

PIONEER PROJECT

VERONA

van eyck research in open access

CONTRACT - BR/132/PI/VERONA

FINAL REPORT

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Promotor

Bart Fransen

Royal Institute for Cultural Heritage (KIK-IRPA)

Parc du Cinquanteenaire 1 - Jubelpark 1

B-1000 Brussels

Authors

Christina Currie (KIK-IRPA)

Susan Jones (KIK-IRPA)

Bart Fransen (KIK-IRPA)





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Avenue Louise 231
Louizalaan 231
B-1050 Brussels
Belgium
Tel: +32 (0)2 238 34 11 – Fax: +32 (0)2 230 59 12
<http://www.belspo.be>

Contact person: Georges JAMART
+32 (0)2 238 36 90

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SUMMARY

Context

VERONA is part of a broad series of projects that is being carried out by the KIK-IRPA and in collaboration with other institutions on the work of Jan van Eyck, and in particular the Ghent Altarpiece (Ghent, Saint Bavo Cathedral):

- Conservation and research on the Ghent Altarpiece. This project, which began in 2012, was commissioned by the Church council of St Bavo Cathedral and is financed by the Flemish government (Culture and Immovable Cultural Heritage). Project leader: Christina Ceulemans (KIK-IRPA).
- 'The Mystic Lamb in the Laboratory 60 years after Paul Coremans': This project focuses on carrying out new scientific analyses on previously existing paint samples from the Ghent Altarpiece (led by the Polychrome Artefacts Laboratory). Project leader: Jana Sanvoya (KIK-IRPA).
- The documentation project 'Closer to Van Eyck', which is recording a vast amount of photographic and scientific imagery on the Ghent Altarpiece and making it available online via the website: <http://clostovaneyck.kikirpa.be>. This project was financed by the Getty Foundation and was supported by the Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NOW). Project leader: Ron Spronk (Radboud Universiteit, Nijmegen ; Queen's University, Kingston, ON, Canada).

VERONA incorporates the core mission of the KIK-IRPA: the inventory, scientific research, conservation and promotion of the artistic and cultural heritage of this country. The KIK-IRPA's mission includes both research and public service. It is a unique institution that puts the spotlight on Belgium's moveable and immovable heritage.

Objectives

The goal of VERONA is to stimulate research into the painter Jan van Eyck (c. 1390-1441). The project focused on the study and documentation of signed, dated and generally accepted works by Van Eyck in European collections, comprising seventeen paintings in ten different locations: Antwerp (KMSKA), Berlin (Gemäldegalerie), Bruges (Groeningemuseum), Dresden (Gemäldegalerie), Frankfurt (Städel Museum), London (National Gallery), Madrid (Museo Thyssen-Bornemisza), Paris (Musée du Louvre), Sibiu (Brukenthal National Museum), Vienna (Kunsthistorisches Museum). The works were documented with the same scientific imaging techniques and using the same protocol as the KIK-IRPA is currently employing for the Ghent Altarpiece: macrophotography (normal light, raking light, infrared and ultraviolet fluorescence). Comparable images are obtained through the use of standardised procedures and the same equipment. The ultimate goal is to add all this documentation to the website 'Closer to Van Eyck'. The online application will be a reference for comparative research on the work of Van Eyck. Researchers will be able to study for the first time the differences and similarities in the artist's technique on the basis of the same comparative material.

Results

Thanks to its various partners, VERONA succeeded in including all the signed, dated and generally accepted works by Jan van Eyck. An enormous quantity of new data and visual imagery of the work of Jan van Eyck was brought together and new observations were made. New insights were made on the artist's underdrawing and painting techniques, the construction of his panels and frames and his preparatory layers. Moreover, the project was enriched through a partnership with Professor Koen Janssens and Geert van der Snickt of the University of Antwerp, who carried out innovative XRF scanning on works of art by Van Eyck in Belgian collections.

As a result of the positive reception of the project by the partner institutions and the museum world in general, more works were ultimately studied and documented than originally foreseen. In total, six works were added to the original corpus. These were from collections in Berlin (Gemäldegalerie), Paris (Musée du Louvre), Rotterdam (Museum Boijmans van Beuningen) and Washington (National Gallery of Art). The Washington Annunciation was temporarily on loan to the Städel Museum in Frankfurt, which facilitated its examination.

The new research findings were presented to the research committee and will be included in future publications, in collaboration with colleagues and/or museum partners. The reports in which the observations were noted will form a basis for a new overview of the work of Jan van Eyck. The Centre for the Study of the Flemish Primitives intends to bring out a publication with the results of the study as part of the prestigious series 'Contributions to the Study of the Flemish Primitives'.

Thanks to a structural partnership, the Bruges Museums are covering the cost of processing the new high resolution imagery. The Vrije Universiteit Brussel is carrying out the stitching and registration of the separate images and Universum Digitalis is developing the on-line access application. Meetings with the various partners have been held and all the images will be available online in the course of 2017 on the website: <http://closertovaneyck.kikirpa.be>.

