Technical analysis of the roof bosses for the Domkerk's library in Utrecht

How do the roof bosses by Jan van Schayck, Ernst van Schayck and Dirck Scay represent the *Utrechtse Stijl* 1450-1550?

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Summary and Abstract

Summary

This thesis researches four roof bosses from the Domkerk in Utrecht by Jan van Schayck, Ernst van Schayck and Dirck Scay in 1497. Macro photography, microscopy, optical microscopy, XRF spot-analysis, micro-Raman and SEM-EDX are used and compared to findings from previous research. The sculptures mostly equal the *Utrechtse Stijl* from 1450 to 1550 in working method, but pigments used for incarnates and ground layers are different.

Abstract

This thesis is the result of the research with which I conclude my masters Technical Art History at the University of Amsterdam. The topic of this thesis are four roof bosses, which together belong to a group of nine sculptures in total, made in Utrecht in 1497 for the library of the Domkerk. The sculptor of these artworks is Jan van Schayck. Two men were employed to apply the polychromy. Their names are Ernst van Schayck and Dirck Scay. The nine sculptures are spread across three collections in the Netherlands and in the United Kingdom. Only in 1991 and 1997 the connections between these sculptures in different collections were rediscovered.

For Jan van Schayck, a small oeuvre is known, but about the painters and their working methods we have little information. This thesis investigates these artists and their working methods. Furthermore, a comparison will be made with results from previous research to contextualise the findings and explore whether they are similar to the general working method in Utrecht from 1450-1550. Specific focus will therefore be: the ground, underlayers, paint layers and gilding.

For the masters' thesis, every student planning to perform technical analysis is assigned an advisor working for the Rijksdienst voor het Cultureel Erfgoed (RCE), who advises on the utilised methods and supports the execution of the chosen methods. Macro photography, microscopy, optical microscopy, XRF spot analysis, micro-Raman and SEM-EDX were used on the four roof bosses in the collection of the Centraal Museum in Utrecht and the Museum Catharijneconvent in Utrecht.

Findings include some distinctive similarities between the roof bosses and other sculptures from Utrecht, such as the manner in which the ground is applied, the use of coloured underlayers and the use of certain pigments. However, differentiations from the common method are found in the application of incarnates, which were applied on top of a green layer, and the presence of vermillion in the ground. Even though the painters of sculptures are often seen as artists of lesser competence, the opposite proves true for Ernst van Schayck and Dirck Scay. Both of them received considerable commissions and praise, Dirck Scay even being the chairman of the artists guild in Utrecht for several years.

Preface

This thesis is part of the curriculum of Technical Art History, a track of Conservation & Restoration at the University of Amsterdam (UvA). The thesis is executed at the end of the two-year master programme and the topic is chosen by the student. Dr. Arjan de Koomen is one of the founders of the Technical Art History programme and has a long-spanning academic career, in which sculpture plays an important role, so it seems only fitting that he was my supervisor.

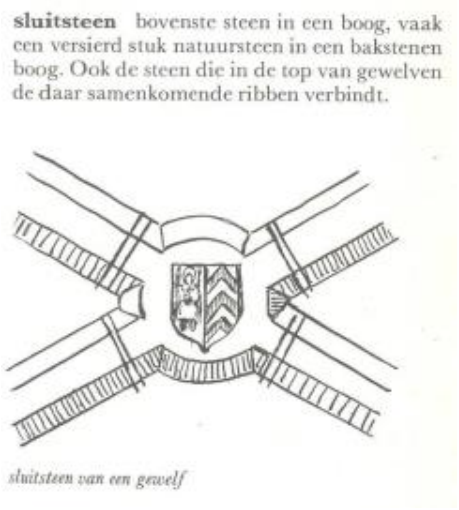
Technical analysis is an integral part of the research of a Technical Art Historian, for which in this case assistance and advice was offered by the Rijksdienst voor het Cultureel Erfgoed (Cultural Heritage Agency, RCE). The UvA and the RCE have strong connections as they both reside in the Ateliergebouw in Amsterdam. Every year, UvA master students get assigned an RCE contact person and analysis supervisor for support during their master thesis. In my case this was Rutger Morelissen, who is a researcher at the Cultural Heritage Laboratory. Technical analysis was for the most part executed and interpreted under his guidance.

The artworks that were researched for this thesis belong to two collections: the Centraal Museum in Utrecht and the Museum Catharijneconvent in Utrecht. It was impossible to transport the artworks to the Ateliergebouw. Therefore, Rutger Morelissen and I travelled to Utrecht to perform in-situ analysis. The results were subsequently analysed in the Ateliergebouw.

I started this thesis because I was interested in stone and sculpture, but I found my interest gradually moved towards wanting to unravel the mysteries of polychromy. It was a true delight to execute technical analysis in the presence of an expert and to get a little closer to understanding the workshop of a medieval polychrome painter.

A note on terminology

The sculptures that are researched in this thesis were originally meant to be roof sculptures, at the intersection of the vault ribs. There are two types of these sculptures: artworks that are incorporated in the architecture and artworks that are purely decorative, hanging from a hook. The subjects of this thesis are part of the latter group. In Dutch they can be indicated as *gewelfschotel* or *sluitsteen*.[1][2] In the original commission for the artworks, they were indicated as *sloetsteyn*.[3] However, a sluitsteen now often refers to artworks that are incorporated in the architecture (fig. 1), which is probably why these specific roundels in later publications are named gewelfschotels.[4]



According to Haslinghuis and Janse's *Bouwkundige termen*, a gewelfschotel is a "Houten schijf, doorgaans cirkelvormig, al of niet met houtsnijwerk en beschilderd, bevestigd op de kruising van de gewelfribben in een houten tongewelf. Veelal versierd met daarin bevestigde stralen."[5] They translate gewelfschotel as *circular vault boss*. Sluitsteen is translated as *keystone* or *boss*. James Stevens Curl did not incorporate the term (circular) vault boss in his *A dictionary of architecture*, but he did include boss: "Formerly *boce,* carved convex blocks, often richly decorated, at the junction of *vault-ribs, etc. in medieval architecture."[6]

Figure 1. *Haslinghuis's depiction of a* sluitsteen*. This clearly shows a sluitsteen is part of the architecture, and not hanging separately.*

One of the most important sources regarding these specific ceiling sculptures is Paul Williamson's "Roof bosses from Utrecht and Jan van Schayck, *Beeldensnijder**", in which they are called *roof bosses*.[7] This terminology is not common and it seems to be a pleonasm, since a boss is inherently part of the roof structure. However, for the purpose of engaging in the discussion once started by Williamson, this thesis will use "roof bosses" to indicate the artworks under investigation.

It is highly plausible that the roof bosses originally hung in the *Librije* of the Domkerk in Utrecht. A *librije* is the Dutch medieval word that indicates a library.[8] Haslinghuis: "in oorsprong een van de lokalen die zich in de loop van de middeleeuwen uit de dienstvertrekken bij de kerk (-> diaconicon, -> archief, -> sacristie) hebben ontwikkeld."[9] In the Domkerk, the librije was indeed built adjacent to the sacristy.

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[1] Edward Johannes Haslinghuis and Herman Janse, *Bouwkundige termen: verklarend woordenboek van de westerse architectuur- en bouwhistorie* (Leiden: Primavera Pers, 1997), 148.
[2] Haslinghuis and Janse, *Bouwkundige termen*, 331.
[3] Wybe Jappe Alberts, *Bronnen tot de bouwgeschiedenis van den Dom te Utrecht: tweede deel, tweede stuk* ('s Gravenhage: Nijhoff, 1946), 464.
[4] Haslinghuis and Janse, 331.
[5] Idem, 148.
[6] James Stevens Curl, *A dictionary of architecture* (Oxford: Oxford University Press, 1999), 87.
[7] Paul Williamson, "Roof bosses from Utrecht and Jan van Schayck, *Beeldensnijder**" *Oud Holland* 105 (1991), 142.
[8] Haslinghuis and Janse, 233.
[9] Haslinghuis and Janse, 53.

1. Introduction

This thesis researches four late-gothic roof bosses, which belong to a group of nine, highly likely from the library in the Domkerk in Utrecht (**fig. 2-9**). The introductory chapter starts with discussing the complete group of sculptures and their iconography, followed by their original location and provenance. The introduction concludes with the research aims.

Figure 2. God the Father, Jan van Schayck, Ernst van Schayck and Dirck Scay, 1497, stone, polychromy and gilding, 49 cm x 47 cm x 11 cm, Museum Catharijneconvent, Utrecht, inv. BMH bs332. Image by Museum Catharijneconvent, Utrecht, by Ruben de Heer.

Figure 3. Saint Jerome, Jan van Schayck, Ernst van Schayck and Dirck Scay, 1497, stone, polychromy and gilding, 33.8 cm x 33.8 cm x 12.3 cm, Centraal Museum, Utrecht, inv. 1812/001. Image by Centraal Museum.

Figure 4. Saint Augustine, Jan van Schayck, Ernst van Schayck and Dirck Scay, 1497, stone, polychromy and gilding, 33.7 cm x 33.7 cm x 12.0 cm, Centraal Museum, Utrecht, inv. 1812/002. Image by Centraal Museum.

Figure 5. Saint Gregory, Jan van Schayck, Ernst van Schayck and Dirck Scay, 1497, stone, polychromy and gilding, 33.8 cm x 33.8 cm x 12.0 cm, Centraal Museum, Utrecht, inv. 1812/003. Image by Centraal Museum.

Figure 6. *St. Matthew*, Jan van Schayck, Ernst van Schayck and Dirck Scay, 1497, stone, polychromy and gilding, 33.2 cm x 33.2 cm x 10 cm, Victoria and Albert Museum, London, inv. A.14-1945. Image by Victoria and Albert Museum.

Figure 7. *St. Mark*, Jan van Schayck, Ernst van Schayck and Dirck Scay, 1497, stone, polychromy and gilding, 33.3 cm x 33.3 cm x 8 cm, Victoria and Albert Museum, London, inv. A.15-1945. Image by Victoria and Albert Museum.

Figure 8. *St. Luke*, Jan van Schayck, Ernst van Schayck and Dirck Scay, 1497, stone, polychromy and gilding, 31.8 cm x 29 cm x 9 cm, Victoria and Albert Museum, London, inv. A.16&:2-1945. Image by Victoria and Albert Museum.

Figure 9. *St. John*, Jan van Schayck, Ernst van Schayck and Dirck Scay, 1497, stone, polychromy and gilding, 33.2 cm x 33.2 cm x 9.8 cm, Victoria and Albert Museum, London, inv. A.17-1945. Image by Victoria and Albert Museum.

A group of nine roof bosses: iconography and condition

The nine roundels, of which eight are still known today, depict God the Father making a blessing gesture (**fig. 2**), the church fathers (**fig. 3-5**) and four Evangelists in their symbolic form (**fig. 6-9**). It is supposed that the church fathers originally were a group of four, also containing a depiction of Saint Ambrose. There is no irrefutable proof that a roof boss depicting Saint Ambrose was indeed made and is therefore missing, but the tradition of depicting the four great (Latin) church fathers together – and the lack of a tradition of depicting three church fathers – is a very strong indication.[10]

All of the roof bosses are sculpted on roundels with a diameter of approximately 33.8 centimetres, with the exception of the *God the Father* figure, which is oval and has a diameter between 47 and 49 centimetres. Again with the exception of God, they all are fully surrounded by a border of clouds and a flat but unevenly carved red coloured background. The *God the Father* roundel has a similar cloud-like border, but it does not surround him completely. Instead, the clouds become smaller towards his head, creating a perspective that fits the sculpture being viewed from below. The other sculptures do not give an indication of perspective directly, but it is noteworthy that they all contain incredible detail in spots which would not have been visible were they to be viewed straight on. The *God the Father* roof boss contrastingly has no background and is completely stripped of its original polychromy with only hues of red remaining.

The roof boss depicting God shows him with a long curly beard falling loosely over his chest. His expression is sober and somewhat strict, with the corners of his mouth pointing downwards, heavy eyelids and wrinkles on his forehead. His eyes seem to be cast down as he makes a blessing gesture with his right hand. In his left hand, he holds a globe. He is thus depicted similarly to Salvator Mundi, the saviour of the world.[11] This depiction was common around 1500 in sculptural ensembles. See for example two works from Kalkar in Germany, a city that had close ties to areas in the Northern Netherlands and specifically Utrecht[12], where God can be seen at the top of the artworks, holding the same attributes and surrounded by similar clouds (**fig. 10-11**).

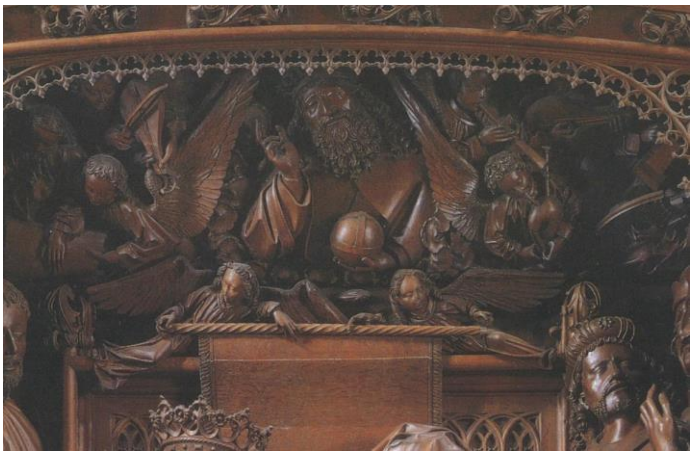

Figure 10. Detail of *Annenaltar*, Master of the Kalkarer Annenaltars, St. Nicolaikirche, Kalkar.[13]

Figure 11. Detail of *Marianum luster*, Henrik Bernst, St. Nicolaikirche, Kalkar.[14]

[10] Engelbert Kirschbaum and Günter Bandmann, *Lexikon der christlichen Ikonografie* (Rome: Herder, 1968), 529-530.
[11] James Hall, *Hall's Iconografisch handboek: Onderwerpen, symbolen en motieven in de beeldende kunst*, translated by Theo Veenhof (Leiden: Primavera Pers, 2018), 303; Kirschbaum and Bandmann, *Lexikon der christlichen Ikonografie*, 423-424.
[12] Wim van Heugten, "Nederrijnse kunst en Kalkar: Nederlands karakter," *Neerlandia* 95 (1991): 106-107.
[13] Guido de Werd and Michael Jeiter, *St. Nicolaikirche Kalkar* (München: Deutscher Kunstverslag, 2002), 106.
[14] De Werd and Jeiter, *St. Nicolaikirche Kalkar*, 111.

The three remaining roof bosses of the church fathers have a similar standardized iconography. All three of them are wearing a mantle with remains of gold and holding a staff, a book and their attributes, making them easily recognizable. Jerome is wearing his cardinal's hat and is accompanied by a lion. Gregory is wearing his papal tiara and Augustine is wearing his bishop's mitre and is holding a heart. Gregory is looking to his right, whereas Jerome and Augustine are looking to their left in different degrees. All of them are depicted *en face*, but their faces are looking down. If they were hanging from the ceiling, they would be looking down at the viewer. The men have lifelike features. Notice how all men have different facial features, resulting in a sense of personality.

The four roundels of the Evangelists show their emblems: St. Matthew as angel, St. Luke as a bull, St. Mark as a lion and St. John as an eagle. All four of them have a set of two wings and are surrounded by a flowing scroll that they are holding in their hands, claws or talons. St. Luke is the only one who is not holding the scroll in any way. Whether these scrolls originally contained text is unknown, although the manner in which they are draped and folded leaves little room for (legible) text. St. John and St. Mark are shown *en profil*, both from their right flank. St. Matthew and St. Luke are depicted from a ¾ profile.

Original location and provenance

The artworks do not carry a dating, but a precise date is known based on archival material. The expenses of the construction of the Domkerk were well kept by the Dom contractors, which is why the original commission of the roof bosses can be traced back to the end of the fifteenth century. In 1497, Jan van Schayck was paid for making "die sloitsteyn ende capitelen mit halff beelden (…) in der librien tsamen".[15] In the same year, another expense was added: "Item ex decreto capituli solvi pro pictura liberarie Ernesto de Schawijck et Theodrico Scay pictoribus."[16] These notes do not refer to any specific details regarding the roof bosses, thus it is impossible to attribute them based solely on these expenses. In 1991, Williamson found seven of the eight roof bosses scattered over the collection of the Centraal Museum in Utrecht and the Victoria and Albert Museum in London and compared them to the capitals that are still on the walls of the library, which are unquestionably by Jan van Schayck (**fig. 12**). Williamson found their stylistic similarities to be convincing enough to establish that our roof bosses are indeed the ones described in the accounting books of the Domkerk.[17]

Figure 12. Three capitals by Jan van Schayck in the Librije. Some remains of polychromy are still visible.

[15] Alberts, *Bronnen tot de bouwgeschiedenis van den Dom te Utrecht,* 464.
[16] Idem, 477.
[17] Williamson, "Roof bosses from Utrecht," 147.

The damaged state of the capitals (**fig. 12)** gives an indication of what happened to the roof bosses. The Dom church avoided the first Iconoclasm of 1566, but in 1580 the nave and the chapels of the Dom suffered greatly. Historian Arie de Groot points out that the choir and sacristy must have survived.[18] No mention is made of the *Librije*, but as it could only be accessed through the sacristy, it is likely that the library also survived. In the ensuing years, there were several campaigns to continue the purification of the Dom. By the end of the sixteenth century, a variety of artworks was still present, including "veel figuratieve bouwsculptuur (…) in boogzwikken, aan consoles en sluitstenen."[19] The church was ravaged by a storm in 1674 and again in 1836, destroying even more of the precious Dom building and artworks.[20] Again, the library survived. Many sculptures from the church were lost in these tumultuous times and the fact that the roof bosses remain in their current condition is exceptional. We probably have their secluded position in the library, hanging from the roof, to thank for that.

Unfortunately the capitals did not share the same fate. The angels' hands and faces are no longer visible and the patches of red paint give away they were once polychromed. The capitals are embedded in the interior architecture, so damage through weathering can be ruled out. Since the damage is specifically related to the hands and faces of the angels, it is safe to assume they were mutilated during the Reformation. The sacristy remained safe until 1580, but at some point fell prone to the removal and demolishing of the capitals. It is therefore likely that the roof bosses were removed after 1580 to keep them safe from these events.

It is unknown how long exactly the roof bosses carved by Jan van Schayck and painted by Ernst van Schayck and Dirck Scay hung in the library, but they had certainly been removed by the start of the nineteenth century. In 1826, they can be found together in an auction catalogue after the passing of their previous owner. Until that moment, they were part of the collection of former canon of the Saint Mary clergy of Utrecht Petrus van Musschenbroek (1764-1823). He was a collector and *archivarius honorair* from Utrecht and his collection mainly consisted of literary sources.[21] When he passed, the complete *Bibliotheca Musschenbroekiana* was auctioned.[22] The roof bosses can be found under *Rariteiten* (Curiosities), where they are divided into three lots (**fig. 13**).[23] This is probably the first time they are being separated:


19 Een rond steenen borstbeeld van den Zaligmaker, met verguld gewaad en een wereldkloot in de hand.
20 Een Engel, Leeuw, Os en Arend, de emblemata der 4 Evangelisten, 4 dergelyke ronde vergulde steenen.
21 Drie Priesterhoofden, in 3 dergelyke steenen.

Figure 13. Excerpt from the Bibliotheca Musschenbroekiana, page 205.

[18] Arie de Groot, "Beelden in de Dom van Utrecht in de zestiende eeuw," Nederlands Kunsthistorisch Jaarboek 1994, 84-86.
[19] Arie de Groot, "Beelden in de Dom," 86.
[20] Den Hartog, 11-13.
[21] "60-2 Verzameling P. van Musschenbroek," Het Utrechts Archief, accessed June 6 2023, https://hetutrechtsarchief.nl/onderzoek/resultaten/archieven?mivast=39&mizig=210&miadt=39&miaet=1&micode=60-2&minr=2710534&miview=inv2&milang=nl.
[22] *Bibliotheca Musschenbroekiana, sive Catalogus Librorum, cum impressorum, tum maxime manuscriptorum, mapparum geographicarum, tabularum aenearum, effigierum sculptarum, aliarumque rerum ad antiquitatem, patriam imprimis, facientium: PETRUS VAN MUSSCHENBROEK, tribunali primae instantiae, quod Trajecti ad Rhenum est, olim adscriptus, Instituto Regio literarum commercio junctus, Societati Leydensi Litterarum Belgicarum Socius, etc. Quorum publica fiet distractio in aedibus dictis de Zon, (W. IV. No. 279. Breedestraat), die IV sqq. M. Octobris MDCCCXXVI.*
[23] Idem, 205.

