende vader van het vak, de filosoof Hegel, leerde dat kunst een manifestatie van een spirituele entiteit was die hij de 'Geist' noemde. Archeologie heeft dat anders aangepakt; dat is meer richting de science kant gegaan. Archeologen staan doorgaans ver van de kunsthistorici, zelfs van die zich op antieke kunst richten. Archeologen willen eerder antropologen en scientists zijn, en zijn daarmee een beetje anti-kunst geworden.

Kortom, het empirische heeft amper een plek binnen de kunstgeschiedenis. Daarbij is er een discours, genaamd *Critical Theory*, overgekomen vanuit Amerika waarin geesteswetenschappers elkaar vertellen dat geloven in de waarheid heel naïef is en dat alles gezien moet worden als een sociaal construct. Deze onderzoekstrend ontstond in de V.S. in de jaren zeventig en tachtig en is iets later naar Europa overgewaaid. Hierin heeft alles te maken met sociale machtsverhoudingen. Binnen deze benadering moet je kunst niet onderzoeken op wat het feitelijk is of op wat het historisch was, maar is vooral een sociaalkritische analyse interessant. Bijvoorbeeld, dat een mythologisch schilderij van Rubens bijdraagt aan de beeldvorming en onderdrukking van vrouwen. Dan wordt de hedendaagse problematiek belangrijker dan de historische werkelijkheid. Deze trend heeft de kunstgeschiedenis nog meer tot een wetenschap van kritische attitudes gemaakt. Alles wat empirisch was, gold in deze opvatting als naïef en onkritisch, want als je geloofde in feiten droeg je bij aan een construct wat gemaakt was om andere mensen te onderdrukken. Sommigen kunnen zich hierin heel goed vinden en anderen vinden deze beweging een soort plaag.

Tegelijkertijd zag je in musea dat technisch onderzoek opkwam. Na verloop van tijd kon er ook steeds meer: apparatuur werd steeds toegankelijker en betaalbaarder. Deze ontwikkelingen gingen grotendeels voorbij aan de academische kunstgeschiedenis. Die was bezig met traditionele, geesteswetenschappelijke kunsthistorische vragen beantwoorden of met critical theory.
Toch zijn kunsthistorici langzaamaan wakker aan het worden en beseffen ze dat technische kunstgeschiedenis, NAAST de al bestaande onderzoeksmethoden, nieuwe perspectieven bied op wat je kan onderzoeken aan een kunstwerk. Daarmee is ook de realisatie verbreid dat een kunstwerk uiteindelijk een fysiek voorwerp is. Kunsthistorici hebben natuurlijk het fysieke aspect van kunst nooit ontkend, maar er ook nooit enige betekenis gegeven.

Heel belangrijk is daarvoor het succes van de tentoonstelling in Londen 'Art in the Making' geweest. Toen bleek opeens: "Hé, er is iets te vertellen, iets te leren, iets te snappen van technisch onderzoek!" Deze tentoonstelling heeft ook heel veel bijgedragen aan het besef bij mensen zoals ik, dat technisch onderzoek inderdaad interessante onderzoeksmogelijkheden biedt.

En er zijn natuurlijk uitzonderingen geweest, zoals van Asperen de Boer met de infraroodreflectografie en het werk van Ernst van de Wetering. Echter, ze gebruikte technisch onderzoek vooral in dienst van toeschrijving; het was in die zin niet echt technische kunstgeschiedenis.

Ikzelf ben een jaar of tien geleden geïnteresseerd geraakt, mede door het feit dat ik in een museum heb gewerkt als conservator beeldhouwkunst, daar had ik veel met restauratoren te maken en met fysieke kwesties. Ik werkte daarna bij het ministerie voor de inspectie van cultuurbezit. Daar had je ook te maken met vragen als: Hoe bewaar je kunst het beste? En wat zijn fysieke problemen van kunstwerken? Daardoor was ik iets ontvankelijker voor deze nieuwe technologische ontwikkelingen binnen de kunst. Toen ik hier aan de UvA kwam te werken ben ik dan ook meteen begonnen met kunsttechnieken in het eerste jaar te introduceren. Dit ontbrak in het toenmalige curriculum of, om precies te zijn, er werden onderdelen heel onsystematisch gepresenteerd; docenten wisten er dikwijls weinig over te zeggen.

Toen ik dit vak introduceerde bleek een collega in Leiden al jaren bezig te zijn met een soort handboek of dit gebied: 'kunsttechnieken in historisch perspectief.' Ik werd voor nooit geleverde bijdragers benaderd en heb dat boek als co-auteur en co-redacteur helpen afmaken. Het kwam uit in 2011.

Vlak erna nodigde ik Marjolijn Bol uit om een keuzevak op de UvA te geven. Zij was promovendus in een Utrechts NWO project dat 'impact of oil' heette. Daar werd nagedacht over wat olie gebracht heeft voor de kunstgeschiedenis. Dat is echt een mooi voorbeeld waar de kunsthistorische betekenis van materiaaleigenschappen werden onderzocht. Met haar heb ik de eerste ideeën geformuleerd om ook een MA-programma op dit gebied te ontwikkelen. Het is in 2015 van start gegaan. Los van Kunstgeschiedenis, maar bij Conservering en Restauratie.