Keywords

Jan van Eyck
Comparative research
Scientific Imagery
Art History
Open Access

SAMENVATTING

Context

VERONA kadert in een ruimer geheel van projecten die door het KIK en in samenwerking met andere instellingen worden uitgevoerd omtrent het oeuvre van Jan van Eyck en dan voornamelijk het *Veelluik van het Lam Gods* (Gent, Sint-Baafskathedraal):

- Restauratie en onderzoek van het Lam Gods. Een project opgestart in 2012 in opdracht van de kathedrale kerkfabriek van Sint-Baafskathedraal en gefinancierd door de Vlaamse Overheid (Cultuur en Onroerend Erfgoed). Coördinatie: Christina Ceulemans (KIK).
- 'The Mystic Lamb in the Laboratory 60 years after Paul Coremans', een onderzoeksproject met de focus op nieuwe analyses van de verfstalen van het Lam Gods (geleid door het Laboratorium Polychromie). Coördinatie: Jana Sanyova (KIK).
- Het documentatieproject 'Closer to Van Eyck', waarbij een grote hoeveelheid aan beeldmateriaal van het Lam Gods bestudeerd met verschillende technieken online wordt ontsloten via de website <http://closertovaneyck.kikirpa.be>. Dit project werd gefinancierd door de Getty Foundation en had de steun van de Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NOW). Zie <http://closertovaneyck.kikirpa.be>. Coördinatie: Ron Spronk (Radboud Universiteit, Nijmegen ; Queen's University, Kingston, ON, Canada).

VERONA schrijft zich in in de kernopdracht van het KIK: de instelling staat immers in voor de inventarisatie, wetenschappelijke studie, conservatie en valorisatie van het artistieke en culturele patrimonium van het land, en heeft een opdracht van zowel onderzoek als dienstverlening. Het vormt een uniek instrument voor de ontsluiting van het roerende en onroerende patrimonium van ons land.

Doelstellingen

VERONA heeft als doelstelling het onderzoek naar de schilder Jan van Eyck (c. 1390-1441) te stimuleren. Het bestudeert en documenteert de gesigioneerde, gedateerde en algemeen aanvaarde werken van Van Eyck in Europese collecties, omvattend zeventien schilderijen op tien verschillende locaties: Antwerpen (KMSKA), Berlijn (Gemäldegalerie), Brugge (Groeningemuseum), Dresden (Gemäldegalerie), Frankfurt (Städel Museum), Londen (National Gallery), Madrid (Museo Thyssen-Bornemisza), Parijs (Musée du Louvre), Sibiu (Brukenthal National Museum), Wenen (Kunsthistorisches Museum). De werken worden met de zelfde methodes voor technische beeldvorming gedocumenteerd als deze die momenteel worden aangewend door het KIK voor het Lam Gods in Gent, te weten macrofotografie (normaal licht, scheerlicht en infrarood), infraroodreflectografie en radiografie. Door een gestandaardiseerde documentatieprocedure te volgen met steeds dezelfde apparatuur zal het nieuwe beeldmateriaal gelijkwaardig en vergelijkbaar zijn. Het uiteindelijke doel is om deze documentatie toe te voegen aan de website "Closer to Van Eyck". De online applicatie zal een referentie worden voor comparatief onderzoek in het oeuvre van Van Eyck, waarbij wetenschappers voor de eerste maal verschillen en gelijkenissen kunnen bestuderen op basis van het zelfde gelijkwaardige materiaal.

Besluiten

VERONA slaagde in zijn opzet en kon dankzij diverse partnerschappen alle gesigioneerde, gedateerde en algemeen aanvaarde werken van Jan van Eyck opnemen in het project. Een enorme hoeveelheid aan nieuwe gegevens en nieuw beeldmateriaal van het oeuvre van Jan van Eyck werd samengesteld en nieuwe observaties werden gemaakt. Zo werden nieuwe inzichten verkregen in het ontstaansproces van zijn schilderijen, in de constructie van het houten paneel en de lijst, in de voorbereidende grondlagen, in de ondertekening en in de schildertechniek. Bovendien kon het project nog worden uitgebreid ten opzichte van het initiële plan:

- Door een partnerschap met de Universiteit Antwerpen werden de toegepaste documentatietechnieken uitgebreid met de innovatieve XRF-scanning methode, ontwikkeld door Prof. Koen Janssens en Geert van der Snickt en toegepast op de werken van Van Eyck bewaard in Belgische collecties.
- Dankzij de positieve ontvangst door de partnerinstellingen en de museumwereld in het algemeen werden uiteindelijk meer werken bestudeerd en gedocumenteerd dan aanvankelijk voorzien. In totaal werden aan het onderzochte corpus zes werken van Van Eyck en/of zijn entourage toegevoegd, bewaard in Berlijn (Gemäldegalerie), Parijs (Musée du Louvre), Rotterdam (Museum Boijmans van Beuningen) en Washington (National Gallery of Art), tijdelijk in bruikleen in Frankfurt (Städel Museum).

De nieuwe bevindingen die het onderzoek opleverden werden gepresenteerd aan het wetenschappelijk comité en zullen deel uitmaken van latere publicaties, in samenwerking met collega's en/of museumpartners. De rapporten waarin deze observaties werden opgenomen, vormen een solide basis voor een nieuw overzichtswerk van het oeuvre van Jan van Eyck. Het Studiecentrum Vlaamse Primitieven van het KIK heeft zich voorgenomen om een publicatie uit te brengen met de resultaten van dit onderzoek binnen de prestigieuze reeks 'Bijdragen tot de Studie van de Vlaamse Primitieven'.