From this catalogue, a few important aspects become clear. It was known in 1826 that these sculptures belong together, but other relevant information such as the artists or the original location of the sculptures was lost. The sculpture depicting God the Father still had gilding on its robe. Most importantly, of the church fathers there were only three listed and instead they were called heads of priests. Thus, the fourth church father had already disappeared and had been lost for so long that their true iconography had become unrecognized.

As the sculptures are still together in 1826, it is possible that Peter van Musschenbroek had obtained them from the church himself and that he was the first owner after the church. It is more probable though, that there was at least one other owner before Van Musschenbroek. In 1934 and 1936, a residence for the verger was removed from this area of the church and before it was a home, a printing house and gas distillery had occupied the spaces.[24] Each time the area changed ownership was an opportunity to sell the sculptures. A printing house and gas distillery surely would have no use for them. Archival research does not indicate how Van Musschenbroek obtained the sculptures.

The three sculptures then got scattered across three collections. The *God the Father* sculpture was donated by priest Louis Gompertz to the Bischoppelijk Museum Haarlem, which would later turn into the Catharijneconvent.[25] The four roof bosses now owned by the Victoria and Albert Museum were formerly in the property of A.W.N. Pugin, a famous architect and art critic, whose grandson Sebastian Pugin Powell inherited them and donated them to the museum in 1945.[26] How A.W.N. Pugin obtained the roundels is unknown, as it is not mentioned in his diaries or his letters. As Williamson describes, it is possible he acquired the sculptures during his travels through the Netherlands in 1834, but he might also have bought them from art dealers in London.[27] There is no record of the acquisition of the roof bosses by the Centraal Museum. Williamson mentions correspondence with J. de Meyere, who believes they were in the collection of the museum before 1850.[28] The first catalogue they were included in is the one from 1878.[29] In 1904, when another catalogue is published, Samuel Muller already speculated that the three sculptures were probably the “Drie Priesterhoofden” of the auction of Van Musschenbroek.[30] Even though the roof bosses became part of the collection of the Centraal Museum very early on, the museum originates in 1830 and thus was not the first owner of the sculptures sold in 1826.[31]

It is only in 1991 that Williamson is able to connect seven of eight remaining sculptures from the collections of the Victoria and Albert Museum and the Centraal Museum back together. However, the central piece of the group is still unknown at this point. Williamson figures that a centerpiece is probably missing, because of the striking resemblance to the sculptural program in the Dom in Cologne. There, the *Schatzkammer* also features four roof bosses of the church fathers and four roof

[24] E. J. Haslinghuis and C.J.A.C. Peeters, *De Dom van Utrecht* (’s-Gravenhage: Staatsuitgeverij, 1965), 186-188.
[25] Jan Klinckaert, “Jan Eerstenss. van Schayck (ca. 1470-before 1527), "beeldensnyder" in Utrecht” in: *Der Niederrhein und die Alten Niederlande. Kunst und Kultur im späten Mittelalter. referate des Kolloquiums zur Ausstelklung "Gegen den Strom. Meisterwerke niederrheinischer Bildschnitzkunst in Zeiten der Reformation*, *(1500-1550)*", red. B. Rommé (Bielefeld: 1999), 201.
[26] Paul Williamson, *Netherlandish Sculpture 1450-1550* (London: V&A Publications, 2002), 44.
[27] Williamson, “roof bosses”, 140.
[28] Williamson, “roof bosses,” 142.
[29] Samuel Muller, *Catalogus van het Museum van Oudheden* (Utrecht: J.L. Beijers, 1878), 12.
[30] Samuel Muller, *Openbare Verzamelingen der Gemeente Utrecht: Catalogus van het Museum van Oudheden* (Utrecht: W. Leijdenroth, 1904), 8.
[31] “Geschiedenis van het Centraal Museum,” Centraal Museum. Accessed 28-07-2023. https://www.centraalmuseum.nl/nl/over-het-museum/organisatie/het-museum/geschiedenis-van-het-centraal-museum.

bosses of the evangelists. Its centerpiece consists of a Mary and child, and so Williamson proposes that in Utrecht there must also have been a Mary and child.[32]

In 1997, however, Jan Klinckaert comes forward with a find in the depot of the Catharijneconvent: the roof boss depicting *God the Father*. He argues that as all of the sculptures are sold together in the auction in 1826 it is likely that they belong together.[33] In another article, he poses stylistic arguments, such as the similarities between the way the drapery and hair is sculpted, the facial features and how all the figures just very subtly seem to extend from the roof bosses.[34]

The attribution as a whole has not been contested. The Centraal Museum, Museum Catharijneconvent and the Victoria and Albert Museum have all accepted that these sculptures belong together as a group and each of the museums also communicates that they originally belonged to the library in the Domkerk. In all publications since 1997 in which the roof bosses are discussed, they are discussed as a group, and often also as originating from the library. The only scholar who has expressed doubts about this attribution is Arie de Groot. In his *Beelden in de Dom van Utrecht in de zestiende eeuw*, published in 1994 (before the *God the Father* piece was found), he mentions in a footnote the attribution is "een vanuit iconografisch oogpunt aantrekkelijke, maar architectonisch gezien niet erg waarschijnlijke hypothese. (…) Het kan ook niet uit de fabrieksrekeningen worden afgeleid."[35] In a later publication in 2006, after the *God the Father* piece had been found, he again expresses his doubts about the original location of the roof bosses. "De toeschrijving aan Van Schayck wil ik hier niet in twijfel trekken, maar uitsluitend de door Williamson voorgestelde plaats."[36] He continues "In het stergewelf van de librije is namelijk alleen het centrale snijpunt van de gewelfribben berekend op een ronde sluitsteen, op de secondaire snijpunten ontbreekt het bij zulke sluitstenen gewenste, door verzwaring van de ribkruising verkregen bevestigingsvlak."[37] He explains that the way in which the roof bosses are attached to the ceiling (**fig. 14**) is not durable and not to be compared with the manner in which the roof bosses in Cologne are attached to the ceiling, using bolts. This is an important note, as Paul Williamson largely bases his argument of placement on the roof bosses from Cologne. Since 2006, the only researcher to have reacted to the arguments of De Groot is Elizabeth den Hartog. She states that De Groot overlooked a document regarding a restoration in 1913-1918, which leaves room for the possibility that the roof bosses were intended for the library, though with a slightly different vault structure, after all. The incredibly high price of sixteen gilders paid for merely nine roof sculptures and three capitals indicates that the artworks must have been very special.[38] The accepted explanation is that the roof bosses were indeed made for the library of the Domkerk.

[32] Williamson, 144.
[33] Jan Klinckaert, *Beeldhouwkunst tot 1850* (Centraal Museum: Utrecht, 1997), 109.
[34] Klinckaert, "Jan Eerstenss. van Schayck" 201-203.
[35] Arie de Groot, "Beelden in de Dom van Utrecht in de zestiende eeuw," *Nederlands kunsthistorisch jaarboek* 45 (1994), 92.
[36] Arie de Groot, *De Dom van Utrecht in de zestiende eeuw: inrichting, decoratie en gebruik van de katholieke kathedraal* (Amsterdam: Vrije Universiteit, 2006), 151.
[37] Ibidem.
[38] Den Hartog, *De bouwsculptuur van de Utrechtse Dom,* 327-328.

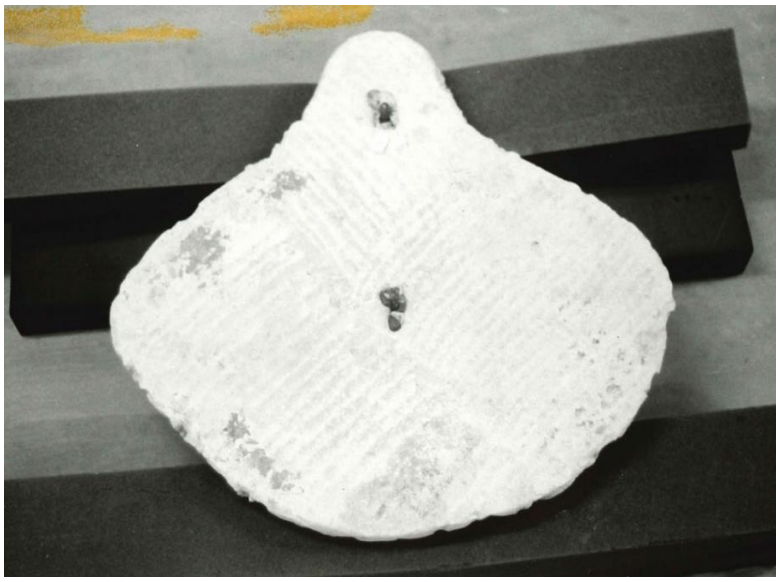

Figure 14. Two hooks in the back were used to hang the roof bosses to the ceiling. Currently, these are invisible as the *God the Father* figure now has a board at the back. Image from the documentation folders of the Museum Catharijneconvent.

The exact placement of the roof bosses has not been the topic of previous research. The library has a low ceiling, at its highest point approximately ten meters high, meaning that the roof bosses were easily visible. According to E. J. Haslinghuis and C.J.A.C. Peeters, the original vault was an *een-en-een-kwart stergewelf* above the library. What a *stergewelf* is, can be seen in (**fig. 15**) and indeed, as a map of the Domkerk shows, the library (top right corner) had a starshaped vault (**fig. 16**). The sacristy now has a similar vault, which is not original, but designed after the one in the library.[39] A starshaped vault as illustrated by Haslinghuis and Janse conveniently has nine intersections where a roof boss could hang. One would expect the two groups to be grouped together in a logical order of importance My hypothesis is that the layout of the Domkerk's library was identical to that of Cologne: church fathers in the corners of the room and the four evangelists towards the centre of the room with God at the centre (**fig. 17**). The Cologne's church fathers' attire, attributes and disposition are strikingly similar to those of the Utrecht church fathers. This is no unintentional coincidence, for the roof bosses in Cologne were made between 1502 and 1509 and were made after the example of the roof bosses in Utrecht.[40] The colours nowadays unfortunately do not correspond anymore.

[39] Haslinghuis and Peeters, *De Dom van Utrecht*, 296-299.
[40] Williamson, 142-144.

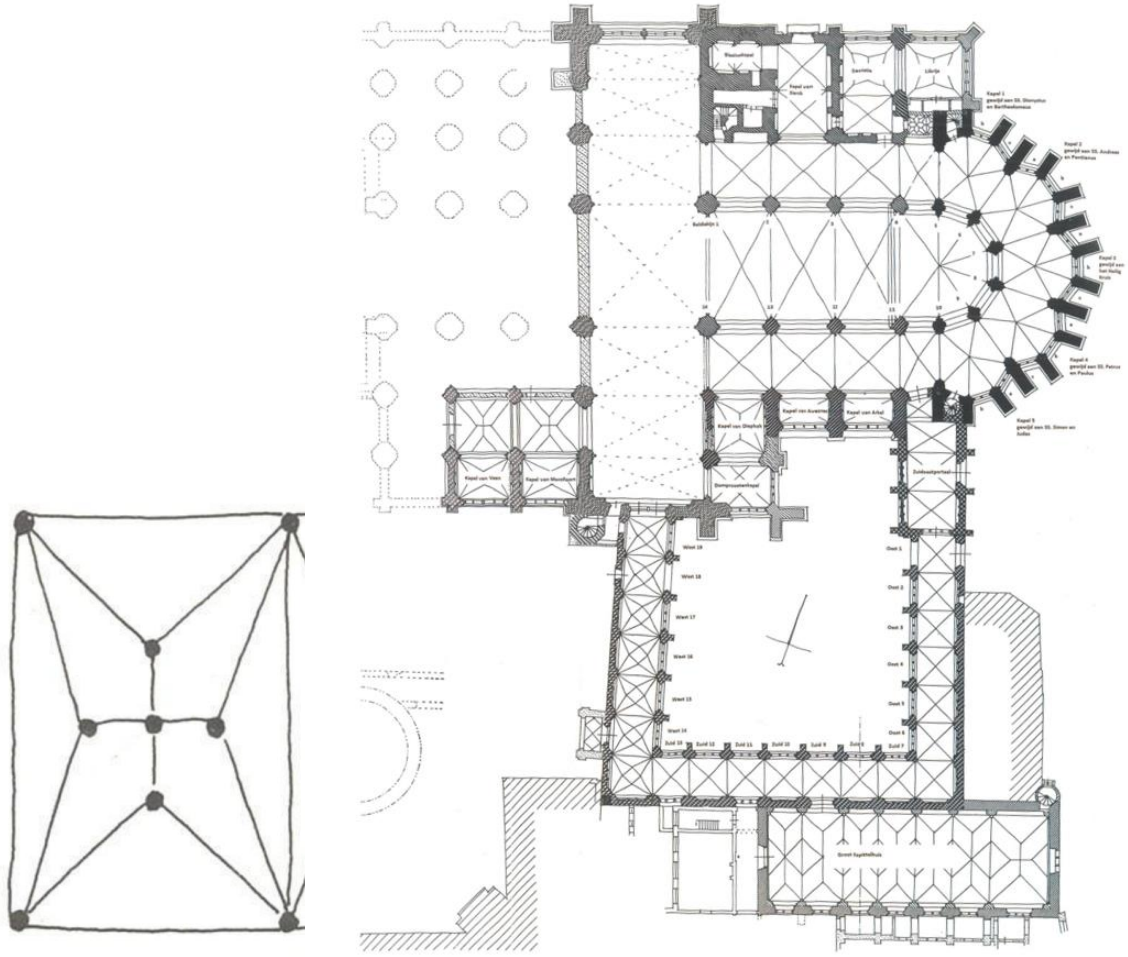

Figure 15. Schematic drawing of a starvault by Haslinghuis and Janse.[41]

Figure 16. Map of the Domkerk.[42]

[41] Haslinghuis and Janse, *Bouwkundige Termen,* 147.

[42] Map published in Micha Leeflang and Kees van Schooten, *Middeleeuwse beelden uit Utrecht 1430-1530* (Antwerpen: Ludion, 2012), 24.

Figure 17. The vault in the Treasury Room of the Dom in Cologne. In the centre: Mary with Child, surrounded by the four Evangelists. At the outer edged: the four church fathers. Image by Rutger Morelissen, RCE.

Currently, the *God the Father* roof boss only has a small hue of red remnants. The other three roof bosses still bear a fair amount of polychromy, but it is unknown how much of it is original. Relatively old sources, such as the auction catalogue of 1826 and the 1878 and 1904 catalogues of the Museum of Antiquities in Utrecht, indicate that there was more polychromy present back then. The *God the Father* roof boss was said to still have traces of gold in 1826 and according to Samuel Muller, the church fathers were still completely covered in their old polychromy of red and gold in 1878 and 1904.[43] The accuracy of these statements has not been corroborated by technical analysis. Many aspects relating to the materiality of the roof bosses remain uncertain. In order to get a better understanding of the roof bosses, technical analysis was performed. The sculptures were subjected to visual analysis, X-ray fluorescence, optical microscopy, scanning electron microscopy with energy dispersive X-ray spectroscopy and Raman spectroscopy. Using these methods, the following questions were answered:

- To what extent is the polychromy original?
- What method did Ernst van Schayck and Dirck Scay employ and how does it relate to contemporary polychromy practice?

For reasons of feasibility the technical investigations in this thesis focus on the roof bosses in the collection of the Centraal Museum and Museum Catharijneconvent. The sculptures in the collection of the Victoria and Albert Museums were not part of the research, but archival sources about these sculptures will be included.

[43] Muller, *Catalogus van het Museum van Oudheden*, 1878, 12: Muller, *Openbare Verzamelingen der Gemeente Utrecht*, 1904, 8.

2. Sculpture in Utrecht around 1500

Late gothic sculpture in Utrecht and Jan van Schayck

Around 1500, sculptors in Utrecht worked in the late gothic style, following in the footsteps of Adriaen van Wesel. The Domkerk and other churches that were built during this period created an incredible amount of work for sculptors and other artists. According to Elizabeth den Hartog, there were at least 29 sculptors active in Utrecht between 1500 and 1510, which is a lot for a city the size of Utrecht.[44] Their names are known, because the accounts of the Domkerk and the Buurkerk were kept and published.[45] Unfortunately, the registers of the *Zadelaarsgilde*, the guild in which artists were united in the fifteenth century, have mostly been lost. Members of this guild could be active as a *beeldensnijder*, a sculptor working in wood, a *steenhouwer*, a sculptor working in stone, or a *beeldenbakker,* someone working in clay and pipe clay, or a combination of these crafts.[46]

Previous to the gothic style, the Romanesque style prevailed, which is known for its static design in which bodies are made to fit into their designated spaces, most often pedestals. The proportions of the bodies and the folds in the draperies are often somewhat incorrect, as naturalism is not that important yet. This changes with the gothic style, in which the sculptures are more realistic and detailed. Sculptors slowly start to experiment with "freeing" the sculptures from their pedestal, showing expression and movement. Figures within sculptures look at each other or seem to interact with one another. Free space between limbs gradually becomes more common, making the figures look more lifelike. According to Gert von der Osten and Horst Vey, important features of the gothic style in Utrecht specifically include the density – the illusion of actual weight – that the figures seem to have, the flowing movement of the folds and drapery, and at the same time the restraint. "At no point is the ultimate expression wrung from the wood with artifice and violence, as with Antwerp. This restraint is not entirely a matter of material; it is also a restraint in the expression of feeling."[47] At the end of the fifteenth century, the late gothic style is prevalent and no great inventions or change of styles happen.

One could say gothic sculpture is somewhat solemn and reserved, which applies to Jan van Schayck's style as well. He sculpts flowing drapery in such a way that the observer can almost feel the weight. His characters do not show much facial expression, however. They look calm and, due to their heavy eyelids, perhaps even a bit tired. Through the attributes, their identity becomes clear. His oeuvre does not show any examples of interaction between sculptural figures. The *Panels from an organ case in the church of Saint Vitus in Naarden*, which Jan van Schayck made between 1515 and 1525 (**fig. 18**), illustrate that his style remains somewhere in between conservative and experimental. He practices different postures that are quite dynamic, but the figures remain on their pedestals without interaction.

In the fifteenth and sixteenth centuries, polychromy was an integral part to sculpture and architecture. Ruud Meischke even goes so far as to say that the building is merely a carrier for the

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[44] Elizabeth den Hartog, *De bouwsculptuur van de Utrechtse Dom: een andere kijk op de* bouwgeschiedenis (Zwolle: WBooks, 2015), 53.
[45] For the end of the fifteenth century: F.A.L. Rappard, "De rekeningen van de Kerkmeesters der Buurkerk te Utrecht in de 15e eeuw," *Bijdragen en Mededeelingen van het Historisch Genootschap Deel 3* (1880): 25-224; Wybe Jappe Alberts, *Bronnen tot de bouwgeschiedenis van den Dom te Utrecht: tweede deel, tweede stuk* ('s Gravenhage: Nijhoff, 1946).
[46] Den Hartog, *De bouwsculptuur van de Utrechtse Dom,* 53.
[47] Gert von der Osten and Horst Hey, *Painting and Sculpture in Germany and the Netherlands 1500 to 1600* (Penguin Books Ltd: Harmondsworth, 1969), 60.

polychromy.[48] Such extreme opinions aside, polychromy did contribute to the spirited experience that sculptures could bring a viewer. Johannes Taubert argues that the quality of late gothic sculpture cannot be seen separately from the increase in quality of the polychromy, which contributes to two important features: humanization and sensualization. The first refers to a greater sense of reality and verisimilitude. Groups and figures within groups become a coherent whole. Polychromy furthermore helps to establish the natural look of the drapery by being consistent with the folds and applying patterns. The latter refers to expression. Polychromy creates more detail in emotional states, different textures and contrasts between matte and polished surfaces.[49]

Figure 18. Two panels from an organ case in the church of Saint Vitus in Naarden, Jan van Schayck (attributed to), c. 1515-c.1525), oak with traces of polychromy, c. 84 cm x c. 23-27 cm x 5 cm., Rijksmuseum, Amsterdam. Images by Rijkmuseum, Amsterdam.