Kunsttechnieken in het eerste jaar van de Bachelor is nuttig en leuk, met practica en dergelijke, maar ook wat een eenmalig en vrijblijvend. Daarom was het van belang om ook op een hoger niveau dit vakgebied te onderwijzen. Kortom, zo zijn we door gaan bouwen zodat er een opleiding ontstond.

Samenvattend kun je stellen dat het empirische, zowel vanwege historische wortels als de dominantie van critical theory, op afstand stond. Maar misschien juist door het credo "er bestaat geen waarheid meer, er is alleen maar discours", is de behoefte voor het empirische wel weer toegenomen. Toen ik hier begon in 2015 hadden de kunsthistorische collega's maar weinig interesse; nu is dat zeker toegenomen. Nu zegt de opleiding kunstgeschiedenis van de UvA 'ja, bij ons staat het object centraal.' Doordat er in kleine stappen, door een aantal mensen, iedere keer weer iemand iets bijdraagt aan deze objectgerichte kunstgeschiedenis, voelt het als een signatuur, een kleine beweging zelfs.

Experimentele onderzoeksmethoden, zoals technische kunstgeschiedenis, en het empirische zijn dan ook in opkomst binnen de kunstgeschiedenis. Toch heeft het nog geen vaste plek binnen de

studie en zal het ook moeilijk zijn om dit te veranderen doordat de meeste collega's zich er niet in thuis voelen.

*Maartje Huijbrechts:*
*Wat dient volgens u te veranderen in het curriculum van de studie kunstgeschiedenis om technische kunstgeschiedenis beter te laten integreren in kunsthistorisch onderzoek?*

Arjan de Koomen:
Het is belangrijk dat kennis in lagen kan worden opgebouwd. Wij hebben hier een heel goed fundament, maar de leerlijn wordt eigenlijk niet genoeg doorgetrokken. Om bij ons technische kunstgeschiedenis beter te integreren, moeten we zorgen dat er na dat eerste jaar ook nog werkgroepen zijn en dat er stages komen. Je moet eigenlijk zorgen dat het een traject is waar je in kan groeien. Nu merk je dat het enthousiasme wat mensen soms voelen in dat eerste jaar, niet gevoed blijft. Individueel kunnen studenten door stage of scriptie natuurlijk er wel in verder.

In jouw vraag heb je het namelijk ook over 'kunsthistorisch onderzoek,' dat is eigenlijk wat wij in deze bachelor niet doen. Het is een kennismaking met technisch onderzoek naar kunst, maar niet naar technisch kunsthistorisch onderzoek. Dit laatste doen studenten nu wel in de master en we hebben een minor conservering en restauratie waar dat ook meer tot uiting komt.

*Maartje Huijbrechts:*
*Technisch onderzoek is vaak empirisch en kent een standaard opmaak wanneer een paper wordt geschreven. Kunsthistorisch onderzoek is gevarieerder en heeft daardoor ook gevarieerdere schrijfvormen. Is het, in dit licht, volgens u soms lastig om in samenwerking met materiaal-technische wetenschappers te schrijven?*

Arjan de Koomen:
Technische verslaggeving, die tekenend is voor bètastudies, hanteert een heel ander soort betrouwbaarheidsindicatie. In mijn tak is je betrouwbaarheid afhankelijk van de mate waarin je overtuigend bent. Wij kunsthistorici moeten, door de bronnen goed weer te geven en door niet te verdraaien wat de feiten zijn of wat iemand ooit gezegd heeft, onze betrouwbaarheid laten zien; daar zit onze transparantie. Wat betreft de standaard opmaak van technisch onderzoek is het daarentegen belangrijk dat waar ook ter wereld, en ook op de lange termijn, iemand begrijpt wat je gedaan hebt en dit kan reproduceren.

Jouw vraag eindigt met, is het lastig om in samenwerking te schrijven? Ja, je ziet dat publicaties soms opgesplitst moet worden. Bijvoorbeeld, wanneer een catalogus gemaakt wordt, dan heb je een technische entry en een kunsthistorische entry. Vervolgens krijg je het probleem, wat zegt die technische entry dan? Zegt dat iets meer over het kunstwerk? Wat heb je eraan? Als respons wordt vaak gezegd: "Ja, maar we moeten die gegevens toch neerzetten, misschien dat over 20 jaar daar iemand iets mee doet." Je merkt dan ook vaak dat kunsthistorici opmerken: "Moeten we nou al die mensen gaan inhuren voor dat technische onderzoek, dat duurt altijd zo lang." Technisch onderzoek gaat ook niet snel. Dan denk je, honderd kunstwerken door zo'n apparaat halen dat gaat toch wel lukken binnen een jaar, maar nee, dat kost dan weer jaren en is nog duur ook. Vervolgens komt er uit die onderzoeken vaak weinig significants of iets dat vanzelfsprekend is. En ja, dat er soms iets anders onder een schilderij zit, zoals een *pentimento,* dat gebeurt zo vaak. Kortom, het is niet zo dat dit soort onderzoek altijd hele significante ontdekkingen met zich meebrengt. Maar laten we niet vergeten, soms wel.

Zelf denk ik dat het een systematische kennisverzameling is die nuttig zal blijken, toch begrijp ik de klacht van kunsthistorici ook heel goed.

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