Dankzij een structureel partnerschap met de Musea Brugge konden de kosten voor de beeldverwerking en de ontsluiting van dit het hoogwaardige beeldmateriaal worden gedekt. De Vrije Universiteit Brussel zorgt voor de stitching en de registratie van de afzonderlijke opnames en Universum Digitalis ontwikkelt de online-toepassing. De afspraken die met de verschillende partners werden gemaakt, voorzien dat al het beeldmateriaal in de loop van 2017 online in open access beschikbaar zal zijn op de website <http://closertovaneyck.kikirpa.be>.

Trefwoorden

Jan van Eyck
Vergelijkend onderzoek
Wetenschappelijke beeldvorming
Kunstgeschiedenis
Open Access

RESUME

Contexte

VERONA s'inscrit dans une vaste série de projets réalisés par l'IRPA ou en partenariat avec d'autres institutions autour de l'œuvre de Jan van Eyck, et plus particulièrement le polyptyque de *l'Agneau mystique* (Gand, cathédrale Saint-Bavon) :

- La restauration et l'étude de *l'Agneau mystique* entamées en 2012 à la demande de la fabrique d'église de la cathédrale Saint-Bavon et financées par le gouvernement flamand (Cultuur en Onroerend Erfgoed) Promotrice : Christina Ceulemans.
- « L'Agneau mystique au laboratoire 60 ans après Paul Coremans », un projet de recherche centré sur de nouvelles analyses des échantillons de peinture déjà existants de *l'Agneau mystique* (sous la direction du labo des polychromies). Promotrice : Jana Sanyova.
- « Closer to Van Eyck », un projet qui rend accessibles en ligne un grand nombre de documents photographiques et scientifiques de *l'Agneau mystique*, via le site web <http://closertovaneyck.kikirpa.be>. Il a été financé par la Getty Foundation et a reçu le soutien de la Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NOW). Promoteur : Ron Spronk (Radboud Universiteit, Nijmegen ; Queen's University, Kingston, ON, Canada).

VERONA intègre la mission principale de l'IRPA : l'inventaire, la recherche scientifique, la conservation et la valorisation du patrimoine artistique et culturel belge, à la fois dans une optique de recherche et de service public. L'IRPA est un instrument unique pour la diffusion de la documentation scientifique, photographique et technique dans ces domaines.

Objectifs

VERONA a pour objectif de stimuler la recherche sur le peintre Jan van Eyck (ca 1390-1441). Le projet se focalise sur l'étude et la documentation des œuvres signées, datées et communément attribuées à Van Eyck conservées dans des collections européennes, à savoir dix-sept peintures issues de dix villes différentes : Anvers (KMSKA), Berlin (Gemäldegalerie), Bruges (Groeningemuseum), Dresde (Gemäldegalerie), Francfort (Städel Museum), Londres (National Gallery), Madrid (Museo Thyssen-Bornemisza), Paris (Musée du Louvre), Sibiu (Brukenthal National Museum) et Vienne (Kunsthistorisches Museum). Les œuvres ont été documentées avec les mêmes techniques d'imagerie scientifique que celles employées actuellement par l'IRPA pour *l'Agneau mystique*, à savoir la macrophotographie (lumière normale, lumière rasante, filtre infrarouge et fluorescence UV), la réflectographie infrarouge et la radiographie. Utiliser une procédure de documentation standardisée et les mêmes appareils pour chaque peinture a permis d'obtenir une documentation similaire qui se prête donc à des comparaisons.

À terme, cette documentation sera ajoutée au site web « Closer to Van Eyck », qui deviendra une référence pour l'étude comparative de l'œuvre de Van Eyck : pour la première fois, les chercheurs pourront étudier les différences et similitudes dans la technique de l'artiste sur la base d'un même matériel.

Conclusions

Grâce à ses partenariats, VERONA a réussi à inclure dans son projet toutes les œuvres signées, datées et communément attribuées à Jan van Eyck. Une énorme quantité de nouvelles données et images ont été rassemblées et ont permis de faire de nouvelles observations. Ainsi, nous avons acquis de nouvelles connaissances concernant le procédé de création de ses peintures, la construction de ses panneaux en bois et de ses cadres, ses couches préparatoires, sa signature et sa technique picturale. De plus, le projet a été enrichi par rapport à ce qui était initialement prévu :

- un partenariat avec l'Université d'Anvers a permis d'ajouter la méthode innovante des scans macro-XRF, développée par Koen Janssens et Geert van der Snickt, aux techniques de documentation utilisées pour les œuvres des collections belges.
- l'accueil positif qu'a reçu le projet auprès des institutions partenaires et des musées en général a permis d'étudier et de documenter plus d'œuvres que prévu. Au total, six œuvres de Van Eyck et/ou de son entourage ont été rajoutées au corpus : elles sont conservées à Berlin (Gemäldegalerie), Paris (Musée du Louvre), Rotterdam (Museum Boijmans van Beuningen) et Washington (National Gallery of Art). L'*Annonciation* de Washington était prêtée temporairement au Städel Museum de Francfort, ce qui a grandement facilité son analyse.