Workshop practice and the *Zadelaarsgilde*

The construction of the Domkerk was a huge undertaking and would take about three centuries, lasting up until the sixteenth century. In 1500, around the time the roof bosses were created, the

[48] R. Meischke, "Het kleurenschema van de Middeleeuwse kerkinterieurs van Groningen," *Bulletin van de Koninklijke Nederlandse Oudheidkundige Bond* 65 (1966), 57-91.
[49] Johannes Taubert, *Polychrome Sculpture*, trans. Michele D. Marincola (Los Angeles: The Getty Conservation Institute, 2015), 30-33.

building was almost finished.[50] The manner of organising such a large-scale construction was copied from the way it was done in France: near the church was a construction workshop, a *bouwloods*. The organisation was guided by a workshop master, a *loodsmeester* or *fabrieksmeester*, which was a prestigious title.[51] The workshop near the Dom was sometimes specifically referred to as *Domfabriek* – Dom factory – indicating how much labour must have been done there.

An interesting contradiction occurs in the validation of the work of sculptors and painters within the Dom workshop. In the present day, the sculptor is often seen as the artistic genius, whereas the painters of sculptures are not perceived as major artists. The roof bosses that are the topic of this thesis illustrate this present-day validation perfectly: Jan van Schayck is credited as the artist in every source. If Ernst van Schayck and Dirck Scay are mentioned at all, it is only briefly and secondary to Jan van Schayck.

The lack of appreciation for the work of the painter is something that has grown over time and was not always so common, as conservation specialist Michele Marincola explains. In the publication *Polychrome Sculpture*, Marincola describes a history in which the core of a sculpture is much more important than the surface. Starting from the nineteenth century, it was common practice to remove polychromy, because it was considered unattractive.[52] To this day, we are accustomed to thinking of sculpture painters as second-tier artists, who were simply not good enough to paint panels or canvasses.

Jilleen Nadolny, a technical art historian, debates against the notion of the sculpture painter as a second-tier artist in their day and instead offers a perspective of the sculpture painter as a non-specialised but versatile artist. Often, these artists were hired to perform different tasks, such as the polychromy, the grounding, the gilding, the restoring of sculptures, et cetera. These artists go by many names in contemporary documents: preparers, finishers, gilders, polychrome painters and painters (as opposed to flat-painters or the painters of panels). None of these terms wholly fit the job description of the craftsmen, because they almost never kept to just one of these activities. Consequently, Nadolny argues for the term *preparer*, as this is the least exclusive one.[53] Even though a preparer did not specialise in one particular craft, he could obtain a master status, depending on the guild he was a member of.[54] In her article, Nadolny does not refer to any guild from the Northern Netherlands, only to German, French, South Netherlandish and Czech guilds and to one Italian example from 1426 to 1578. However, it is likely that a similar situation occurred in the Northern Netherlands, especially in large workshops like the Dom factory where multiple artists worked on several artworks at a time.

Jan van Schayck is known as a sculptor and must have focused only on the sculptural. Besides the roof bosses he received other commissions in the Domkerk: he worked on wooden panels for the door of the sacristy and a wooden banister for the choir and decorated the wooden covering of the altar of indulgence. Other sculptural commissions included the pair of wings for a procession, possibly in wax, and the modelling of a paschal candle.[55] It also seems that at least in 1508 and 1509 he had two apprentices working for him.[56]

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[50] Den Hartog, 21.
[51] Den Hartog, 66.
[52] Michele D. Marincola, "Introduction, " in *Polychrome Sculpture* (The Getty Conservation Institute: Los Angeles, 2015), xii.
[53] Jilleen Nadolny, "One craft, many names: gilders, preparers, and polychrome painters in the 15th and 16th centuries," ICOM Committee for Conservation 15th Triennial Meeting New Delhi India 22-26 September 2008, 11.
[54] Nadolny, "One craft, many names," 11-12.
[55] Den Hartog, 60.
[56] Den Hartog, 53.

Ernst van Schayck and Dirck Scay were preparers. This can be clearly illustrated by their other commissions in the years 1497-1498 as shown in **table 1**:[57]

Table 1. Commissions in the accounts of the Domkerk from Ernst van Schayck and Dirck Scay in the years 1497-1498, with the exception of the roof bosses.

Item gegeven Dirck Scay van malen en Dertiendach.
Item Dirck Schaye heeft dit jaer ghemaelt ende ghestoffeert na inhout sijnre cedulen.[58]
Item de mandato et ex contractu capituli cum pictoribus Ernesto van Schayck et Theodrico Schaey pro deauratura et ornatura maioris domus capitularis unacum parva camera episcopi adiacente simul solvi.
Item betaelt Dirck Schay om te verwerven ende vermaken Sinte Michiels beelde op die biscops capel.
Item Ernesto van Schayck pictori solvi ad bonum computum super premio picture tabule altaris maioris ecclesie nostre etc. quadraginta aur. Fl. ren. Quolibet pro 30 st. comp. Facit.
Item operariis servitoribus Ernesti van Schaeijck pictoris ut pocius operentur in opere tabule summi altaris de mandato capituli propinavi 1 post. Rod. Facit.
Item de mandato et concordia capituli solvi Ernesto de Schawijck de pictura tabule in summo altari preter 40 fl. ren. Aur. Solutos per prepositum Leydensem magistrum Nicolaum de Lavennis magistrum fabrice anni precedentis adhuc 91 fl. Ren. Aur. Quolibet de 30 st. Facit.
Item Dirck Schayck sy cedel beloipt dit jair van dat hij gemailt heeft.[59]

From these expenses it seems Dirck Scay was involved with painting something for the Feast of Epiphany, painting and gilding, and repairing sculpture. Ernst van Schayck was involved with painting the high altar of the church and even seems to have had an apprentice to help him. Furthermore, Dirck Scay and Ernst van Schayck together were responsible for decorating and gilding the Chapter house and a small chamber for the bishop. It seems the title of preparer fit both these artists well, although according to Nadolny a preparer is often distinguished from the painter working on flat surfaces. Ernst van Schayck working on *picture tabule altaris maioris ecclesie nostre* with an apprentice does not match with the instances Nadolny describes. However, at least in the Southern Netherlands it was not uncommon for a painter to paint both flat surfaces and sculptural projects. Even renowned artists like Jan van Eyck and Rogier van der Weyden painted sculptures on altarpieces. It seems a similar accordance in ethos was present in Utrecht.[60]

Sculptors, painters, preparers and many other types of artists in Utrecht were all members of the *Zadelaarsgilde.* Unfortunately, the archives of this guild have not been preserved. Only a few sources remain, one of which is a list of names of the *oudermannen*, the eldermen presiding the guild. In

[57] Alberts, *Bronnen tot de bouwgeschiedenis van den Dom te Utrecht,* 413, 439, 452, 453, 455, 477.
[58] Cedel, cedule, definition found in "Cedel," Woordenboek der Nederlandse taal, accessed on June 6, 2023, https://gtb.ivdnt.org/iWDB/search?actie=article&wdb=WNT&id=M012586&lemma=cedel.
[59] Idem.
[60] E. van Damme, "The Documentary Sources For The Study of Late-Gothic Polychromy in Flanders," *ICOM Committee for Conservation 3rd Triennial Meeting Madrid Spain 2-7 October 1972.*

Utrecht, two or four new eldermen were selected each year. Jan van Schayck and Ernst van Schayck were undoubtedly members of the guild, as they would not have been allowed to sell their artworks otherwise, but they were never ouderman. However, Dirck Scay is a recurring name on the list of eldermen, in the years 1483, 1485, 1488, 1489, 1490 and 1492.[61] Being ouderman was a prestigious position and it is telling that a preparer could be an *ouderman*, let alone six times.

Family ties: the brothers Van Schayck and Dirck Scay

Jan van Schayck and Eerst or Ernst van Schayck were brothers. Caroline de Jonge wrote an article primarily focussing on the works of their offspring, in which a family tree of the Van Schaycks is published. With this publication, she verifies the existence of an artist family, of which the family tree started two generations before Jan and Ernst. Regardless, both De Jonge and Godefridus Hoogewerff start the history of artistic feats of the Van Schayck family with Jan and Ernst, without mention of any older relatives involved in art.[62]

It is unknown whether Dirck Scay was in any way related to the brothers. The roof bosses seem to be the only commission the three men worked on together, so their work history is no argument in favour of the men being related. However, in the family tree published in De Jonge, the father of Jan and Ernst is called "Dirck".[63] Dirck Scay is the name we now know the artist by, but in the expenses by the Domkerk for 1497 and 1498, he is mentioned by several names: Dirck Scay, Dirck Schay, Dirck Schaye, Dirck Schayck and Theodrico Schaey.[64] Looking at the similarity among these names and the names Jan and Ernst go by (Van Schayck, Van Schaeijck, De Schawijck), it is possible that Dirck Scay was a relative of Jan and Ernst, considering his age possibly their father or uncle.

He is mentioned in historical sources for the first time in 1472, when he was hired to *stofferen* – paint and/or gild – sculptures and reliquaries for the Buurkerk. Furthermore, he seems to have been paid for *snijden* or remaking of sculptures and gilding a cross.[65] In 1483, he is ouderman of the Zadelaarsgilde for the first time. This is long before Jan and Ernst occur as artists in historical sources: in 1494 and 1497 respectively.

Avesnes stone or Baumberg stone?

Although the contents and context of the polychromy of the roof bosses are the main questions in this thesis, the exact stone that is used is also unsure. The most likely candidate is *Avendersteen*, Avesnes stone. This was proposed in 2012 in *Middeleeuwse beelden uit Utrecht: 1430-1530*, the most recent publication in which the roof bosses are discussed. However, many earlier publications and current webpages offer contradictory information. This most likely has to do with the fact that the use of Avesnes stone in Utrecht was relatively unknown for a long period of time and that the stone

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[61] Samuel Muller, *De Utrechtse Archieven: I. Schilders-Vereenigingen te Utrecht, bescheiden uit het Gemeente-archief* (Utrecht: J. L. Beijers, 1880), 55, 56.
[62] C.H. de Jonge, "Utrechtse Schilders uit de tweede helft van de XVIde eeuw," *Oud Holland* 50 1933, 161; G.J. Hoogewerff, "De Utrechtsche kunstenaarsfamilie Schayk," *Oudheidkundig Jaarboek. Bulletin van den Nederlandschen Oudheidkundigen Bond* 3 1923, 28-29.
[63] De Jonge, "Utrechtse Schilders," 163.
[64] Alberts, *Bronnen tot de bouwgeschiedenis van den Dom te Utrecht*, 413, 439, 452, 453.
[65] Llewellyn Bogaers, "God Wouts: de financiering van de Buurkerk (1435-1569) als spiegel van groepsvorming en belangentegenstellingen binnen de parochie," *Jaarboek Oud-Utrecht* 2003: 113-114.

looks very similar to *Baumbergersteen*, Baumberg stone. The stones were previously (visually) identified as sandstone[66], the sandy limestone Baumberg stone[67] and the Avesnes limestone[68].

In the area around Utrecht itself, there are no natural sources of stone, so the construction materials had to be imported (**fig. 19**). Avesnes owes its name to the place the limestone was sourced: Avesnes-le-Sec, while Baumberg was sourced in the area of Münster. Hendrik Jan Tolboom and Wim Dubelaar explain that Avesnes and Baumberg stone were and are often mixed up or are simply lacking definition in sources, but that sculptors must have been aware of their differences.[69] The Avesnes stone has a fatty surface.[70] The Baumberg stone is a bit harder, and thus may have been used for less refined sculptures that were more prone to wear.[71] Avesnes stone is easy to cut and contains small fragments of fossils. It is not very compact. It has a strong capillary force because of its pores, making it sensitive to weathering.[72] Both these stones benefit from an isolation layer before applying any ground or paint to prevent the stone from absorbing the paint layers, although as one can see in chapter two, there is not always an indication present that isolation layers were actually applied.

[66] "Symbol of St. Luke," Victoria and Albert Museum, accessed on June 6 2023, https://collections.vam.ac.uk/item/O71504/symbol-of-st-luke-roundel-schayck-jan-van/; Samuel Muller, *Catalogus van Museum van Oudheden* (Utrecht: s.n., 1904), 8.
[67] "Drie gewelfschotels met de kerkvaders Sint Hiëronymus, Sint Augustinus en Sint Gregorius," Centraal Museum Utrecht, accessed on June 6 2023, https://www.centraalmuseum.nl/nl/collectie/1812-001-003-drie-gewelfschotels-met-de-kerkvaders-sint-hironymus-sint-augustinus-en-sint-gregorius-jan-van-schayck-scayk; "God de Vader," Museum Catharijneconvent, accessed on June 6 2023, https://adlib.catharijneconvent.nl/Details/collect/40322; Jan Klinckaert, *Beeldhouwkunst tot 1850* (Utrecht: Centraal Museum, 1997), 107.
[68] Micha Leeflang and Kees van Schooten, *Middeleeuwse beelden uit Utrecht 1430-1530* (Antwerpen: Ludion, 2012), 255.
[69] Timo G. Nijland, Wim Dubelaar and Hendrik Jan Tolboom, "De historische bouwstenen van Utrecht," in *Utrecht in Steen: Historische bouwstenen in de binnenstad*, ed. Wim Dubelaar (Utrecht: Uitgeverij Matrijs, 2007), 82-83; Hendrik-Jan Tolboom, Wim Dubelaar and Bertil van Os, "Avendersteen" in *Middeleeuwse beelden uit Utrecht 1430-1530*, ed. Micha Leefland and Kees van Schooten (Museum Catharijneconvent: Utrecht, 2012), 103-104.
[70] Nijland, Dubelaar and Tolboom, "De historische bouwstenen van Utrecht," 83.
[71] Den Hartog, 106.
[72] Den Hartog, 103.

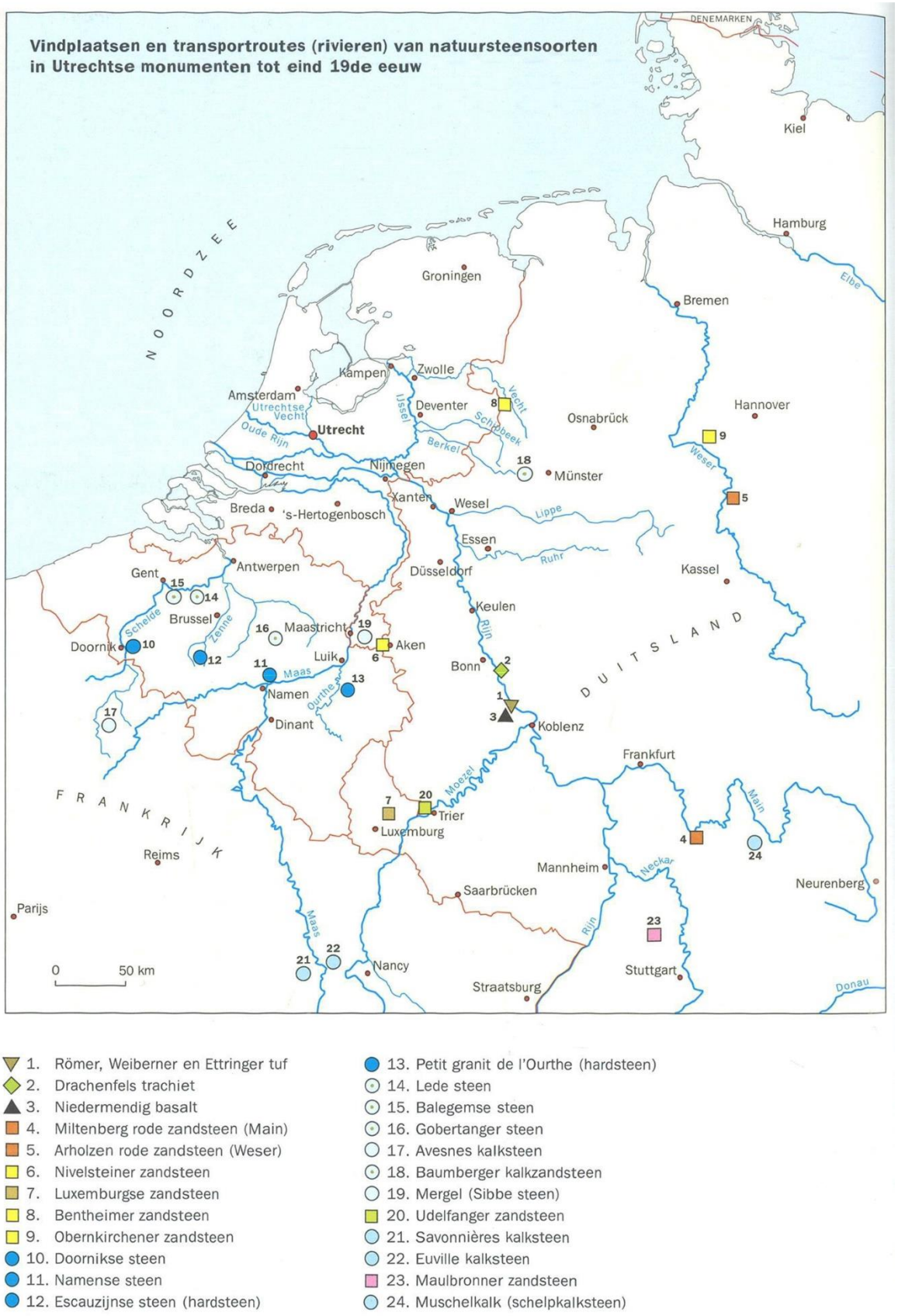

Figure 19. Map illustrating sites and transportroutes of stones used for monuments in Utrecht until the end of the nineteenth century. Image from Dubelaar, *Utrecht in Steen*, 32.

Chemically the two types of stone differ enough to differentiate them through analysis. Specific numbers are provided by Hendrik-Jan Tolboom, Wim Dubelaar and Bertil van Os:

> De Baumberger steen bevat minder calciumcarbonaat en meer kwarts en gips, wat zich uit in een lager calciumgehalte (20-25% versus 35-40%), een hoger siliciumgehalte (5-10% versus 0-2%) en een verschillend gehalte aan sporen van strontium (900-1300 ppm versus 300-500 ppm) en zirconium (30-50 ppm versus 10-15 ppm).[73]

Aleth Lorne and Matthijs de Keijzer add about Avesnes stone: "Deze ietwat geelgroen gekleurde, fijnkorrelige kalksteen bevat kwarts en grove kristallen van glauconiet, met de karakteristieke elementssamenstelling van ijzer, kalium, aluminium, silicium en magnesium."[74] These elemental details will help in determining the stone with analytical methods.