Les nouvelles découvertes ont été présentées au comité scientifique et seront prochainement publiées, en collaboration avec des collègues et/ou partenaires de musées. Les rapports constituent une base solide pour une nouvelle approche du travail de Van Eyck. Le Centre d'étude des Primitifs flamands de l'IRPA a l'intention de publier les résultats de cette étude dans la prestigieuse collection *Contribution à l'étude des Primitifs flamands*.

Le développement du matériel visuel haute définition a été financé grâce à un partenariat structurel avec Musea Brugge. La Vrije Universiteit Brussel s'est chargée de l'assemblage et de la synchronisation des photos, et Universum Digitalis de la mise en ligne. Les accords avec les différents partenaires visent à ce que toutes les images soient en ligne dans le courant de l'année 2017 sur <http://closertovaneyck.kikirpa.be>.

Mots-clés

Jan van Eyck
Étude comparative
Imagerie scientifique
Histoire de l'art
Open Access

1. INTRODUCTION

Since the “rediscovery” of early Netherlandish painting in the course of the 19th century, art historians have been inextricably drawn towards Jan van Eyck (ca. 1390-1441), the artist generally considered to be the founding father of this school. Famous even in his own lifetime, Van Eyck signed and dated at least nine of his works, mostly on their original frames, unlike the vast majority of works from the fifteenth century of which few can even be linked to archival documents. These signed works, of certain authorship, inspired early art historians to make comparisons and establish a corpus of paintings attributed to the master. These comparisons were then revised and enriched through new scientific investigations on the paintings: microscopic examination, analysis of paint samples and cross-sections, X-radiography, infrared reflectography and dendrochronology. Examinations were usually carried out at the same time as the conservation-restoration of the works, and took place in various institutions each with their own scientific equipment.

The stylistic comparisons made during the course of the twentieth century, based on poor quality black and white photographs, rarely took account of the differences in scale between paintings, differences in condition, etc. Furthermore, the results of early scientific examinations should be reassessed in light of technological advances made over the last decades. The publication of the new documentation in open access will invite scholars of the scientific community worldwide to make objective comparisons on the basis of standardized scientific imagery for a revision of the corpus of works by Jan van Eyck.

2. METHODOLOGY AND RESULTS

2.1. Methodology

A Standardized Protocol for Equivalent Scientific Data

The documentation campaign included a corpus of 21 paintings for which a standardised research protocol has been followed. With the same cameras, same lightning, same photographer and identical protocol for all paintings, the documentation will provide a unique dataset that will facilitate objective comparative research.

VERONA has used three different techniques with KIK-IRPA equipment:

- Macrophotography (in normal light, raking light, infrared light, UV fluorescence),
- Infrared reflectography
- X-radiography (for paintings in Belgian collections)

With its ultra-modern equipment VERONA has contributed to establishing the KIK-IRPA as the major centre of expertise on Jan van Eyck, the pioneer of early Netherlandish painting.

Supplementary to the documentation of the paintings in six modes, the project will gather together as much existing data as possible. The major advantage of this study is to be able to compare research data that has been acquired using one and the same method.

Scientific Equipment

- **Macrophotography**

The Hasselblad H4D-200MS is the ultimate tool for any photographic application where the highest degree of resolution is required. The camera has a 200 million-pixel resolution that gives unprecedented detail and provides an ultimate photographic package in a six shot capture mode for still subjects. The H4D-200MS camera uses a 50Mpix sensor mounted onto a symmetrical multi-shot frame, which can accurately position the sensor with accuracy, using piezo-electrical actuators. The camera is also equipped with infrared mode for which it has a live view.

The standard protocol for macrophotography involves taking a series of close-up photographs in each mode. We have taken both 7.5 x 10 cm and 15 x 20 cm surface areas, which reveal almost microscopic levels of detail and in practice can lead to hundreds of high-resolution images per painting. Given the fact that these images are later stitched together digitally, the positioning of the camera needs to be extremely precise. For this reason, we place the camera on a motorised rail system that moves the camera with precision (see below).



Fig. 1 Hasselblad H4D-200MS: 50M pixel captor

Some technical characteristics:

- Raw and tiff files: 8176 x 6132 pixels
- Size of raw images: 82.84 MB
- Size of tiff files: 16 bit image; 286.88 MB
- Surface size photographed: 15 x 20 cm and 7.5 x 10 cm
- B+W093 Infrared filter
- Used in four modes: normal light, raking light, infrared light and UV-light.

- **Infrared Reflectography**

Infrared reflectography (IRR) is an imaging technique that was developed to reveal underdrawings from beneath the paint layers that now cover them. Early Netherlandish painters such as Hubert and Jan van Eyck would prepare their compositions on their panels with a full-scale drawing. These underdrawings, typically executed in a dark material on the whitish ground layers that cover the oak support, served as a compositional guide for the painting process. Changes in composition can often be detected between different drawing stages or between the drawing and the painting stage, and images of underdrawings can therefore provide important information on the genesis of a painting. Stylistic analyses of underdrawings can also be used to support or to reject attributions. Since IRR also detects paint losses and retouching, it is an important aid for art conservators.