The Dom factory monitored closely which stones were imported for the construction of the Dom in the accounts between 1329 and 1529. Within the years 1490 and 1497, the factory ordered only large amounts of *Benthemersteen* (sandstone), *Munstersteen* (Baumberg stone) and *boechsteen/boichsteen* (bricks).[75] Small amounts were ordered of "blaeuwen steen ende Hoelscher simull" and "steens van loests".[76] Blaeuwen steen is currently known as Petit Granit, Blue Stone or Belgian Blue Limestone. Hoelscher stone is not a traditional name for a stone, but rather an informal name. It is often used to refer to Petit Granit from Brabant, *Arduin*, a white coloured stone.[77] Here it is called "Hoelscher simull" because it is probably an imitation of some sort. "Steens van loests" is more relevant to the question of whether Avesnes stone was imported to the Domkerk. It is a white limestone from Loos, a city near Lille. It was only rarely transported over the river Leie to the Northern Netherlands.[78] Between Loos and Antwerp, it passes Cambrai, which is from where Avesnes stone was shipped. Both being white limestones coming from the Southern Netherlands, shipped from the river Leie, it might be the two stones were confused. However, there is no further proof for this hypothesis. Only later, in 1502 and 1510-1511, Avesnes stone was delivered to the Domkerk under this name.[79] It was already used in 1501 for the Holy Sepulchre Monument, indicating that sculptors were able to import the stones without interference of the *Domloods.*[80]

Time Nijland, Wim Dubelaar and Hendrik Jan Tolboom mention that the details of the gate of the sacristy might have also been made in Avesnes stone.[81] The gate for the sacristy was built in 1497, like the roof bosses, but by a sculptor named Hendrick Bontmaker.[82] Bontmaker and Jan van Schayck will have encountered each other many times, even if they did not work in the same workshop, for Jan van Schayck cut wooden frames for the doors for the gate Hendrick Bontmaker was working on. In the expenses of the Domkerk, they can be encountered side by side in the expenses for July, both working on the *gerukamer*, which is now the sacristy.[83] According to Jan Klinckaert, both the wooden door and the stone gate were polychromed, but the expenses do not show who was responsible for

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[73] Den Hartog, 103-104.
[74] Aleth Lorne and Matthijs de Keijzer, "VI: De Polychromie van de reliëfs," in *De Sint-Maartenskerk te Doorn: vroeg renaissancemonument, bouwsculptuur en bouwgeschiedenis*, ed. Gerard van Wezel (Zwolle: WBOOKS, 2015), 87.
[75] Alberts, *Bronnen tot de bouwgeschiedenis van den Dom te Utrecht,* 286, 305, 330, 349, 368, 387, 414, 440, 471.
[76] Alberts, 387, 414.
[77] H. Janse and D. J. de Vries, *Werk en Merk van de Steenhouwer: Het steenhouwersambacht in de Nederlanden voor 1800* (Zwolle: Waanders, 1991), 18.
[78] Janse and De Vries, *Werk en Merk*, 12.
[79] Nijland, Dubelaar and Tolboom, "De historische bouwstenen van Utrecht," 83.
[80] Nijland, Dubelaar and Tolboom, 84.
[81] Ibidem.
[82] Dirk Jan de Vries, "Poortjes van Martinus," in *Utrecht in Steen*, ed. Wim Dubelaar (Utrecht: Uitgeverij Matrijs, 2007), 22-24.
[83] Alberts, 464.

this.[84] They also worked together on the decorative scheme for the *librije.* If either the decorations on the gate to the sacristy and/or our roof bosses are indeed made from Avesnes stone, this would indicate this group of sculptors were some of the first Dutch sculptors using this material.[85]

[84] Klinckaert, "Jan Eerstenss. van Schayck," 193.
[85] Idem, 83-84.

3. Technical analysis on polychromed sculptures

From antiquity until the middle ages, most sculptures in Europe were polychromed. In some cases the artworks received only partial polychromy, to emphasize certain aspects of the sculpture, but it rarely occurred that no colours were applied at all. From the renaissance on, artists often made their artworks without polychromy, showing the bare and pure material their creations stem from. In the following centuries, the view towards sculpture changed. It was believed that "color (…) distracted from the apprehension of plastic form that was the true province of sculpture," as Alex Potts describes.[86] "For roughly two hundred years, the assumption prevailed in the European and American art worlds that sculpture was an art of pure plastic form, and that to be truly sculptural it had to be divested of coloristic and tonal effects thought to be proper to painting."[87] By underscoring the differences between painting and sculpture and by marking these as the disciplines' specific qualities, sculpture had to stay as far away from colour as possible in order to be appreciated.

The idea that sculpture should be without colour did not only apply to contemporary artworks, but also to already existing ones. Until the late nineteenth century, there was no such thing yet as a professional restorer or an international restoration ethos.[88] Instead, artworks were treated by artist-restorers, who felt the same sentiment regarding the relationship between plasticity and colour. This often resulted in the removal of paint on sculpture to make the sculptures better fit the zeitgeist.[89] Up until the late nineteenth century, the opinion that polychromy was secondary to the sculpture remained dominant.[90] A noteworthy example is mentioned by Elizabeth den Hartog, who illustrates that the Louvre Museum in Paris only agreed to the acquisition of a sculpture after its original polychromy was removed.[91] Even though this is an extreme example, cases of the removal of polychromy in especially the nineteenth century are numerous. This practice, combined with the vulnerability of the artworks and the catastrophic consequences of the iconoclasm, caused few medieval sculptures to survive with their original polychromy. As the *God the Father* roof boss still contained gilding in 1826 –original or not – this sculpture too was since then stripped of its colour.[92]

The preference for white or bare sculpture received little challenge, until 1762 when John Stuart and Nicholas Bevett published *Antiquities of Athens*, including in it a discussion about gold and ivory polychromy.[93] This was the start of a slow movement towards the acceptance and even eventual embrace of polychrome sculpture. For at least another hundred years, however,polychrome sculpture was predominantly faced with disapproval. Simultaneously, an interest in colourful sculpture resurfaced in the nineteenth century. Artists experimented with polychrome sculptures themselves and researchers showed a renewed interest in colour on sculpture from all historical periods. According to Anna Adamska, this scholarly tradition started with Johan Huizinga (1872-1945) and his *Herfsttij der Middeleeuwen* (1919), in which he examines colour as a signifier of meaning. The field of research into colour in all artworks spread from there to sociology, cultural history,

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[86] Alex Potts, "Colors of Sculpture," in *The Color of Life*: *Polychromy in Sculpture from Antiquity to the Present,* ed. Roberta Panzanelli, Eike Schmidt and Kenneth Lapatin (Los Angeles: Getty Publications, 2008), 78.
[87] Potts, "Colors of Sculpture," 78.
[88] Delphine Steyaert, "The conservation of polychromy on medieval sculptures in Belgium in the nineteenth century and its perception by the Royal Monuments Commission of the time," in *Conservation in the Nineteenth Century*, ed. Isabelle Brajer (London: Archetype Publications, 2013), 92-93.
[89] Elizabeth den Hartog, ""Geen beeldhouwwerk in steen, dat niet beschilderd is" De polychromie van het Bergportaal van de Sint-Servaaskerk in Maastricht," *Madoc, de Middeleeuwen in Kleur* 15, 4 (2001), 279-281; Potts, 84-88.
[90] Steyaert, "The conservation of polychromy," 95.
[91] Hartog, den, "Geen beeldhouwwerk in steen, dat niet beschilderd is," 281.
[92] *Bibliotheca Musschenbroekiana, 205.*
[93] Andreas Blühm, *The Colour of Sculpture 1840-1910* (Zwolle: Waanders Uitgevers, 1997), 15-25.

anthropology, linguistics, psychology, history, art history (e.g. heraldry and semiotics) and physics.[94] Adamska dismisses physics as the discipline that discusses colour in terms of the electromagnetic spectrum which we can perceive with our eyes. She fails to see physics as the discipline that investigates the materials that invoke colour as a part of history. Subsequently, technical art history is not included in the list of disciplines that research colour according to Adamska.

Corresponding to Adamska's timeline – one in which the interest in colour in the middle ages gets fuelled from the 1980s onwards by all scientific disciplines – the first technical analysis into polychromed sculptures takes place in the 1970s and matters slowly develop from there. One of the first projects of importance was the examination of the Herlin Altarpiece (1466) in Rothenburg ob der Tauber, Germany. The findings of this project will not be used in this thesis, for the altarpiece is German, but the articles have shaped the research that followed. The publication illustrates very clearly what methods have been used and to what findings each method has led. Although the conclusion is indeed quite taxonomic, it is nonetheless insightful.[95] As early as in the 1970s, one article is published about polychrome sculptures from Utrecht and their materials. It concerns the examination of five limestone sculptures by Karin Groen, who was also involved in the Herlin altarpiece examination, and gives an overview of the detected ingredients.[96] The publication is an account of a presentation at a conference, making the text hard to read.

After the 1980s, the body of publications on technical analysis on polychromy slowly expands, until there is a boom in the 2010s. Chemical and interdisciplinary research concerning art from all over the world and various historical periods is published. As the publication *Paint and Piety* perfectly illustrates, art from the Southern Netherlands, England and Scandinavia are most often topic of this research when it concerns medieval art.[97]

Unfortunately, sculpture from Utrecht remains underrepresented. Marieke van Vlierden notes in 2001 that there is no overview work of polychromy in Utrecht.[98] To this day, there still is none, but attempts have been made to fill this gap. There are three important publications which pay extensive attention to polychromy on sculpture from Utrecht between 1450 and 1550.[99] In one of the texts, the author Aleth Lorne even speaks, although cautiously, of characteristics that together form the base for an *Utrechtse stijl*.

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[94] Anna Adamska, "Grenzeloze kleuren. Een reflectie over de studie van middeleeuwse kleuren," *Madoc, de Middeleeuwen in kleur* 15, 4 (2001): 195-198.

[95] M. Broekman-Bokstijn, J. R. J. Van Asperen De Boer, E. H. van 't Hul-Ehrnreich and C. M. Verduyn-Groen, "The Scientific Examination of the Polychromed Sculpture in the Herlin Altarpiece," *Studies in Conservation: Special Issue on the Conservation, Technique and Examination of Polychromed Sculpture* 15, 4 (1970): 370-400.

[96] C. M. Groen, "The examination of five polychrome stone sculptures of the late 15th century in Utrecht," *ICOM Committee for Conservation 5th TriennialMeeting Zagreb Yugoslavia 1-8 October 1978* (1978).

[97] Noëlle L. W. Streeton and Kaja Kollandsrud, *Paint and Piety: Collected Essays on Medieval Painting and Polychrome Sculpture* (London: Archetype Publications, 2014).

[98] Marieke van Vlierden, "Kleur op middeleeuwse sculptuur. Enkele voorbeelden uit de collectie van Museum Catharijneconvent te Utrecht," *Madoc, de Middeleeuwen in kleur* 15, 4 (2001), 268.

[99] J.A. Mosk and M.F.S. Karreman, "Onderzoek van de polychromie van twee beeldhouwwerken van de Illustre Lieve Vrouwe Broederschap te 's Hertogenbosch," in *Adriaen van Wesel: een Utrechtse beeldhouwer uit de late middeleeuwen (ca 1417- ca 1490)* ed. W. Halsema-Kubes ('s Gravenhage: Staatsuitgeverij, 1980); Gerard van Wezel, *De Sint-Maartenskerk te Doorn: Vroeg renaissancemonument, bouwsculptuur en bouwgeschiedenis* (Zwolle: WBOOKS, 2015); Aleth Lorne and Annelies van Loon, "12: Ontdekkingstocht naar een kleurrijk verleden. Onderzoek naar de polychromie van laatmiddeleeuwse stenen beelden in Utrecht," in *Middeleeuwse beelden uit Utrecht 1430-1530,* ed. Micha Leeflang and Kees van Schooten (Antwerpen: Ludion, 2012).

As Lorne repeats in all her publications, research on late-medieval polychromy from the Northern Netherlands, especially from Utrecht, is scarce.[100] In order to contextualise the findings of the roof bosses' research, to see if they were executed in this style of Utrecht and create a bigger understanding of this style, I have gathered previously published research in **table 2** below. This is indeed not a long list of artworks, which makes it so important to add data to this body of research.

All these artworks were made between 1450 and 1550 in or around Utrecht. Only one group of sculptures certainly predates the roof bosses from the Domkerk. The sculptures by Adriaen van Wesel were made in 1475-1477 in Utrecht, but the polychromy was only applied in 1508 and 1510, in 's-Hertogenbosch.[101] The dates of the other artworks are estimates.

There are three notes of importance regarding the table. First, although the chapter of Aleth Lorne and Annelies van Loon was published in 2012, most of the case studies used in their text were studied by other researchers and date back to between 1968 and 1974.[102] The aforementioned findings by Karin Groen, presented in 1978 but researched in 1973 and 1974, are included. Secondly, the fragmentary reliefs from the Sint-Maartenskerk in Doorn were discussed in two separate publications which show contradictory findings concerning the medium of the ground. Both publications show Aleth Lorne as author, so the findings of the most recent publication are used in the table. Lastly, there are some empty spaces in the table. Here, the specific information is not mentioned in the publications, which does not mean that none of it is present, but rather that no data was found.

Not all sources used the same research techniques. For the research on the reliefs from the Sint Maartenskerk in Doorn, the following methods were used: optical microscopy, scanning electron microscopy with energy dispersive X-ray spectroscopy, X-ray diffraction and gas chromatography-mass spectrometry.[103] The research into the other artworks was gathered by Aleth Lorne and Annelies van Loon, but the methods used in the original research are not mentioned. The *Stenen Vrouwenkop* was researched later with a stereomicroscope and samples of the sculpture were investigated using optical microscopy SEM-EDX.[104]

[100] Aleth Lorne, "IV: Typisch Utrechts : De renaissancepolychromie van de stenen reliëfs" in *De Sint-Maartenskerk te Doorn: Vroeg renaissancemonument bouwsculptuur en bouwgeschiedenis* ed. Gerard van Wezel (Zwolle: WBOOKS, 2013), 69, 71; Lorne and Van Loon, "12: Ontdekkingstocht naar een kleurrijk verleden," 146.
[101] Mosk and Karreman, "Onderzoek van de polychromie," 51-53.
[102] Lorne and van Loon, 147-148.
[103] Van Wezel, *De Sint-Maartenskerk te Doorn*, 96.
[104] Lorne and van Loon, 153-155.

Table 2. Gathered findings on polychromy on sculptures from Utrecht from 1450-1550.

Two sculptures from the Illustre Lieve Vrouwe Broederschap, 's-Hertogenbosch, Adriaen van Wesel, 1475-1477 (polychromy 1508-1510), 47-49 cm x 33-35 cm x 17 cm.[105]	**Support**	Oakwood
	Ground	One layer of chalk and glue, followed by a red, yellow or white layer, depending on the colour of the paint.[106] In some places there is one additional coloured underlayer in bright yellow or bright orange.
	Matte paint	Blue paints consist of a grey layer with azurite on top. Green paints consist of a combination of white, green, blue and yellow pigments in several layers. Grey paints consist of a lead white layer with a layer of lead white and charcoal on top.
	Transparent paint	Green and red transparent paints on top of gold to create motives. Red is vermillion, several unidentified greens are used.
	Incarnates	Applied on top of a lead white underlayer. Consists of lead white and vermillion. Sometimes another layer is applied, painted wet-in-wet.
	Gilding	A thick poliment gilding and a thin matte gilding are found. Tin indicates the presence of a pressed brocade. A red transparent paint was partially applied on top of it.
Relief fragments from the Sint-Maartenskerk in Doorn, anonymous, ca. 1490-1540.[107]	**Support**	Avesnes stone
	Ground	A ground was made of red ochre with chalk. The ground was applied in various thicknesses to achieve a darker or lighter tone. In some place the ground was left bare.[108]
	Matte paint	Blue paints consist of azurite on a layer of green paratacemite. This was applied on a dark underlayer or directly on the red underground.[109] Red paints are vermillion, found in clothing. Lead white was only used as white paint. In order to obtain a lighter shade of another colour, chalk was used.
	Transparent paint	A white glaze was applied on top of a yellow ochre layer. A red glaze was applied on top of vermillion layers. For the hair, a glaze of vermillion and charcoal black was used. To achieve shadow parts, grey and brown glazes were used, except in the blue (oil) and gilded areas.
	Incarnates	N.A.
	Gilding	A pure gold matte gilding was found on the architectural parts.
Memorial altarpiece for the	**Support**	Likely Baumberger stone
	Ground	Red iron-oxide in glue.

[105] Mosk and Karreman, "Onderzoek van de polychromie," 51-53.
[106] Red was not only applied for gilding, it seems to have been applied on larger areas for ease.
[107] Lorne, "IV: Typisch Utrechts," 68-80; Aleth Lorne and Matthijs de Keijzer, "VI: De polychromie van de reliëfs," in *De Sint-Maartenskerk te Doorn: Vroeg renaissancemonument, bouwsculptuur en bouwgeschiedenis*, ed. Gerard van Wezel (Zwolle: WBOOKS, 2015), 86-96.
[108] The author mentions a relevant curiosity: within one scene the underground is applied in various thicknesses under two white areas. This resulted in one area being a brighter shade of white than the other. See: Lorne and de Keijzer, "De polychromie van de reliëfs," 87.
[109] The author specifically notes that this method was not often used and the usual way to apply azurite would be on top of a black or dark-grey layer. In 2015 only five other sculptures using this method are known. Four of them are made in Utrecht. See: Lorne, "Typisch Utrechts," 76-77.

family Pot, Master of the Utrechtse Stenen Vrouwenkop, ca. 1510-1520, Domkerk, Utrecht.[110]	**Matte paint**	Azurite blue was used. A brown paint was found on the bustier of Catharine.
	Transparent paint	Several glazes were found on top of the gilding: dark red, dark green, orange and brown.
	Incarnates	Incarnates were finished with a layer of varnish to achieve a glossy effect.
	Gilding	Brocade motifs were used with several glazes. On top of azurite blue pressed brocade was found. Gilding was applied on top of an even, yellow underlayer.
Stenen Vrouwenkop, Master of the Utrechtse Stenen Vrouwenkop, 1500-1525, 36 cm x 32 cm x 24 cm, Museum Catharijneconvent, Utrecht.[111]	**Support**	Avesnes stone
	Ground	No indication of an isolation layer. The ground consists of a bright orange colour of red lead and lead white, except in the areas underneath the incarnates and the scarf. In those areas the ground is light orange. On top of the orange ground are one or more ochre yellow or bright pink underlayers.
	Matte paint	Several reds were used in mixtures. Vermillion, red earth, red lead and red glazes were found. Verdigris and leadtinyellow were found.
	Transparent paint	A thin red glaze was applied on top of a pink underlayer.
	Incarnates	N.A.
	Gilding	Traces of gold and silverleaf on top of the yellow ochre layer are found. Motifs are built up from the ground layer. Pressed brocade was used on the dress, with a red glaze in between the gold areas.
Pontianus, Martinus, Paulus, Maria Magdalene and Agnes for the westside of the rood screen of the Domkerk in Utrecht, Jan Nude, ca. 1450, all approximately 70 cm. high, Centraal Museum, Utrecht.[112]	**Support**	Avesnes stone
	Ground	Red lead in oil as ground, except underneath blue and white paints. Lead white was added to the red lead underneath pink paints.
	Matte paint	N.A.
	Transparent paint	Most layers are finished with a glaze, to achieve a glossy effect.
	Incarnates	N.A.
	Gilding	Gilding was applied on top of a yellow ochre and white layer in oil or protein. This was thick.
A big Holy Sepulchre group in the Petruskerk in Woerden, Meester Arnoldus (?), ca. 1500, Petruskerk, Woerden. [113]	**Support**	Avesnes stone
	Ground	Red iron-oxide in glue. No ground underneath white, light-pink and blue paints.
	Matte paint	N.A.
	Transparent paint	N.A.
	Incarnates	N.A.

[110] Idem; Lorne and van Loon, "12: Ontdekkingstocht naar een kleurrijk verleden," 146-156.
[111] Ibidem.
[112] Ibidem.
[113] Ibidem.

	Gilding	The underlayer of the gilding is very thin, so through the gilding the texture of the stone is still visible. This results in a matte and sober look.

Lorne and others have endeavoured to identify a style specific to Utrecht in terms of material. Achieving this is complicated, because of the lack of examples. However, some similarities between several sculptures from Utrecht have been found.[114] Typical for polychromy in Utrecht from around 1450-1550 is the use of a red ground of either red lead in oil or red ochre in glue.[115] Whether oil or glue was used for the grounds and paints mostly had to do with the location of the polychromy. Bigger sculptures often were first positioned in the church and then coloured, in which case the fast-drying glue was used. Smaller sculptures could be painted in a workshop, in which case the preferred glossy-looking, but slow-drying oil paints were used. Furthermore, it was common to already indicate the light and shadows in the ground layers, either by working in different shades of ochre or by applying red to some areas and leaving other areas without.[116] Until the renaissance arrived in Utrecht, it was customary to apply a lot of gilding to the sculptures. Especially pressed brocades were popular, but it was also not uncommon to paint plant motifs by hand, using a red or green glaze on a matte gilded background.[117][118]

Medieval sculptures would also often be overpainted quite soon after their creation. Such commissions can be found in the accounts for the Domkerk and the Buurkerk. In current restoration practice, such overpaint would be considered part of the history and although it might not be original, it would not be removed.[119] It is hard to distinguish original layers from medieval overpaint, because it is very likely the same pigments and binding mediums were used. Visual analysis and optical microscopy often prove useful in such situations.

With the data of the table, a hypothesis can be formed about the expected palette of the roof bosses. First of all, a ground layer with chalk and glue is expected. Next, a colour ground layer with a red colour, bound in either oil or glue, can be found on all the sculptures from Utrecht. The way in which they are applied varies. There is only one case where a uniform red layer was used. All the other case studies show that the painters used different methods to establish different tonalities already in the underlayers. Sometimes, different shades of red were applied by adding white lead to create lighter tonalities. In other cases, different colours such as orange or pink were used next to the red parts. In two cases, in areas where a red ground would influence the eventual surface colour too much, no coloured ground was applied. In one case, the red ground was applied in various thicknesses, resulting in a stronger or milder colour shade of red. Based on these findings, one or the other method is not specifically predicted, but it is likely that Dirck Scay and Ernst van Schayck did use a method to obtain different shades of underground.