The IRR system consists of a high resolution near-infrared camera equipped with a sensor that is sensitive in the near-infrared region of the electromagnetic spectrum, from 900 up to approximately 1,700 nanometers. An infrared-rich light source is directed at the painting. Any carbon-based underdrawing and motifs painted in black will absorb infrared, whereas the white ground layer will reflect it, resulting in a black and white image on the computer screen. At these wavelengths, the paint surface can be penetrated to a much greater extent than in infrared photography, and underdrawing can also be revealed from beneath most blues and greens. True blacks, however, will remain opaque under infrared. IRR can also reveal black or other infrared-absorbing paint from beneath the paint surface, and is thus complementary to X-radiography (which typically registers heavier materials such as lead white).

In VERONA, the works have been documented with KIK-IRPA's Lionsystems near infrared digital camera which has a 640 x 512 focal plane array. The camera has an InGaAs sensor with a sensitivity of 900-1700nm, and is generally used with an 1500-1730nm narrow band width filter. The relatively low resolution of this camera requires the close-up documentation of literally tens of thousands of individual IRRs, each of which documents an area of 5 x 5 cm of the paint surface. All these details will be digitally assembled into complete images of the painting's composition.



Fig. 2 Lionsystems near infrared digital camera

Some technical characteristics:

- Captor: Indium gallium arsenide (InGaAs)
- Focal plane array: 512 x 640
- Wavelength of camera: 900-1700 nm
- Narrow bandwidth filter: 1500-1730 nm
- Lens: micro-Nikkor 55mm, 2.8
- Lighting: 2 x halogen lamps
- Surface size photographed: 5 x 5 cm

- **X-radiography**

The painting is placed between the X-ray source and the film sheet, which is placed directly against the paint surface, providing an exact 1:1 image. Materials absorbing X-rays (such as lead white or lead-tin yellow pigments in a painting) will appear as relatively light areas on the X-ray film. Since X-ray opaque pigments are often found in lighter coloured paints, X-radiography is complementary to infrared reflectography.

Since the absorption patterns of complex three-dimensional objects are registered in two-dimensional documents, it is useful to study the X-radiographs in conjunction with other data, such as good macrophotographs of the paint surface and Macro-XRF scanning.

X-radiographs can reveal changes between earlier paint layers and the final paint surface. The high-penetrating power of the X-rays will also provide information about the structure of the painting supports, which in the case of panel paintings includes the wood grain, presence of dowels between the joins and splits. They also provide information about the condition of the paint layer revealing the true extent of losses.

The KIK-IRPA has been carrying out X-radiography since the 1940s. Recently new mobile X-ray generators have been purchased with the aid of the National Lottery. The KIK-IRPA follows strict safety protocols and is monitored closely by the Belgian government-appointed agency AIB-Vincotte Controlatom. We frequently work on-site in Belgium and abroad, and obtain local permits to work abroad where necessary.



Fig. 3 One of the different X-ray generator at KIK-IRPA

Some technical characteristics:

- portable air-cooled X-ray generators: 50kV to 160kV generators
- high quality industrial film: plates of 30 x 40 cm (Agfa D7) or 35.5 cm (Agfa D4) wide strips
- X-radiographic plates/strips are scanned with a high resolution laser scanner; original plates/strips are stored in KIK-IRPA's air-conditioned archive

- **Rail system**

The Hasselblad camera and the Lionsystems near infrared digital camera are both used on a solid motorised rail system that consists of a horizontal and a vertical rail and a platform on which both cameras can be fixed. It is transportable and the set-up is relatively easy. The system has been custom built by the *Institut de Physique Nucleaire, Atomique et de Spectroscopie*, part of the *Centre Européen d'Archéométrie* at Liège University. This remotely controlled modular device can move the camera in all directions. Of particular importance is the mobile stage on which the camera sits, which moves back and forward automatically to accommodate the warp of a panel painting. The movement of the camera is operated wirelessly via a Samsung Galaxy application. The distance between the camera and the painting is measured by an infrared laser sensor.



Fig. 4 Mobile rail system developed by Liège University for KIK-IRPA

- **Macro XRF-scanning**



Fig. 5 Prototype of the Macro-XRF scanner developed by Antwerp University (Koen Janssens and Geert van der Snickt)

For the documentation campaigns in Belgium, VERONA established a partnership with the University of Antwerp, who developed with the Technische Universiteit Delft an innovative technique to visualize the presence of elements in a painting: scanning macro-XRF (MA-XRF). It is a non-invasive technique that enables the identification of elements in a painting, at and below the surface. The data is obtained by scanning the surface with a focused or collimated X-ray beam and analysing the emitted fluorescence radiation. The results are assembled into a set of images that reveal the distribution of elements across the entire surface. During the VERONA campaigns in Bruges and Antwerp the XRF-scans were made by Geert van der Snickt (University of Antwerp).

2.2. Partnerships

To reach its goal VERONA has developed a network of partnerships:



Fig. 6 Structure of the network of partnerships in VERONA

The **VERONA** project, based at KIK-IRPA, is financed by the Belgian Federal Science Policy (**BELSPO**) through the programme BRAIN (Belgian Research Action through Interdisciplinary Networks).

The project depends on the agreements made with different **Museum Partners** worldwide. Their input 'in kind' is crucial and consists in having access to the paintings, being able to study and document them in safe and well equipped work spaces and agreeing with the open access policy of all the scientific imagery made by VERONA.