Some pigments were found repeatedly in examples from Utrecht and are thus expected to be found in the roof bosses as well. Specifically vermillion, red earth and red lead were found several times. Red glazes were found as well. For blue, only azurite was detected, in different variations. It would either be applied on top of a grey layer, which is the more traditional method, or it would be applied on top of a layer or green paratacemite. This latter method is a rather rare find and is not expected

[114] Lorne, "Typisch Utrechts," 71.
[115] Idem, 71.
[116] Idem, 72.
[117] Idem, 71.
[118] Lorne and van Loon, 149.
[119] Taubert, *Polychrome Sculpture*, xii.

to be detected in the roof bosses. For white colour, lead white and chalk were used. Other pigments that have been found are lead tin yellow, which might be found, and verdigris. As the roof bosses show no green paints, verdigris is not expected to be found. Black often consists of charcoal. Furthermore, glazes In the colours red, orange, green, brown and grey. The brown and grey glazes were mostly used to achieve shadow areas, whereas the other glazes were used to achieve a glossy surface. In the incarnates, lead white and vermillion were used.

Lastly, regarding the gilding: in most cases, several methods of gilding were used alongside one another. A thick poliment gilding was used for burnished gold layers, a thin matte gilding was used for rougher surfaces left unpolished and specifically popular in Utrecht seems to have been the pressed brocade technique. This method can be identified easily, because foils of tin were used to attach the gold to the objects. When tin is found in gold, this is a clear indication of the use of the pressed brocade method. With the technique, one can efficiently apply gold patterns – like flowers – on a curvy surface.[120] As the roof bosses do not show the use of motifs, but rather of complete surfaces covered in gold, it is not expected that pressed brocades were used.

The roof bosses have been researched in the past for purposes of conservation. Victor Borges of the Victoria and Albert Museum in London has been kind enough to share the latest treatment reports of the museum's roof bosses. These date to 2012, when the four sculptures were being prepared for travelling to Utrecht for the *Ontsnapt aan de Beeldenstorm* exhibition. The reports do not contain mention of original pigments or binders. They do make mention of the removal of overpaint, but do not specifically note all areas in which overpaint was present. Therefore the reports cannot be used to extract information about the originality of the colours that can be seen on current images.

God the Father has also received restoration treatments, the reports of which were shared by Christiaan Veldman of the Museum Catharijneconvent. One treatment was executed in 1996 by Paulus Reinhard, which focused solely on reattaching the hand of God after a previous restorer did a poor job of this. Another treatment took place in 2001 by Archeoplan. The report does show images, but no mention of a treatment. Similarly to the reports regarding the roof bosses in the Victoria and Albert Museum, these reports do not provide data about the polychromy.

[120] Ingrid Geelen and Delphine Steyeart, *Imitation and Illusion: Applied Brocade in the Art of the Low Countries in the Fifteenth and Sixteenth Centuries* (Brussels: Royal Institute for Cultural Heritage, 2011).

4. Methodology

Involved organisations and process

The surviving roof bosses by Jan van Schayck, Ernst van Schayck and Dirck Scay are spread across three collections: that of the Centraal Museum in Utrecht, Museum Catharijneconvent in Utrecht and the Victoria and Albert Museum in London. This thesis only analyses the roof bosses currently in Utrecht, since this is feasible within the limits of a master's thesis.

The thesis process started by writing a research proposal which was extensively discussed with heritage experts from the Rijksdienst voor het Cultureel Erfgoed in Amsterdam (RCE). During these discussions, requirements by and possibilities within the different parties (Centraal Museum, Museum Catharijneconvent, RCE, UvA) and the challenges of the research were considered. For the museums, it was important that invasive research would be kept to a minimum. It was agreed that one sample could be obtained in each museum, if a substantial argument was brought forward to do so. It was impossible to bring the roof bosses to the Ateliergebouw in Amsterdam; instead, the research took place in the respective depots in Utrecht. Therefore, the equipment had to be portable.

After careful consideration, a two-step research plan was made. The first step entailed a visit to both depots within a limited amount of time, during which the artworks were visually analysed properly. X-ray fluorescence (XRF) spot analysis was performed and photographic documentation was gathered using both a digital camera and a USB microscope. At the end of the visits, sampling was discussed and possibly executed. The second step involved bringing the sample to the Ateliergebouw where it was imbedded and polished to obtain a cross-section. It was then analysed using optical microscopy, scanning electron microscopy with energy dispersive X-ray spectroscopy (SEM-EDX) and micro-Raman.

Several publications – such as Pereirda-Pardo, et. al.[121], Dine, et. al.,[122] Mounier et. al.[123], Dyer, et. al.[124] and Alberghina, et. al.[125] – show the use of methods such as Fourier-transform infrared spectroscopy (FT-IR), gas chromatography-mass spectrometry (GC-MS), fiber-optic reflectance spectroscopy in the visible and near-infrared and multi-spectral imaging, and how they prove successful. However, some of these methods were not available because the research was carried out in situ. RCE experts advised against using GC-MS, which is often used to investigate the organic compounds in paints, such as binding media, preparatory layers and isolation layers. The leading argument for not including this method was the high chance of the organic compounds having been lost after more than 500 years and therefore being undetectable. GC-MS requires a sample that will be lost afterwards and thus is extremely invasive, so the risk of the method not being able to detect anything would be too high in relation to its invasiveness. Optical microscopy, XRF spot analysis and

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[121] Lucía Pereira-Pardo, Diego Tamburini and Joanne Dyer, "Shedding light on the colours of medieval alabaster sculptures: Scientific analysis and digital reconstruction of their original polychromy," *Color Res Appl.* 44 (2019): 223-224. https://doi.org/10.1002/col.22323.

[122] H. Dine, M. Abbe, L. Anderson-Zhu, A. Elliott, and G. Gates, "A technical study of exceptionally preserved polychromy and gilding on a Roman marble head," in *Transcending Boundaries: Integrated Approaches to Conservation. ICOM-CC 19th Triennial Conference Preprints, Beijing, 17–21 May 2021*, ed. J. Bridgland, 1-8 (Paris: International Council of Museums), 3.

[123] Aurelie Mounier, Markus Schlicht, Maud Mulliez, Romain Pacanowski, Antoine Lucat and Pascal Mora, "In search of the lost polychromy of English medieval alabaster panels in the Southwest of France," *Color Res Appl.* 45 (2020): 431-432.

[124] Joanne Dyer, Elisabeth R. O'Connell and Antony Simpson, "Polychromy in Roman Egypt: a study of a limestone sculpture of the Egyptian god Horus," *The British Museum Technical Research Bulletin* 8 (2014): 95-98.

[125] M. F. Alberghina, R. Barraco, M. Brai, L. Pellegrino, F. Prestileo, S. Schiavone and L. Tranchina, "Gilding and pigments of Renaissance marble of Abatallis Palace: non-invasive investigation by XRF spectrometry," *X-RAY Spectrometry* 42 (2013), 70-71. DOI 10.1002/xrs.2435.

SEM-EDX were preferred over these methods because they are less invasive and together they can definitively identify components of the paint layers.

As methods focussing on organic compounds were not included, the focus of the thesis shifted towards the pigments that were used. However, previous research into the style of Utrecht mainly focuses on pigments too, and the lack of data on organic compounds will not obstruct the roof bosses to be placed in (or outside of) this context.

When the sample was about to be embedded it proved to be quite brittle by breaking into three extremely small pieces. This led the experts to think that indeed barely any organic compounds were still present. The three parts were analysed with an optical microscope, after which it was concluded that not all three were fitting for further research, since they did not contain all the layers the original sample had.

Methods and objectives

Methods are discussed in an order of invasiveness, starting with the non-invasive techniques.

Visual analysis and digital photography

The visits to the depots were the first and last opportunities to see the art objects from up close. The conservators had gathered them from the museum and depot and displayed them flat on the table. This made it possible to walk around the artworks and look at them from different angles, an experience not shared by the scholarly clergy 500 years ago. Important observations were photographed using a Canon EOS 40D with EF-S 60mm F/2.8 Macro USM lens and IR block filter.

Visual analysis is perhaps the most important method as all the other methods are useless when they cannot be contextualised in the visible and tangible. The research was started with visual analysis and all other findings were continually being compared to the findings of the photographs. The main objectives of the visual analysis were to become familiar with the objects, to obtain a better understanding of the three-dimensionality of the artworks, to gain a general idea of the condition of the artworks and to search for fitting areas of interest for the subsequentially executed methods.

USB-microscopy

A Dino-lite USB microscope type AM4113T-FVW with 1.3 megapixel and IR cut-filter > 650 nm, switchable to 395 nm UV-LED was used with DinoCapture 2.0 software in order to gather microscopic images of the surface of the artworks on location. This method supplies much more detailed images than a regular digital camera, while being portable.

The main objectives of using USB-microscopy were to obtain more detailed images of the artworks' surfaces and therefore a more detailed understanding, to understand the layer build-up as visible from the surface and to select fitting areas of interest for subsequentially executed methods.

X-ray fluorescence (XRF) spot analysis

The roof bosses were analysed by using a Bruker Tracer 5 handheld XRF, with an X-ray tube of a nickel-copper alloy coated in rhodium. Therefore, the elements nickel, copper and rhodium are always detected in the XRF measurements. The specific settings of the handheld XRF are shown in the **table 3**.

Table 3. X-ray fluorescence spot analysis settings.

Excitation source voltage	**40 kV**
Excitation source current	**22 mA**
Collimator size	**3 mm**
Measurement time	**60 s**

Using XRF, information about the pigments as well as the stone can be found. Identifying the stone should be rather straightforward, as historically there are two options. The stone is either Baumberg stone or Avesnes stone. More information about this topic is discussed in the next chapter.

Most importantly, XRF was used to identify pigments by obtaining elemental information about the paints. Portable XRF is a point analysis, meaning that of one specific point, all elemental information will be shown, regardless of the paint layers these elements are in. Hence, one spectrum will show the contents of paints, overpaints, grounds and stone.

Sampling

One sample was taken from the roof boss of Saint Jerome. For the exact location, see **Appendix II.** The museum allowed one sample to be taken, so this decision had to be made carefully. Ideally, several samples, each of a different colour would have been taken. Since this was not possible, the red-coloured background of the roof bosses was chosen. The background has the most intense colour for which it was expected that this colour is not original. However, as the relief of the background is so uneven and has many bumps, it was also expected to find one or more original paint layers in the coves of the background. Using optical microscopy and SEM-EDX the layers can be discerned and the pigments belonging to the original paints and modern paints can be identified. The sample was taken by Rutger Morelissen, who obtained a sample including layers from the surface to the stone. The sample was then imbedded in Technovit resin and polished using SiC-grinding paper (Struers and Micromash).

In consultation with the conservator at the Museum Catharijneconvent no sample was taken from the *God the Father* sculpture. The red that was still present on the sculpture was really only a hue, making it impossible to sample it. Therefore, the urgency was not high enough to continue invasive treatment.

Optical Microscopy

The cross-section was analyzed with Optical Microscopy using the Leica DM 2500M microscope in bright field, dark field and UV. To make pictures, the ZEN 3.2 software was used.

By investigating samples under the microscope one can obtain a better understanding of layer built up. The support (stone), ground and paint layers can be distinguished under the microscope. Aspects such as the amount of layers, the use of isolation- or intermediate layers, their thickness and whether an artists worked wet-in-wet can all be seen in OM. This method therefore often provides

the most information about the working methods of an artist. Pictures are obtained in order to study the cross-section later and to show findings in the thesis. Furthermore, the images are used to compare the findings in the backscatter images of the SEM.

Scanning Electron Microscopy with Energy Dispersive X-ray Spectroscopy (SEM-EDX)

For the SEM-EDX a Jeol JSM-IT700HR Scanning Electron Microscope with JED-2300-Fully integrated JEOL EDS system was used. The primary electron beam was 20 kV. The cross-sections were examined in low-vacuum mode (30Pa).

The objective for SEM-EDX was to obtain a better understanding of the layer built-up, since the backscatter image of the SEM is more detailed than an image obtained with optical microscopy. Sometimes, layers that are not easily distinguishable in OM will be clearly visible in the backscatter image. Furthermore, the SEM-EDX can identify each particle in the cross-section and map the distribution of elements throughout the cross-section. The goal is to understand what all layers consist of.

Micro-Raman

The cross-section was also researched using micro-Raman. The objective was to confirm or rule out interpretations of the XRF measurements and SEM-EDX findings. The micro-Raman spectra were recorded with a Perkin-Elmer Raman Micro 300 (Raman microscope) and a Raman Station 400F (Raman spectrometer) equipped with a diode laser (l0 = 785 nm). Sample irradiation was accomplished using the 50× and 100× microscope objectives of an Olympus BX51M microscope. The exposure time, laser power and accumulations were selected to get sufficiently informative spectra. The laser spot size was adjusted at ca. 10 and 20 µm, for the 100× and 50× objectives, respectively. Power values ranged between 7-70 mW (50× objective) and 4-40 mW (100× objective) and a 600 lines/mm grating was used. Raman scattering was filtered by a double holographic notch filter system and collected by an air-cooled charge coupled device (CCD) detector.

5. Results

In this chapter, the results of visual and technical analysis of the four roof bosses of *God the Father, Hiëronymus, Gregorius* and *Augustinus* will be presented. *God the Father* is in a fairly different state of conservation compared to the other three, being the only one almost completely stripped of its polychromy. The church fathers still contain large amounts of polychromy, with barely any stone uncovered. However, the gilding and paint layers are far from intact.

Stone

In *God the Father*, one can see the stone uncovered. Through visual analysis, a couple of characteristics of the stone can be discerned. Overall, the stone looks white-greyish, with small black dots (**fig. 20-21**). These dots are everywhere, but frequently cluster and form black hues as well (**fig. 22-23**). In some areas, yellow lines are visible. At first it was thought this might be an indication of yellow ground, but upon closer look it became apparent that the lines are part of the stone (**fig. 24-25**). When the XRF spectra of an area with yellow line and without yellow line are compared, barely any differences are noticeable (**fig. 26-27**). Within the yellow, less zinc and less lead are detected. Such differences can occur in stone, as it is not a homogeneous material. The high amount of calcium does point to an identification of Avesnes stone.

Figure 20. GOD-1: The hair and forehead of *God the Father*, showing the white-greyish stone with black dots.

Figure 21. DL-GOD-1: Microscopic image of *God the Father*.

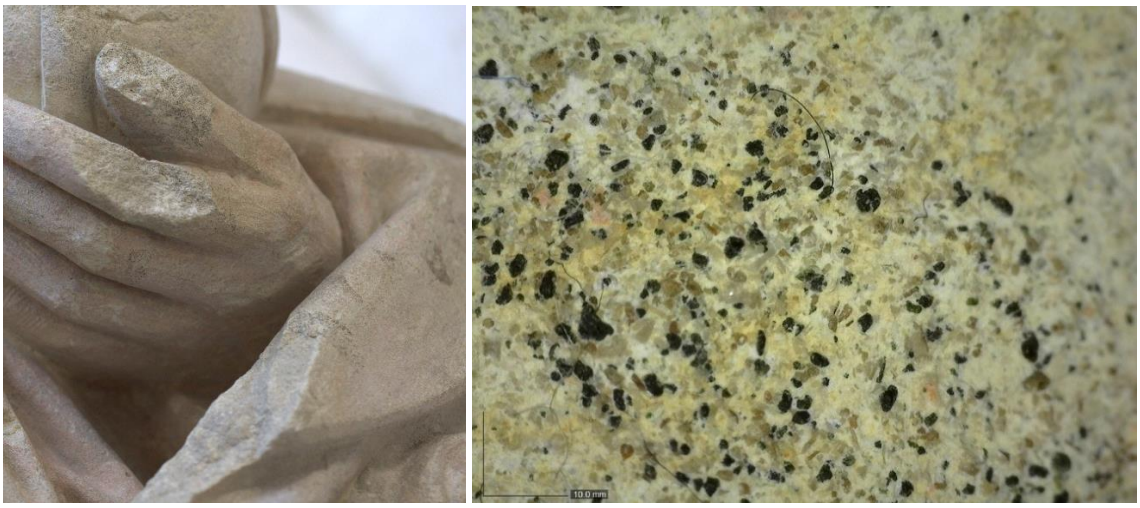

Figure 22. GOD-2: The hand of *God the Father*, showing clusters of black dots.

Figure 23. DL-GOD-2: Microscopic image of the hand of *God the Father*, showing clusters of black dots.

Figure 24. GOD-3: Image of *God the Father*, his hair. Yellow lines are meandering across his hair. See arrow for indication.

Figure 25. GOD-4: Image of *God the Father*, his cloak. Yellow lines are meandering across his cloak. See arrow for indication.

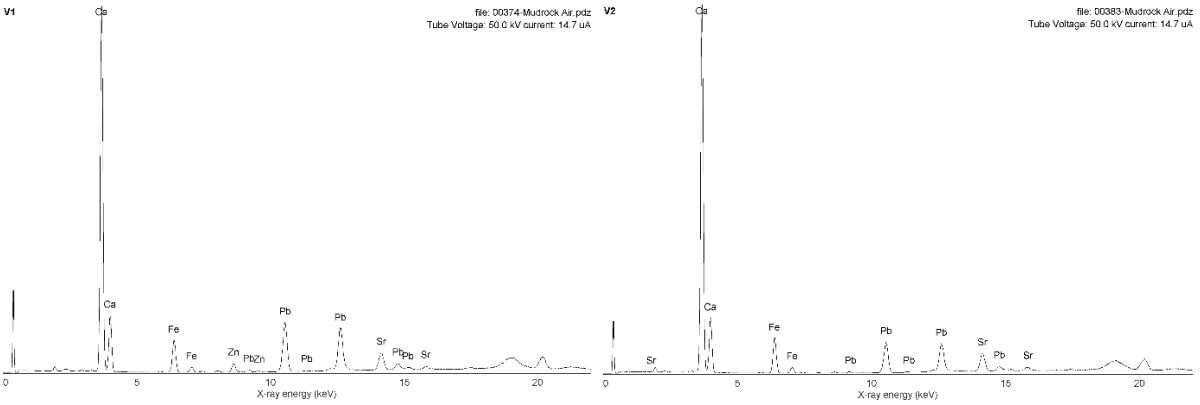

Figure 26. XRF spectrum (V1) of *God the Father*. This spectrum is obtained from a white area of stone.

Figure 27. XRF spectrum (V2) of *God the Father*. This spectrum is obtained from a yellow area of stone.

Ground

The *God the Father* sculpture has completely lost its paint layers, but remnants of a red colouring are still visible (**fig. 28-29**). The residue looks more like a hue than actual fragments of paint and it can be found almost everywhere on the sculpture (**fig. 30-31**). It is most noticeable on the drapery, the hands and deep in the folds. Whether this is part of the original ground layer cannot be distinguished by visual analysis. Polychromy was still present in 1826, so the red must at least be older than that. XRF analysis of these areas does not show any modern pigments and compared to the data of the bare stone, the only difference is a higher peak for iron. Therefore it is most likely that the red hue is indeed a remnant of red earth, which can be the original ground or bolus.

Figure 28. GOD-5: Image of *God the Father*, showing his hand, cloak and globe. A red hue is visible across all these parts.

Figure 29. GOD-6: Image of *God the Father*, showing the red hue on his cloak.

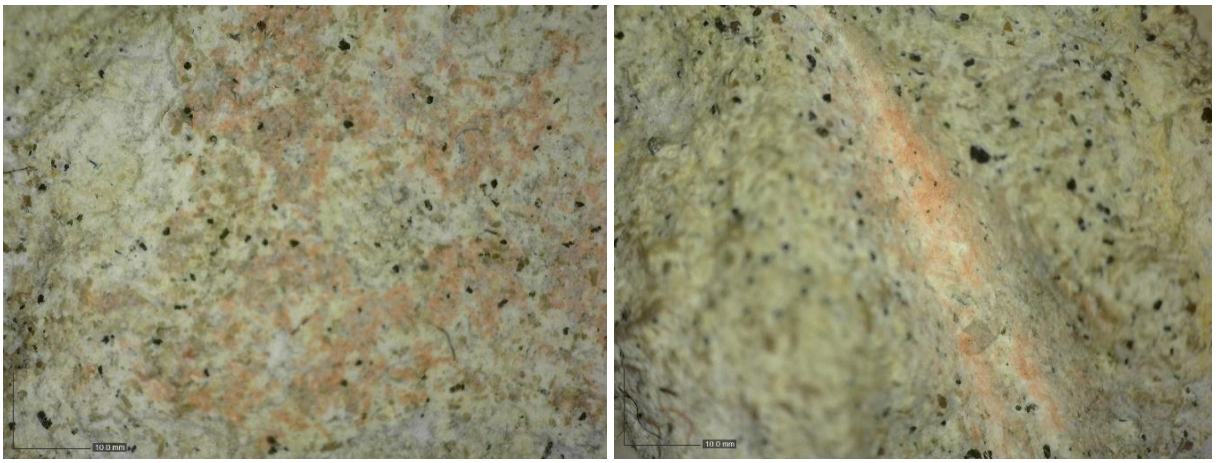

Figure 30. DL-GOD-3: Microscopic image of the red hue on a flat surface.

Figure 31. DL-GOD-4: Microscopic image of the red hue in a fold.

Unfortunately, the church fathers are in such a condition that the red ground or underlayer(s) are visible with the naked eye in many paint losses and cracks on the artworks. Two tonalities of a red ground can be discerned. Yellow and grey underlayers are present underneath certain colours.

In one specific damaged area, a chip is missing in the ground. One can see there is no other coloured layer underneath the red layer. The layer is so thin that the black particles in the stone shimmer through. This red is the colour of the original ground layer (**fig. 32**). XRF analysis shows a high peak for lead, which is indicative for red lead. A high peak for iron is also found, higher than in spectra for just the stone, indicating there might be red earth present. This corresponds with the findings on the *God the Father* sculpture. Furthermore, a small peak for sulphur and mercury is found, meaning that vermillion is present, albeit in very small amounts (**fig. 33**). Micro-Raman was used on the sample taken from the red background. The cross-section shows that several red layers were applied directly onto the stone (**fig. 60**). It is thus incredibly likely that at least the bottom layer is the original ground layer. Micro-Raman on the bottom red layer confirms that vermillion and red lead were used. The ground is therefore a mixture of red earth, red lead and a little bit of vermillion. The lead might also indicate the presence of lead white, but since the ground is quite dark in colour, this is not to be expected.

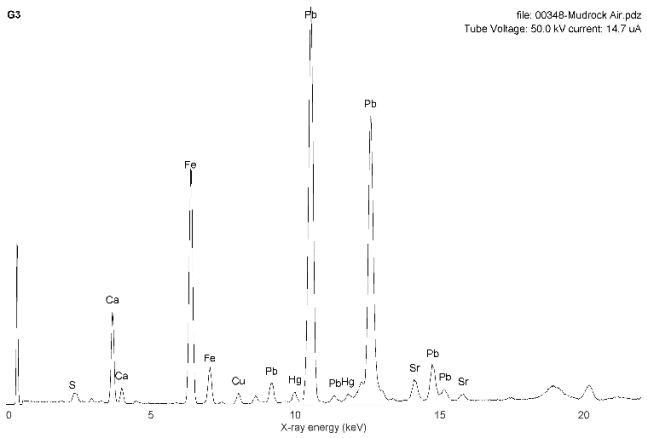

Figure 32. DL-G-1: A microscopic image of Saint Gregory, showing a chip missing from the ground, laying the stone bare.

Figure 33. XRF spectrum (G3) of Saint Gregory. This spectrum is obtained from the red ground.

A red ground is visible underneath the garments (**fig. 34**), the gilding (**fig. 35**), the incarnations and even underneath white or light areas (**fig. 38-39**). Explicitly visible underneath the gilded parts of the lion in *Saint Jerome* are two tonalities of red **(fig. 35**). The two tonalities do not correspond to the areas that should naturally receive more or less light. The nose, collarbones, eyelids and eyebrows of the lion – areas that normally would catch the light and receive a highlight – actually show the darkest red in the underground. Other areas that would naturally be in the shade show a lighter underground. XRF analysis did not detect different components in the different shades of red, but with a microscope, the two colours are clearly discernible (**fig. 36-37**).

Figure 34. H-1: Image of the drapery of Saint Jerome, with a clear red ground showing underneath.

Figure 35. H-2: Image of the lion of Saint Jerome, with two tonalities of ground showing underneath the gilding.

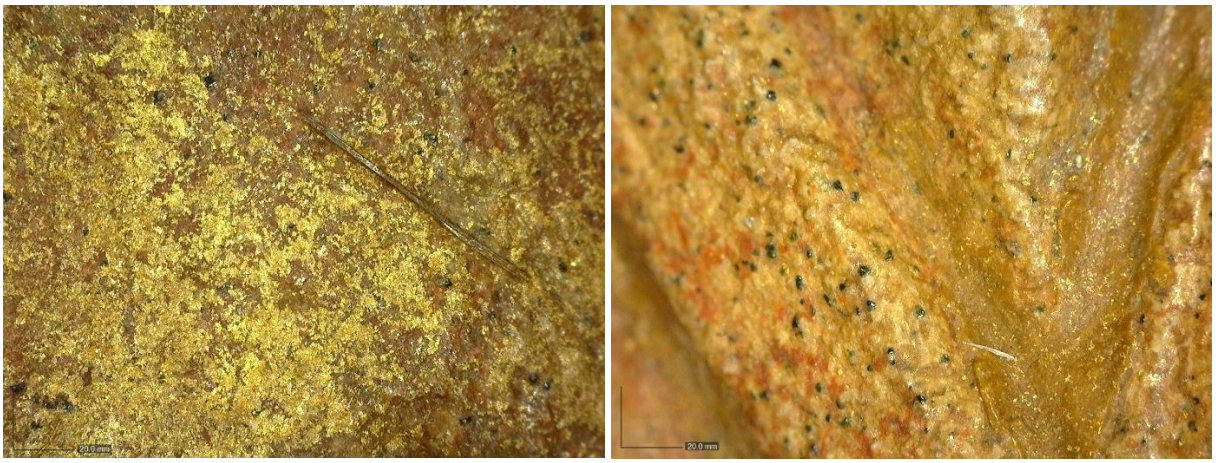

Figure 36. DL-A-1: Microscopic image of *Saint Augustine*, a gilded area, showing a light red ground.

Figure 37. DL-A-2: Microscopic image of *Saint Augustine*, a gilded area, showing a dark red ground.

A red ground underneath paint and gilding is far from uncommon. However, as previous research has shown, some painters from the area of Utrecht would refrain from using a red ground or a red underlayer underneath certain colours. Especially underneath white paint, a red ground would have a pinkening effect. In the case of the roof bosses, a red ground is still visible in the pages of the books and the eyes of the church fathers. Within the area of the books, the white paint can be seen immediately on top of a thin red ground, without an underlayer (**fig. 38-39**). The black spots of the stone shimmer through the red ground, indicating how thin the ground is. The colour of the ground resembles the lighter shade of red as seen in DL-A-2 (**fig. 37**). The painters thus did not apply a different coloured ground or underlayer underneath white paint, but they did opt for the lighter shade of red ground.

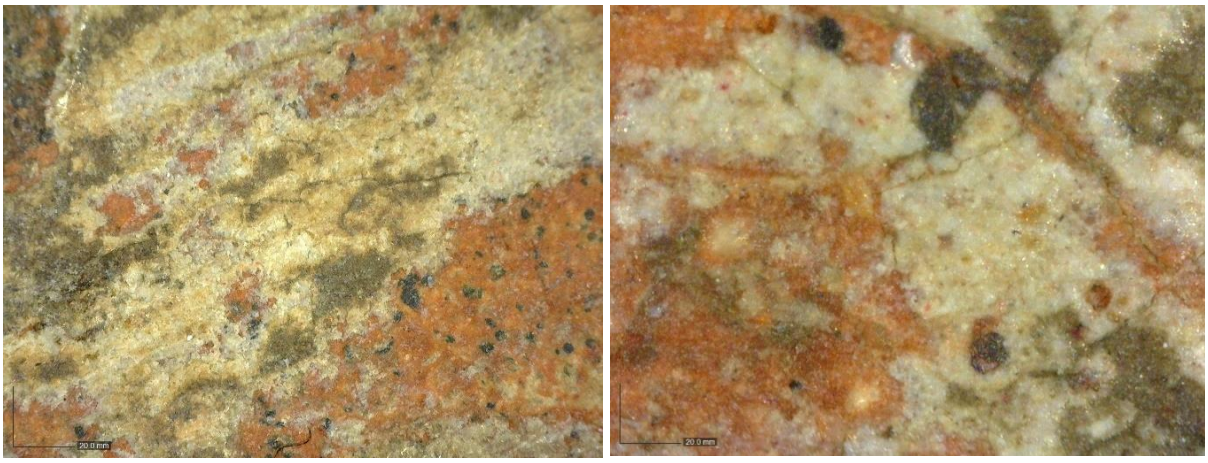

Figure 38. DL-G-2: Microscopic image of *Saint Gregory*, showing the page of the book he is holding.

Figure 39. DL-H-1: Microscopic image of *Saint Jerome*, showing the page of the book he is holding.

Even in the border of clouds, which were blue, a red ground can be discerned. One has to look a little harder to see it, as most of the clouds are quite damaged and the red ground has disappeared almost everywhere, but underneath the grey paint layers a red ground – again, the lighter shade – is visible (**fig. 40-41**).

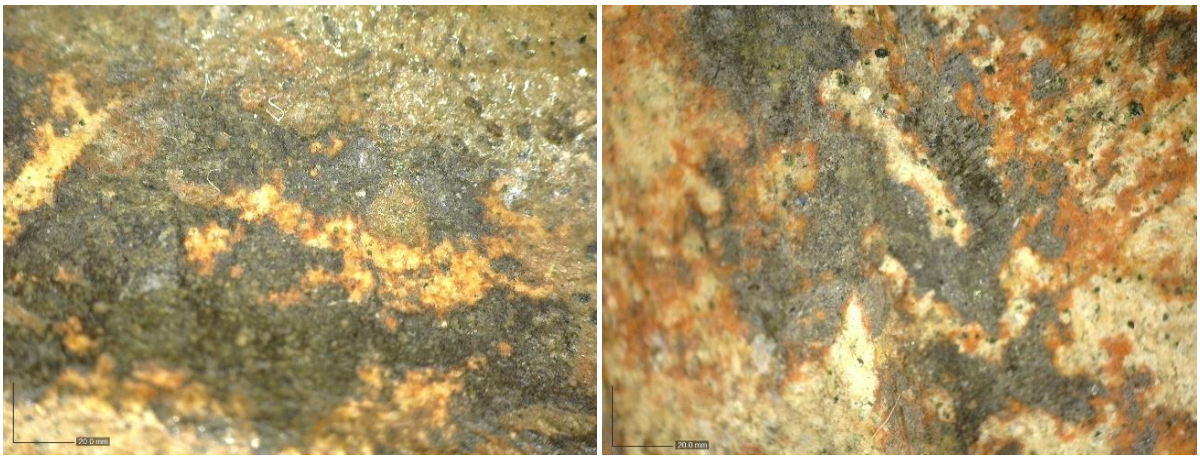

Figure 40. DL-G-3: Microscopic image of *Saint Gregory* of a cloud, showing a grey layer on top of a red ground.

Figure 41. DL-A-3: Microscopic image of *Saint Augustine* of a cloud, showing a grey layer on top of a red ground.

Underlayers

In most areas, the paint is applied on top of the red ground, but there are two exceptions. The first exception is the clouds: in between the red ground and the blue grey and blue paint layers, a yellow underlayer was applied. The layer shows underneath the grey layer (**fig. 42**), which is present underneath the blue paint (**fig. 43**).

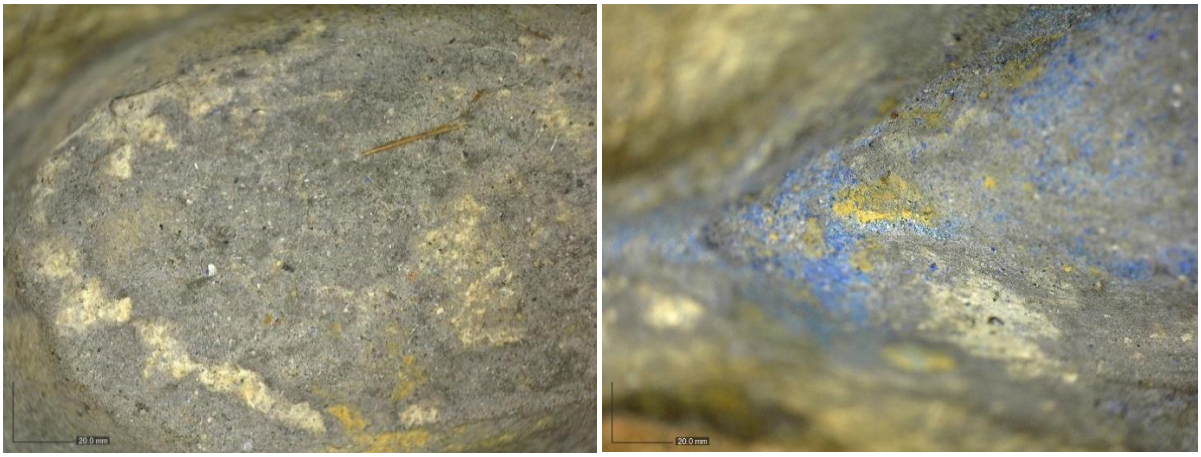

Figure 42. DL-A-4: A grey paint on top of a yellow layer which is discernible from the whiter stone.

Figure 43. DL-A-5: A blue paint, on top of a grey paint, on top of a yellow layer which is discernible from the whiter stone.

The second exception is the black areas, which are mostly the dresses of the church fathers. These also have a yellow underlayer on top of the red ground. More information about why a yellow underlayer would be desirable in these parts is offered in the next section. The yellow layer is not specific to one black dress, but to all (**fig. 44-45**).

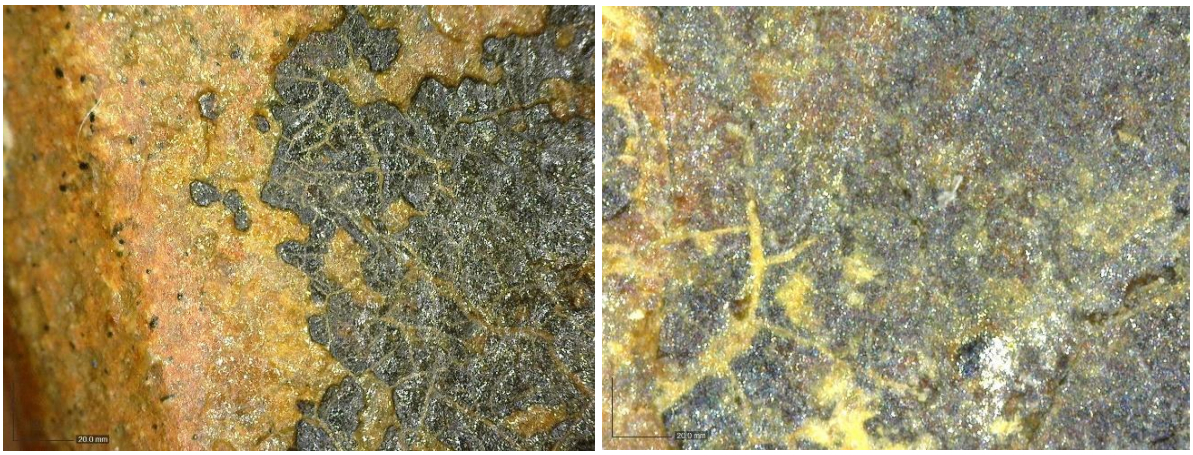

Figure 44. DL-A-6: Microscopig image of *Saint Gregory*, showing a black paint on a yellow layer on the red ground.

Figure 45. DL-H-2: Microscopic image of *Saint Jerome*, showing a black paint on a yellow layer on the red ground.

Paint layers

The three sculptures have a very similar colour scheme: all of the dresses are gilded. Other frequent colours are red and black. Red can be found in the background and now in the dress, although that is probably due to the gilding flaking off. Black can be found in the accessories of the church fathers. Their incarnations share the same tints; the backgrounds all have the strange bright red. All of the rows of clouds show both red and blue colours.

This colour scheme is somewhat strange: black is not often present in such amounts in polychromed sculptures and often more colours than just red are used. When one compares the black hair of Saint Gregory to the black ribbons at the back of his tiara, a difference in blacks becomes apparent. Logically, the hair was intentionally painted dark, but one may wonder whether the ribbons – and other black areas – were intended to be black or not. XRF analysis shows a high peak for copper (**fig. 46**). Copper is typically present in green and blue paints, such as verdigris and azurite. Considering that the underlayer is yellow, the black paint was probably green of origin (**fig. 47**). A yellow underlayer would have turned the overall look of a blue paint somewhat green, so a green paint is more logical.

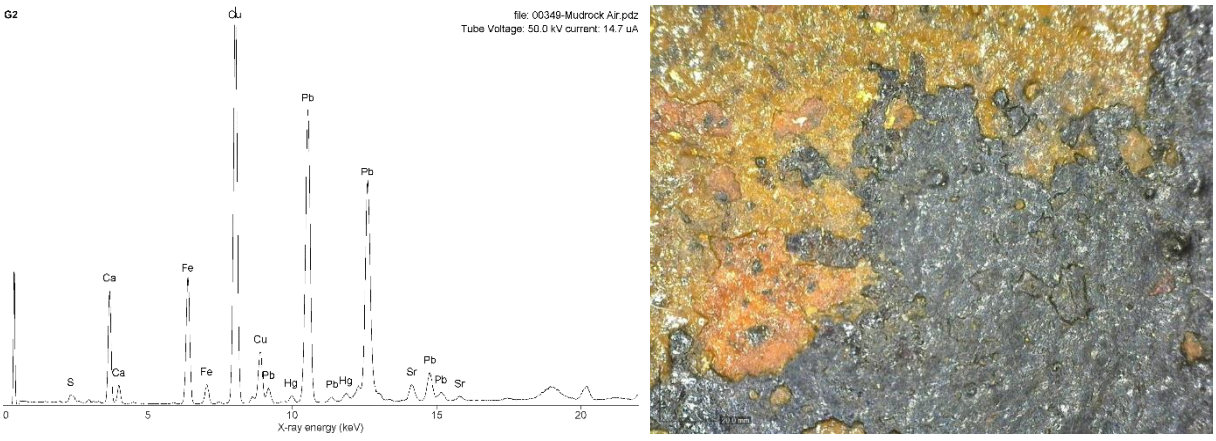

Figure 46. XRF spectrum (G2) of the black in *Saint Gregory*.

Figure 47. DL-G-4: Microscopic image of *Saint Gregory* showing the yellow underlayer underneath the black paint.

The incarnations of the church fathers all look similar and are quite detailed. It is hard to discern, as the surface has been damaged, but it seems the incarnations have highlights. Applying highlights is

fitting for the *Utrechtse Stijl*, but is all the more important in this case as the roof bosses hung above the window where no light could reach them from above. The face of *Saint Augustine* shows best the method used for the incarnations (**fig. 48**). The lips were tinted slightly darker red than the ground and the eyes were painted white on top of the red ground. The top eyelid received a line of dark paint to establish the shadow of the eyelid. All three men received this line underneath the top eyelid and none had painted eyebrows. The sculpting of the faces however was performed so neatly, that the natural shadow created by light makes up for this. Next to Augustine's left ear, two curly lines can be seen, which represent hairs. The surface layer of the skin is applied on top of a green layer, (**fig. 49-50**). XRF analysis shows a large peak for lead, a very small peak for iron and also a small peak for mercury and sulphur (**fig. 51**). As the iron peak is very small compared to other red areas, we may assume this is the iron in the stone itself or an indication that green earth was used for the green. The surface layer is painted with a lot of lead white and small amounts of vermillion.

Figure 48. A-1: Image of *Saint Augustine*, showing the right side of his face.

Figure 49. DL-A-7: Microscopic image of *Saint Augustine*, showing a red ground with green and a light skin colour on top.