The **Bruges Museum** are a privileged structural partner in VERONA. They are financing the image processing and the online application that will enable VERONA to offer all imagery in open access.

The image processing (stitching and registration) and the development of the online application is done respectively by the **Vrije Universiteit Brussel** and **Universum Digitalis**.

In Belgium, **Antwerp University** joined the VERONA missions with their Macro-XRF-scanning and agreed upon sharing these images in open access.

The final goal of VERONA is to publish all imagery on the **Closer to Van Eyck** website, launched in 2012 and funded by the **Getty Foundation**.

2.3. Corpus of Paintings

The pioneer project initially focused on seventeen paintings in ten European collections, a corpus that together with the Ghent Altarpiece covers over 95 percent of the panel surfaces painted by Jan van Eyck. Due to advantageous circumstances six further paintings have been studied and documented following the VERONA protocol.

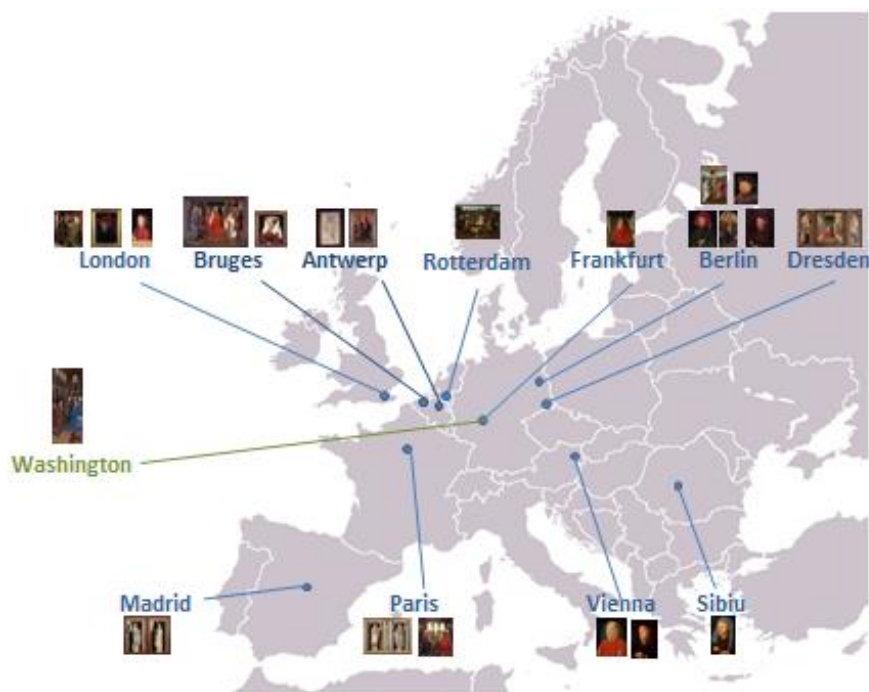


Fig. 7 Map of Europe with all paintings included in VERONA

The final corpus of paintings included in VERONA is:

1. Antwerp, Royal Museum of Fine Arts, *Saint Barbara*, 41.2 x 27.6 cm (incl. original frame)
2. Antwerp, Royal Museum of Fine Arts, *Virgin by the Fountain*, 24.8 x 18.1 cm (incl. original frame)
3. Berlin, Gemäldegalerie, *Virgin in a Church*, 31 x 14 cm
4. Berlin, Gemäldegalerie, *Portrait of Baudouin de Lannoy*, 26 x 19.5 cm
5. Berlin, Gemäldegalerie, *Portrait of Giovanni Arnolfini*, 29 x 20 cm
6. Berlin, Gemäldegalerie, *The Crucifixion*, 43 x 26 cm
7. Berlin, Gemäldegalerie, *Head of a Man*, 11.8 x 8.8 cm
8. Bruges, Groeningemuseum, *Madonna with Canon Joris van der Paele*, 122.1 x 157.8 cm
9. Bruges, Groeningemuseum, *Portrait of Margaret van Eyck*, 41.3 x 34.5 cm (incl. original frame)
10. Dresden, Gemäldegalerie Alte Meister, *Triptych of the Virgin and Child*, 33.2 x 13.9 cm (left wing), 33.2 x 27.2 cm (centre panel), 33.2 x 13.7 cm (right wing) (incl. original frames)
11. Frankfurt, Städel Museum, *"Lucca" Virgin*, 65.7 x 49.6
12. London, National Gallery, *The Arnolfini Double Portrait*, 84.5 x 62.5cm
13. London, National Gallery, *Portrait of a Man (Self Portrait?)*, 33.1 x 25.9
14. London, National Gallery, *Portrait of a Man ('Léal Souvenir')*, 33.3 x 18.9 cm
15. Madrid, Museo Thyssen-Bornemisza, *Annunciation Diptych*, each panel 39 x 24 cm