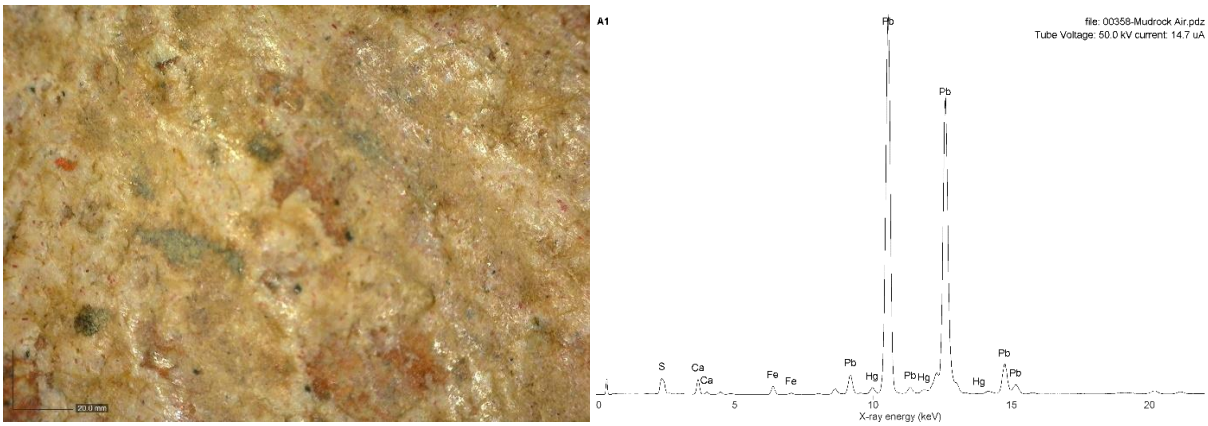

Figure 50. DL-G-5: Microscopic image of *Saint Gregory*, showing a red ground with green and a light skin colour on top.

Figure 51. XRF spectrum (A1) of *Saint Augustine* of his incarnates.

The clouds had two colours: red and blue. XRF analysis shows a peak for copper in the blue areas and also some mercury and sulphur (**fig. 52**). Therefore it is most likely the blue was made of azurite. As previous research has shown, azurite was most often applied on a grey paint layer, as is the case here (**fig. 53**). The red was made with vermillion. Whether the whole row of clouds was blue or only the outer edges is unsure. The red seems to be present only in the clouds facing the saints, whereas the blue seems to be present only in the clouds facing away from the saints (**fig. 54-55**). As Annabel Dijkema pointed out to me, this is a theme that occurs more often in the near surroundings of medieval Utrecht (**fig. 56**).

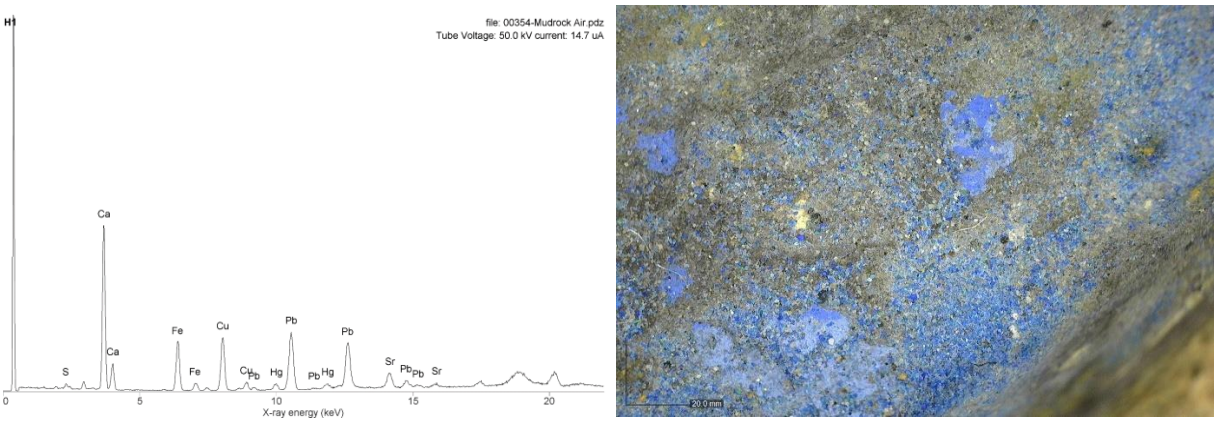

Figure 52. XRF spectrum (H1) of *Saint Jerome*, indicating a blue area in the clouds.

Figure 53. DL-A-8: Microscopic image of *Saint Augustine*, showing the blue paint on top of a grey paint.

Figure 54. A-2: Image of border of clouds of *Saint Augustine*.

Figure 55. H-3: Image of the border of clouds of *Saint Jerome*.

Figure 56. *Antepedium*, Nürnberg, ca. 1470, linen, wool and goldthread, 75 x 200 cm., Museum Schnütgen, Cologne. Inv. N1409. Image: https://museenkoeln.de/portal/bild-der-woche.aspx?bdw=2013_40.

The background of the sculptures – the undetermined spaces left and right of the men's heads – are painted a bright colour of red. This part was ruggedly carved and remains uneven and irregular. Since the surface is not flat, more paint was necessary to cover the whole background. A thick layer was applied (**fig. 57**). The colour has a different tonality than the red ground in other areas. The stone shimmers through where the paint is thin (**fig. 58**). Still, it is impossible to say by visual analysis whether this is just one layer of overpaint and what is still present underneath.

Figure 57. A-3: Image of *Saint Augustine*, showing the background.

Figure 58. DL-H-3: Microscopic image of *Saint Jerome*, showing the background.

XRF analysis shows a notable amount of lead in this area, much more than in other areas. A small peak of titanium is present, but experts say the peak is too small to be indicative of the presence of titanium in the paint layer. Small amounts of sulphur and mercury are indicative of vermillion, which was used until approximately 1900 (**fig. 59**).[126] The paint can thus not have been applied later than 1900.

[126] "Pigments Checker Timeline," Cultural Heritage Science Open Source. Accessed July 28, 2023. https://chsopensource.org/tools-2/pigments-checker-4/.

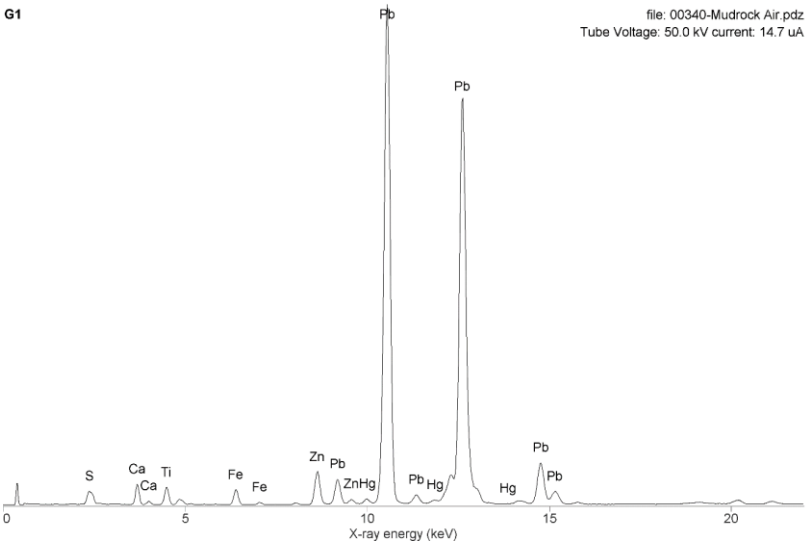

Figure 59. XRF spectrum (G1) from the red background of *Saint Gregory*, showing a high peak of lead and small peaks for titanium, sulphur and mercury.

In order to understand the background layer(s) better, a sample was taken from the roof boss of *Saint Jerome*. For the exact location, see **Appendix II**. Unfortunately, the sample was so brittle, it almost immediately broke into three pieces. One piece (2023-012), embedded in Technovit, was used to take pictures through Optical Microscopy (**fig 60-62**). It was also researched using SEM-EDX and Micro-Raman.

In the bright field image of cross-section 2023-012, there is a clear distinction between the stone layer and the paint layers (**fig. 60**). It seems there are two paint layers present, although one paint layer does not cover the whole width of the sample. This is due to the breaking of the sample. Especially in the ultraviolet image, a distinction between the bottom layer and the top layer is visible, with some darker line – perhaps dust – separating the two (**fig. 62**). The bottom layer has an orange medium and consists of small orange and bigger red and white particles. In UV, the medium shows orange as well, the white particles turn grey and the red particles are still red, but darker. The top layer, which is only fragmentarily present, is darker red than the bottom layer. In bright field, the medium is red, containing only small red and small white particles. In UV, the medium becomes white and the white and red particles are a little darker.

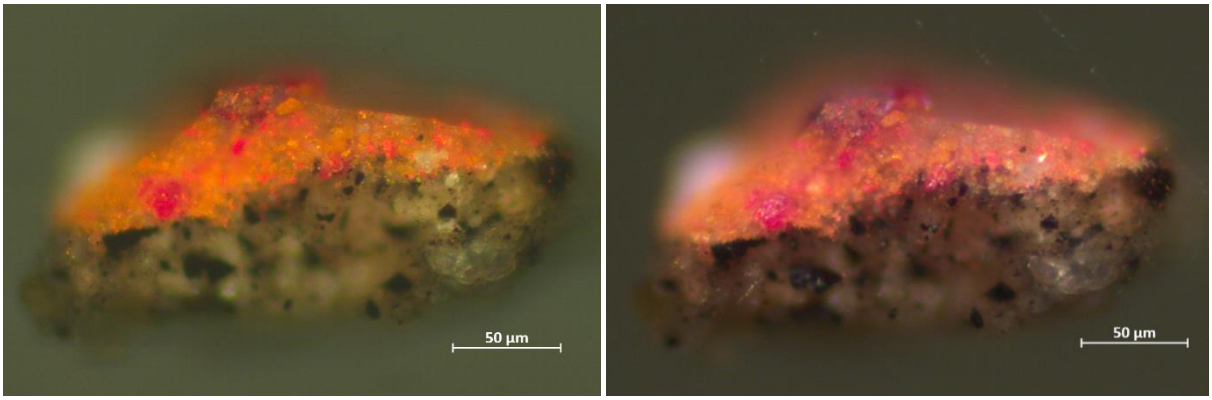

Figure 60. Microscopic image of cross-section 2023-012. Bright field, magnification 200x.

Figure 61. Microscopic image of cross-section 2023-012. Dark field, magnification 200x.

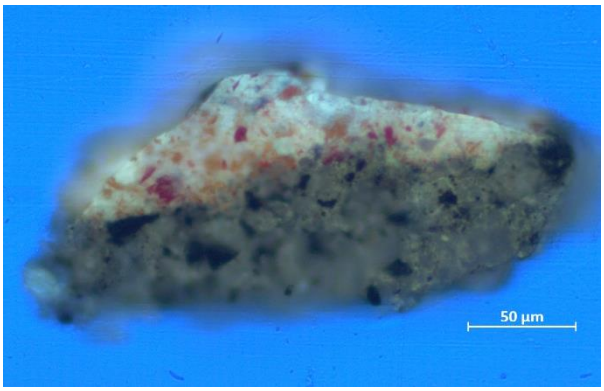

Figure 62. Microscopic image of cross-section 2023-012. Ultravoilet, magnification 200x.

The SEM-EDX analysis on sample 2023-012 indicated that only four elements were found in this sample: calcium in the stone, mercury and sulphur as specific particles in the paint and lead and sulphur spread through the entirety of the paint (**fig. 64**)[127]. Indeed, no titanium was found by SEM-EDX. The paint layers seem to exist entirely of HgS, also known as the pigment vermillion, and a combination of lead and sulphur. XRF analysis was expected to reveal a lot of lead and only small amounts of vermillion. The SEM-EDX elemental maps verify this, as there are only a few particles of mercury present in the sample compared to the amount of lead found (**fig. 63-64**). The presence of overpaint could be neither confirmed nor ruled out by SEM-EDX analysis. The elemental mappings of the SEM-EDX analysis showed both lead and sulphur being equally distributed throughout the sample. Micro-Raman was used to rule out the presence of lead sulphate, which is a pigment used only much later in time. No lead sulphate was found, only vermillion, red lead and lead white.

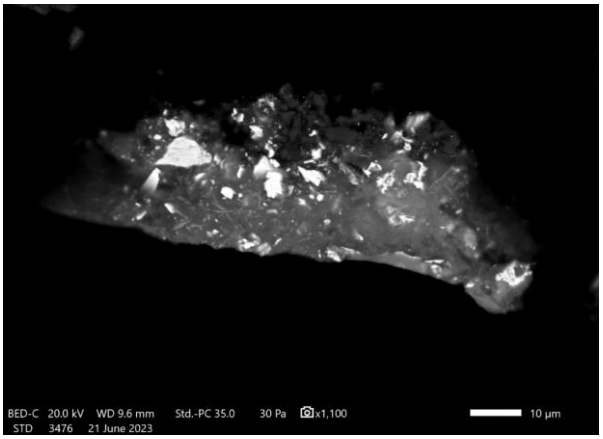

Figure 63. Backscatter image of sample 2023-012. Magnification 1100x.

[127] I have looked at this sample with Rutger Morelissen and Fahed Ibrahim spread over three occasions. Each time difficulties arose as the sample did not look similar in SEM-EDX and under the microscope. The last time, the SEM-EDX did not give sufficient information. It is almost impossible for the stone to exist solely of calcium and no other trace elements. Nonetheless, no trace elements were found. However, both researchers still insist that the information obtained from the SEM-EDX is truthful – although incomplete – and can be used for this thesis.

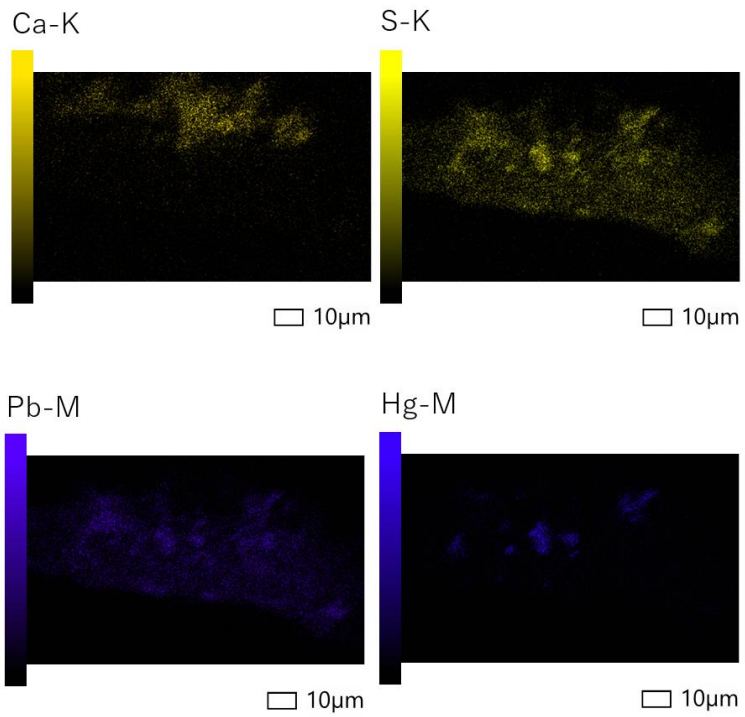

Figure 64. SEM-EDX elemental mappings of cross-section 2023-012, showing calcium, sulphur, lead and mercury.

Gilding

The sculptures now look overwhelmingly red, but all the dresses and even the books, staffs and the heart of S*aint Gregory* were at some point gilded. In the gilding, XRF analysis shows pure gold, with only a very low copper peak that is too low to be indicative of actual copper (**fig. 65**). It is possible that some of the gold was applied later, but there are no indications for this other than it being uncommon to gild this much of the sculptures. Covering all the sculptures with an equal amount of gilding does not signal their importance properly. Furthermore, if the roof bosses were completely gilded, it was hard for the viewer to differentiate between different parts of the sculptures. However, a high amount of gold does fit with the high price paid for the painting of the roof bosses. Furthermore, it is important to note that no tin was found in any of the gilding spectra. Thus, no pressed brocade methods were used.

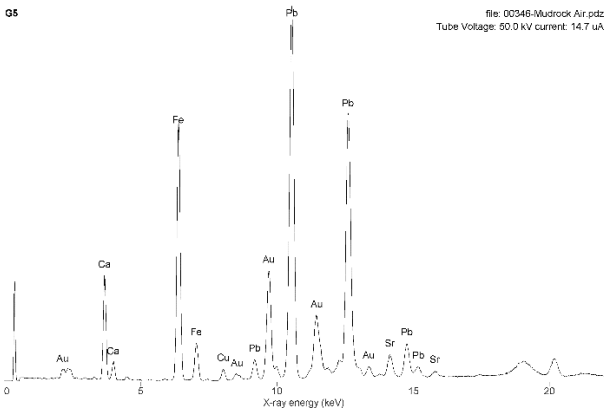

Figure 65. XRF spectrum (G5) of *Saint Gregory*, gilding.

6. Conclusion

The goal of this thesis is to answer the following research questions:

- To what extent is the polychromy original?
- What method did Ernst van Schayck and Dirck Scay employ and how does it relate to contemporary polychromy practice?

After visual and technical analysis, no indications of modern overpaint have been found. This does not mean that all of the paint is original, but no modern pigments have been found and only medieval pigments remain. An expected result would have been for at least the background of the roof bosses to be a modern overpaint, but as vermillion is present in the paint layers, they cannot have been painted later than 1900. When one compares the colour of the background to the background of the roof bosses in the Victoria and Albert Museum collection, the colours are strikingly similar. Indeed, although the Evangelists' roof bosses look more damaged and thus the colours are not identical, they do look alike. This might be an indication that the roof bosses received the background paint when they were still together, before 1826. Perhaps, over time, the backgrounds have discoloured, or a combination of a lot of lead white and very little vermilion does turn this bright red. Nonetheless, it seems indeed true that most of the paint on the church fathers is original, or at the very least was applied close to the date of manufacture.

Regarding the stone, XRF analysis points towards an indication of Avesnes stone. This means that Jan van Schayck belongs to the group of Utrecht sculptors who were the first to work in Avesnes stone, introducing others to the stone as well. Avesnes stone was not ordered by the Domloods in 1497 or before, so the sculptor had to order batches of the stone himself. As Jan van Schayck already had many commissions in 1497, he probably had a large workshop. Ordering the stone was thus whithin his means, especially if he combined his orders with other sculptors who experimented with the material, such as Hendrick Bontmaker.

The painters Ernst van Schayck and Dirck Scay worked as *preparers*; such has become clear from looking into the expenses of several churches in Utrecht. However, that does not mean that they were lesser artists. Dirck Scay was *ouderman* of the Zadelaarsgilde, which was the guild for all artists in the city. To achieve this position was an honorary feat, so Scay must have been a renowned artist. Besides several commissions as preparer, Ernst van Schayck also received the commission to paint the high altar for the Domkerk, which is now lost. Such a commission would not be given to an incompetent painter. It is possible that Ernst van Schayck learned the job from Dirck Scay, for Scay was possibly an older family member of Ernst – in which case he could have learned the craft for free – and they worked together on several commissions during Ernst van Schayck's early career.

Their working method has become clear through technical analysis. They exclusively used a red ground, although it seems they applied it in a darker and a lighter shade. Through XRF analysis and micro-Raman, red lead, red earth and small amounts of vermillion were found in the ground layer. No methods were used which could detect the binder of the ground, but since these sculptures are small and were painted in a workshop, it is expected that oil was used (see the section "Technical Analysis on Polychrome Sculpture"). For *God the Father*, there was too little pigment present to make a strong statement about the contents. No modern elements were found on the surface of the sculpture, leading one to think the red hue is indeed part of the original ground layer which has sunk into the stone. The fact that the red ground was able to absorb into the stone makes one think no or little isolation layer was used before applying the ground. These findings mostly correspond to previous findings concerning sculpture in Utrecht: a red ground was used, with which a distinction between different shades was made. A lighter shade was used underneath white and blue paints and

highlights. What is surprising, however, is the combination of several pigments including vermillion in the ground. Vermillion was not a cheap pigment and it was normally saved for paint layers, not for the ground. Vermillion was not found in the ground in any of the other polychromed sculptures between 1450 and 1550, possibly pointing to a working method specific to Dirck Scay and Ernst van Schayck.