16. Paris, Musée du Louvre, *The Virgin and Child with Chancellor Rolin*, 71 x 65 x 2.3 cm
17. Paris, Musée du Louvre, *Diptych of the Virgin and Child and Saint John the Baptist*, 38.3 x 23.5 cm and 38.2 x 23.4 cm
18. Rotterdam, Boijmans van Beuningen, *The Three Marys at the Tomb*, 71,5 x 90 cm
19. Sibiu, Brukenthal National Museum, *Portrait of a Man*, 22.5 x 16.6 cm
20. Vienna, Kunsthistorisches Museum, *Portrait of Jan de Leeuw*, 33.3 x 27.5 cm (incl. original frame)
21. Vienna, Kunsthistorisches Museum, *Portrait of a Man (Cardinal Albergati?)*, 32.5 x 25.5 cm
22. Washington, National Gallery of Art, *The Annunciation*, 92.7 x 36.7 cm

2.4. Missions

Antwerp, Royal Museum of Fine Arts

Both paintings (figs 7, 8) have been studied and documented following the VERONA protocol with macrophotography, infrared reflectography and X-radiography. Thanks to the partnership with Antwerp University, both paintings have also been documented by M-XRF scanning.

Team members: Susan Jones, Bart Fransen, Christina Currie, Valentine Henderiks, Sophie De Potter, Jean-Luc Elias, Catherine Fondaire, Hervé Pigeolet, Cyriel Stroo, Saïd Amrani.

Mission dates: 26-29 October 2015



Fig. 8 *Saint Barbara*

Fig. 9 *Virgin at the Fountain*

Berlin, Gemäldegalerie

All three paintings (figs 9-11) included in the initial plan of VERONA have been studied and documented following the VERONA protocol with macrophotography and infrared reflectography. At the request of the museum three more Eyckian paintings were studied and documented, of which two paintings (figs 12, 13) are included in the project. Team members: Susan Jones, Christina Currie, Valentine Henderiks, Sophie De Potter, Jean-Luc Elias, Saïd Amrani.
Mission dates: 14-18 December 2014



Fig. 10 *Virgin in a Church*

Fig. 11 *Portrait of Baudouin de Lannoy*

Fig. 12 *Portrait of Giovanni Arnolfini*

Fig. 13 *The Crucifixion*

Fig. 14 *Head of a Man*

Bruges, Groeningemuseum

Both paintings (nos 8 and 9) have been studied and documented following the VERONA protocol with macrophotography, infrared reflectography and X-radiography. Thanks to the partnership with Antwerp University, both paintings have been documented by M-XRF scanning.

Team members: Susan Jones, Bart Fransen, Christina Currie, Valentine Henderiks, Sophie De Potter, Jean-Luc Elias, Catherine Fondaire, Hervé Pigeolet, Cyriel Stroo, Saïd Amrani.
Mission dates: 5-9, 12 and 28-30 January 2015



Fig. 15 *Madonna with Canon Joris van der Paele*

Fig. 16 *Portrait of Margaret van Eyck*

Dresden, Gemäldegalerie Alte Meister

The painting (no. 10) has been studied and documented following the VERONA protocol with macrophotography and infrared reflectography.

Team members: Susan Jones, Bart Fransen, Christina Currie, Sophie De Potter, Jean-Luc Elias.

Mission dates: 1-6 February 2016



Fig. 17 Triptych of the Virgin and Child

Franfurt, Städel Museum

The painting (no. 11) has been studied and documented following the VERONA protocol with macrophotography and infrared reflectography.

Team members: Susan Jones, Bart Fransen, Christina Currie, Sophie De Potter, Jean-Luc Elias.

Mission dates: 27-30 April, 2015



Fig. 18 Virgin and Child

London, National Gallery

A separate agreement has been made about the participation of the National Gallery in the VERONA project for three major Van Eyck paintings of the group (figs 18-20). After a comparative study of the equipment and the scientific imagery made by KIK-IRPA and the NG, it has been agreed that the NG will produce new scientific imagery following exactly the same protocol as established by VERONA, that this will be done in close collaboration with the VERONA team members to guarantee equivalent standards and that this documentation will be added to the same website, consultable in open access.

Meeting: 20 June 2016



Fig. 19 *The Arnolfini Double Portrait*

Fig. 20 *Portrait of a Man (Self Portrait?)*

Fig. 21 *Portrait of a Man ('Léal Souvenir')*

Madrid, Museo Thyssen-Bornemisza

The painting has been studied and documented following the VERONA protocol with macrophotography and infrared reflectography.

Team members: Susan Jones, Bart Fransen, Christina Currie, Sophie De Potter, Jean-Luc Elias, Saïd Amrani.

Mission dates: 7-11 September 2015



Fig. 22 *Annunciation Diptych*

Paris, Musée du Louvre

Two paintings were studied and documented following the VERONA protocol with macrophotography and infrared reflectography.

Team members: Susan Jones, Bart Fransen, Christina Currie, Sophie De Potter, Jean-Luc Elias, Saïd Amrani.

Mission dates: 7-12 June 2015



Fig. 23 *Virgin and Child with Chancellor Rolin*

Fig. 24 *Diptych of the Virgin and Child and Saint John the Baptist*

Rotterdam, Boijmans van Beuningen

The painting, initially not included in VERONA, has been studied and documented following the VERONA protocol with macrophotography and infrared reflectography.

Team members: Susan Jones, Bart Fransen, Christina Currie, Sophie De Potter, Jean-Luc Elias, Valentine Henderiks.