Just like some of the other sculptures from Utrecht, the roof bosses have some yellow-coloured underlayers on top of the red ground, specifically under green and blue paint layers. The red ground probably had too much of an influence on the overall colour in these areas, making the blue look dark and the green look brown. By applying a yellow underlayer, this effect was reduced. In the XRF measurements from the green and blue areas, no particular elements stand out. There are relatively low iron peaks, which may result from the ground. However, it might also mean the yellow underlayer is made of yellow ochre, just like in the *Stenen Vrouwenkop*. So far, it seems that applying a yellow ochre underlayer underneath white and blue paint is part of the style from Utrecht.

The colour scheme of the paint is very simple. White and black are used for elements such as the eyes, books and hair. The now black areas of the roof bosses were probably green originally, based on a copper paint. The blue in the clouds is made of azurite applied on top of a grey layer. The incarnates are made of lead white and vermillion on top of a green layer. Most of these findings are very typical for the *Utrechtse Stijl*, although no other researchers have reported the use of the *verdaccio* technique, in which the skin is already modelled in green and skin colours are added on top.

The gold on the figure consists of pure gold. The copper peaks in the XRF measurements are too low to say copper is present in the gold. Currently, the gilding is present everywhere on the figures except for their skin. There is reason to assume only part of the gilding is original. This would have left room for a more diverse colour palette, including red or yellow in the paint layers.

To summarise, these are the first objects painted by Ernst van Schayck and Dirck Scay to have been researched through means of technical analysis. This has given us an idea of their working methods. Their approach shows much similarity with other polychromed sculptures from Utrecht, yet the men also had their own tweaks. They applied vermilion to their ground layers and used a light *verdaccio* for the incarnates. In general, I would say their method fits within the *Utrechtse Stijl* as described by Aleth Lorne, but the complete essence of the *Utrechtse Stijl* has not yet been fully grasped. Many artists probably had their own little alterations in their working methods. Therefore, more research needs to be done into the different artists from Utrecht in order to establish what is the core of the style from Utrecht, how this relates to other artistic centres and which procedures are indeed deviations from this style and part of the defining method of the artist.

7. Discussion

Reflection on research

The topic of this thesis is to contextualize the artists' method of the roof bosses in relation to the *Utrechtse Stijl* as described by Aleth Lorne. As she is a restorer, most of her work is not published and not available for all to see. Therefore, other sources had to be gathered to assemble the style of Utrecht. Not much research has been published on polychromy from Utrecht, so I had to search within a broader area. The Sint-Maartenskerk in Doorn is approximately 20 kilometres away from Utrecht. Even though this is much closer to Utrecht than other artistic centres, the church itself does not lay within the city of Utrecht and its artistic centre. Even further removed from Utrecht are the two panels of the altarpiece of Mary made by Adriaen van Wesel. Indeed the sculptor resided in Utrecht and the altarpiece itself was made in Utrecht, but it was polychromed years later in 's Hertogenbosch by local painters. As can be seen in chapter 2, "Technical Analysis on Polychromy", the findings on these artworks differ the most from the rest of the case studies. I do believe this offers an interesting perspective on the comparison with the *Utrechtse Stijl*, which is why I included the works in the table.

XRF spot analysis is a very precise and reliable research method that identifies elements in a very specific measured area, penetrating through several layers at once. Therefore, XRF analysis is very reliable concerning the elements present, but interpretations about the layers these elements are present in or which components they form cannot be formed based on XRF spot analysis alone. Other research methods such as micro-Raman and SEM-EDX were used to affirm identifications. However, these techniques can only be used on a sample, meaning the resulting findings cannot be applied on the artworks as a whole. Interpretations regarding compounds present or layers in which they are present are always the result of a combination of information sources.

One of the obstacles in this thesis – as is often the case in research – was the limitation of time. As the objects are in the museums or their depots, their availability for research was limited. Both museums were visited once, for two to three hours. Within these brief visits I had to familiarize myself with the artworks, as this was the first time I would see them from up close. Furthermore, macrophotography, microscopic photography and the XRF measurements had to be executed and the sample had to be taken. This is a rather short amount of time and I understand now that my research would have benefitted from spending more time with the artworks in person. After the day of the research, I would look at the results of the analysis and questions would arise for which I would need to go back to the objects. Unfortunately, this was not possible.[128] This taught me a great deal about organising research, but I was unable to put this into practice during this thesis.

Suggestions for future research

As made clear above, the analysis sometimes led to new questions. These questions can be the topic of future research and would contribute to assembling a general style from Utrecht and specific artists. Questions that arose during my thesis include:

- What is the composition of the now black, but once green paint? Is this indeed verdigris and what made the paint discolour so drastically?
- Two different shades of ground can be found. How was this accomplished? Is the elemental composition different (e.g. one contains more lead white?) or was one applied more thinly than the other?

[128] Because of summer vacations and busy depot schedules, it was impossible to visit the depot of the Centraal Museum again before the deadline of the thesis.

- How were the incarnations painted? What are the components in the green paint underneath the layer of lead white and vermillion?
- What are the organic components in the ground and paint layers?

Ideally, it would be possible to obtain more samples from differently coloured areas. For example, a sample of the gilding, of the black/green paint and of the incarnation. This way, the layer build-up of all the paints can be much better understood and a more definitive answer as to how these artists worked can be found.

Furthermore, it would be highly instructive to make a digital 3D reconstruction of at least one of the roof bosses, to create a better idea of what these roof bosses – and thus the work of Jan van Schayck, Ernst van Schayck and Dirck Scay – originally looked like. Creating 3D reconstructions comes with pros and cons and there are many requirements for a reconstruction to be an addition to the research at all, but in general such digital reconstructions at their worst can be a great visible aid to museum visitors to understand the artworks. At their best, they can be much more than that. In the past ten years, there has been a profound increase in the amount of 3D reconstructions made of sculptures – see for example research by Pereirda-Pardo, et. al.,[129] Mounier, et. al.,[130] and a little closer to home, Sanne Frequin's dissertation that researched funerary sculpture in the Domkerk of Utrecht.[131]

Lastly, it is clear as day that more research concerning medieval sculpture from Utrecht needs to take place. If we want to speak of an *Utrechtse Stijl* convincingly, we need to base this on more than a handful of artworks. Most of these sculptures are still present in the churches or are now part of the collections of museums in Utrecht, meaning such research is a practical possibility. A much clearer overview can be created by means of combining technical analysis of sculptures and the financial accounts of the churches, perhaps even resulting in the oeuvres of *preparers*, such as Ernst van Schayck and Dirck Scay, or insight into how closely sculptors and preparers worked together. The already executed research into polychromed sculpture from Utrecht, with this thesis as its latest contribution, is only the beginning.

[129] Pereira-Pardo, Tamburini and Dyer, "Shedding light on the colours of medieval alabaster sculptures," 231.
[130] Mounier, Schlicht, Mulliez, Pacanowski, Lucat and Mora, "In search of the lost polychromy," 445-446.
[131] Sanne Frequin, *Propaganda in Steen: een reconstructief onderzoek naar de commemoratieve en politiek-dynastieke boodschap van de grafmonumenten van het grafelijk Henegouwse Huis 1280-1356* (PhD diss., University of Amsterdam, 2021), 385-403.

Acknowledgements

Halfway through writing this thesis, my supervisor reminded me that writing a thesis is a lonely feat. Indeed, as the many days (and I will admit, also nights) in the library on my own illustrate, this is true. However, there are some people, without whom this thesis would not be.

First and foremost, I would like to thank my supervisor Arjan de Koomen. Arjan always approached me with understanding and patience and tirelessly shared with me his knowledge on the topic. Every chapter was reviewed several times and returned to me with useful feedback and questions, pushing me to write a better thesis.

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Other researchers of the RCE also helped me a great deal. When Rutger was on vacation, Luc Megens and Fahed Ibrahim provided me with the XRFbeta3 software, a crash course in its application and words of encouragement. Fahed helped untangle the SEM-EDX results and Suzan de Groot and Inez van der Werf eliminated some persistent doubts by looking at my sample with micro-Raman.

I would also like to thank Saskia Smulders, whose help did change the course of my thesis, even though that is not visible in the final version. Saskia is the GC-MS expert working at the RCE and we had a fruitful discussion about whether or not GC-MS would lead to useful results. In the end, she advised me not to use the method, which taught me about the considerations of invasive analysis.

The Centraal Museum in Utrecht and the Museum Catharijneconvent in Utrecht were of the utmost importance to my thesis. Without their cooperation, I would not have had access to the artworks, but they were more than mere suppliers of artworks. Their staff was also very helpful to me both in organizing our appointments and showing me where to find their in-house information. I would like to specifically thank Marie-Fleur Dijk, the collection manager form the Centraal Museum, and Annabel Dijkema, head of collection management from the Museum Catharijneconvent, who were present during my research and enlightened me with refreshing insights and perspectives. Christiaan Veldman supplied me with restoration reports. The roof bosses in the collection of the Victoria and Albert Museum in London were not part of my technical analysis, but Victor Borges, senior sculpture conservator of the Victoria and Albert Museum, did supply me with all the information the museum has in their collection, for which I am also grateful.

Furthermore, I would like to thank Maarten van Bommel and Ella Hendriks, who looked at my first proposal and expressed their positive expectations in spite of me having a slow start; Rene Peschar for giving feedback on the chemical analysis and my thesis in general, Het Utrechts Archief, for being incredibly helpful in their communication as I tried to manoeuvre around an archive for the first time; Bieke van der Mark for sharing with me her knowledge and sources on Jan van Schayck, whom she had previously researched for the Rijksmuseum; the Domkerk in Utrecht for allowing me access to the sacristy (including the former library); Elisa Barzotti and Camille Dankmeyer-Dullaart for their emotional support during the polishing of the sample of the 500-year-old artwork; and Jacob van Niftrik for picking me up off the floor after long days in the library and being my support in general.

Appendix I: List of objects used for comparison of polychromy

Figure 66. Two sculptures from the Illustre Lieve Vrouwe Broederschap, 's-Hertogenbosch, Adriaen van Wesel, 1475-1477 (polychromy 1508-1510), 47-49 cm x 33-35 cm x 17 cm.[132]

Figure 67. Detail of the *Memorial altarpiece for the family Pot*, Master of the Utrechtse Stenen Vrouwenkop, ca. 1510-1520, Domkerk, Utrecht.[133]

[132] Micha Leeflang and Kees van Schooten, *Middeleeuwse beelden uit Utrecht 1430-1530* (Utrecht: Museum Catharijneconvent, 2012), 228-229.
[133] Leeflang and van Schooten, *Middeleeuwse beelden*¸ 148.

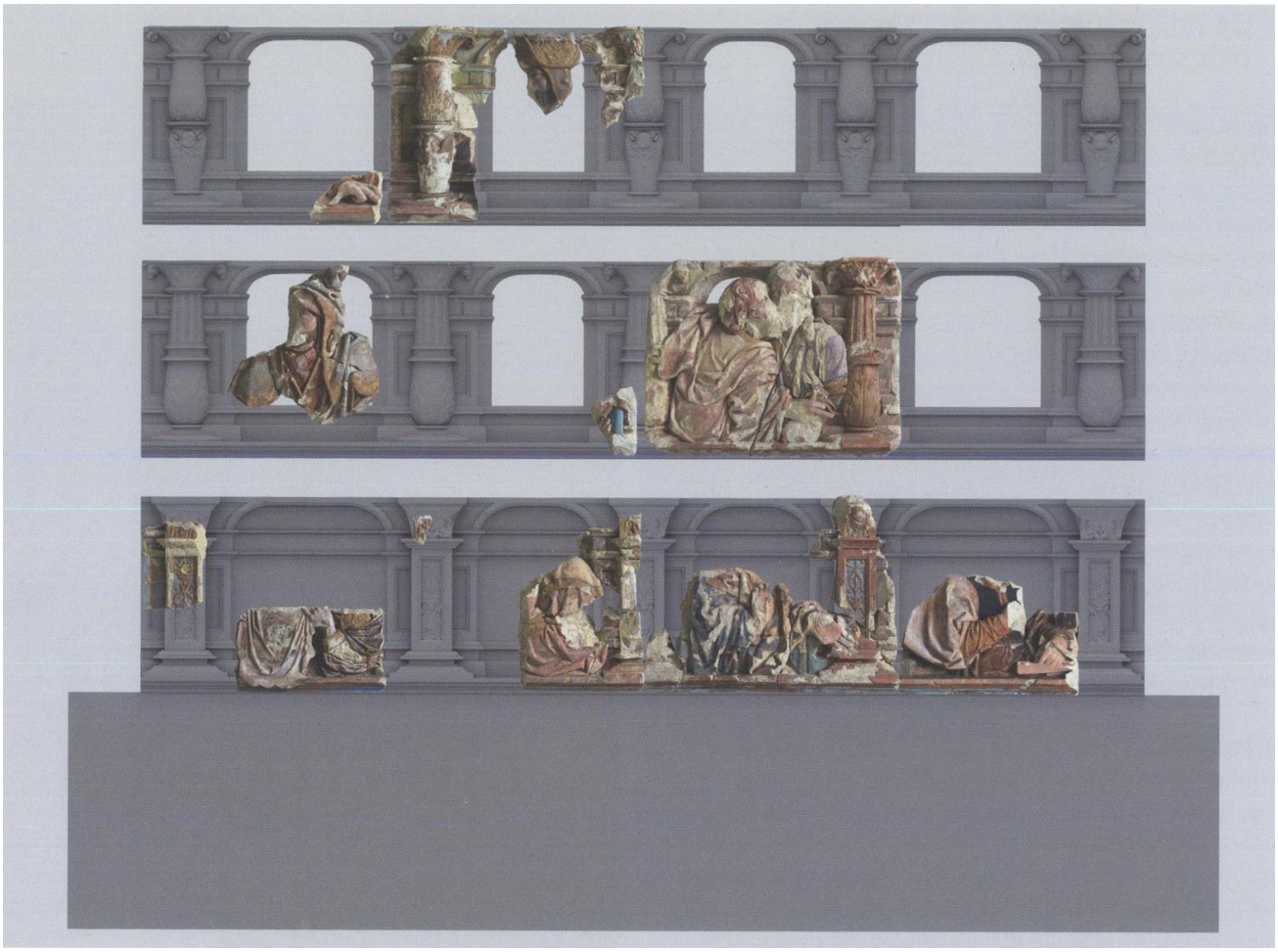

Figure 68. Reconstruction of the wall-monument with the found fragments. 3D reconstruction by Daan Claessen, 2014.[134]

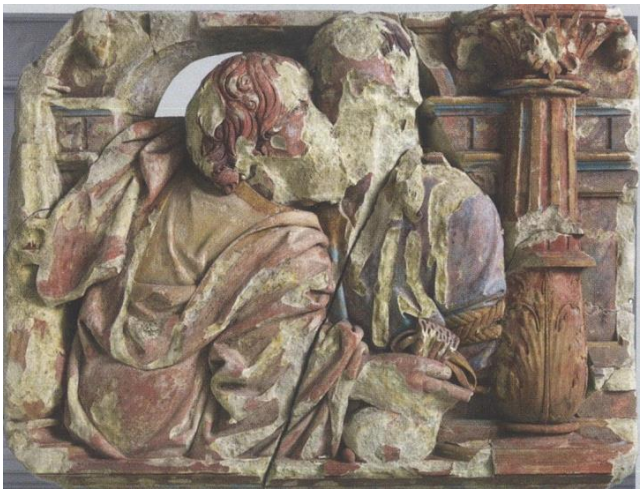

Figure 69. One of many fragments from the Sint-Maartenskerk in Doorn: Judas Kiss. Image by Jan van Galen, RCE.[135]

Figure 70. One of many fragments from the Sint-Maartenskerk in Doorn: hand. Image by Jan van Galen, RCE.[136]

[134] Gerard van Wezel, *De Sint-Maartenskerk te Doorn: vroeg renaissancemonument, bouwsculptuur en geschiedenis* (Zwolle: WBOOKS, 2015), 32.
[135] Van Wezel, *De Sint-Maartenskerk*, 27.
[136] Van Wezel, 21.

Figure 71. *Utrechtse Stenen Vrouwenkop*, Master of the Utrechtse Stenen Vrouwenkop, 1500-1525, 36 cm x 32 cm x 24 cm, Museum Catharijneconvent, Utrecht. Image by Museum Catharijneconvent, Utrecht.

Figure 72. *Sint Maarten,* Jan Nude, ca. 1450, 72.5 x 92 x 14.5 cm., Centraal Museum, Utrecht. Inv. 1788/001. Image by Centraal Museum.

Figure 73. *Sint Pontianus van Spoleto*, Jan Nude, ca. 1450, 68.2 x 33.7 x 12.7 cm., Centraal Museum, Utrecht. Inv. 1788/002. Image by Centraal Museum.

Figure 74. *Sint Agnes*, Jan Nude, ca. 1450, 66.4 x 36.3 x 10 cm., Centraal Museum, Utrecht. Inv. 1788/003. Image by Centraal Museum.

Figure 75. *Sint Paulus*, Jan Nude, ca. 1450, 67 x 34 x 12 cm., Centraal Museum, Utrecht. Inv. 1788/004. Image by Centraal Museum.

Figure 76. *Sint Maria Magdalena*, Jan Nude, ca. 1450, 68.9 x 30.3 x 12 cm., Centraal Museum, Utrecht. Inv. 1788/005. Image by Centraal Museum.

Figure 77. A big Holy Sepulchre group, attributed to Meester Arnoldus, ca. 1500, Petruskerk, Woerden.[137]

[137] Leeflang and van Schooten, 99.

Appendix II: All images, microscopic images, XRF spectra and samples used for this thesis and their exact locations on the roof bosses

Images and microscopic images in black, XRF measurements and samples in green.

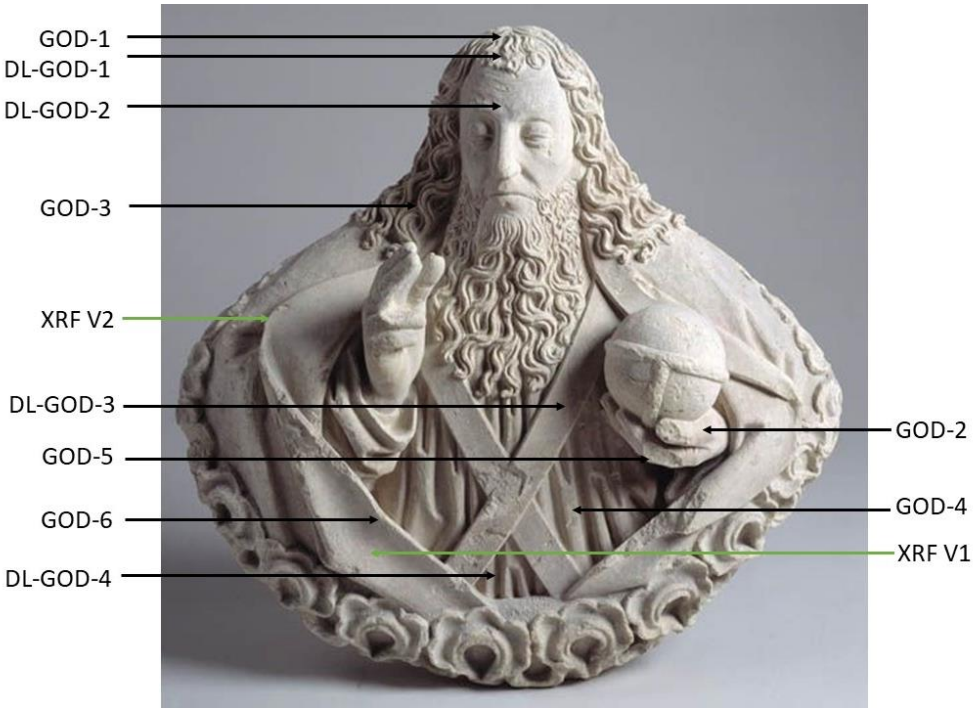

Figure 78. *God the Father* and exact locations of images, microscopic images and XRF-measurements.

Figure 79. *Saint Jerome* and exact locations of images, microscopic images, XRF measurements and sample.

Figure 80 Saint Augustine and exact locations of images, microscopic images and XRF measurements.

Figure 81. *Saint Gregory* and exact locations of images, microscopic images and XRF measurements.

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