29 February to 4 March 2016



Fig. 25 *The Three Marys at the Tomb*

Sibiu, National Brukenthal Museum

Due to the temporary loan of the painting (no. 19) from Sibiu to the Noordbrabants Museum in 's Hertogenbosch, the painting could be studied and documented in 's Hertogenbosch following the VERONA protocol with macrophotography and infrared reflectography.

Team members: Bart Fransen, Christina Currie, Sophie De Potter, Jean-Luc Elias.

Mission Dates: 9-11 October 2016, 's-Hertogenbosch



Fig. 26 Portrait of a Man

Vienna, Kunsthistorisches Museum

Two paintings have been studied and documented following the VERONA protocol with macrophotography and infrared reflectography.

Team members: Susan Jones, Bart Fransen, Christina Currie, Sophie De Potter, Jean-Luc Elias, Valentine Henderiks, Cyriel Stroo, Saïd Amrani.

Mission dates: 22-28 November, 2015



Fig. 27 Portrait of Jan de Leeuw

Fig. 28 Portrait of a Man (Cardinal Albergati?)

Washington, National Gallery of Art

Due to the temporary loan of the painting (no. 22) from Washington to the Städel Museum in Frankfurt, the Van Eyck *Annunciation* could be included in the VERONA-project. The painting has been studied and documented following the VERONA protocol with macrophotography and infrared reflectography.

Team members: Susan Jones, Bart Fransen, Christina Currie, Sophie De Potter, Jean-Luc Elias.

Mission dates: 24-27 January 2016, Frankfurt, Städel Museum



Fig. 29 *Annunciation*

2.5. Results

The massive documentation obtained during the two years of documentation campaigns consists of:

- 16.298 image files
- 1499 gigabyte (total size of all files)
- 22 reports with measurements and observations

During each mission, time was set aside to measure and examine the works of art. We attempted to understand the construction of the wooden supports and their often semi-integral original frames. We also used small directional hand-held lamps, both in visible and ultraviolet mode, to learn as much as possible about the ground and paint layer structure. Any interesting observations were recorded photographically in ultra-high resolution.

Inscriptions on frames were investigated with a view to establishing their authenticity, for example in the case of the *Madonna with Canon Joris van der Paele*. Again, ultraviolet fluorescence light was most useful for distinguishing between original and later lettering on the frame.

Close-up photographs were taken of the wooden edges of the panel or frame to reveal the wood grain and any tool marks or signs of later restoration. Original and later marbling on the frames and/or reverse side of panels was examined with a loupe or with a microscope, for example, the *Portrait of a Man* from Sibiu, whose probable original marbling is damaged and partially concealed by labels. Where feasible, the layer structure of the marbling was recorded photographically through tiny losses.

Photographs were also taken from left, right, above, and from behind to show the work of art as a functioning 3-dimensional object, be it a single panel, diptych or triptych.

We were also able to consult the conservation and curatorial files on the paintings in most of the museums, which sometimes provided useful documentation on the material history of the works of art.

2.6. VERONA Team Members

- Bart Fransen, project leader, art historian
- Susan Jones, project manager, art historian
- Christina Currie, head of photography and scientific imagery, art historian
- Jean-Luc Elias, photographer macrophotography
- Sophie De Potter, photographer infrared reflectography, assistant for macrophotography
- Cathérine Fondaire, X-radiography
- Herve Pigeolet, assistant for X-radiography
- Valentine Henderiks, art historian
- Cyriel Stroo, art historian
- Saïd Amrani, driver of VERONA

3. DISSEMINATION AND VALORISATION

3.1. Dissemination

One of the objectives of VERONA is to share the newly made documentation in open access on the website <http://closertovaneyck.kikirpa.be>. This dissemination was not budgeted within the BELSPO-grant but could be financed thanks to the structural partnership with Bruges Museums.

In 2010 high resolution scientific documentation was made of the most important work in Jan van Eyck's oeuvre, the Ghent Altarpiece (Saint-Bavo Cathedral). Financed by the Getty Foundation this new data-set has been made available in open access through the innovative web application, launched in 2012, 'Closer to Van Eyck. Rediscovering the Ghent Altarpiece', hosted at the KIK-IRPA servers: <http://closertovaneyck.kikirpa.be>. Extremely high resolution images of the painting are now available worldwide in four modalities: macrophotography, infrared macrophotography, infrared reflectography and X-radiography. This research tool has stimulated many scholars worldwide to conduct research on the Ghent Altarpiece. Since its launch the website counted no less than 650.000 visitors, 435.000 single visitors, 33% returning visitors and an average time on the website of 34 minutes, which is relatively long. This open access material was quickly exploited by researchers and some of the material discussed during the international Van Eyck colloquium held in Brussels in September 2012.

The Closer to Van Eyck website, coordinated by Ron Spronk, will house the VERONA material with the aim of allowing scholars worldwide to study the technical material of the complete oeuvre of Van Eyck on the basis of equivalent data. In this way, there will be more objectivity in comparative research. Based on this new material, similarities and contrasts within Van Eyck's production will be reconsidered.

3.2. Valorisation

The VERONA project has been well received in both the museum sector and the scholarly community. In terms of press and publicity, attention to the VERONA project has been given through:

- A documentary film (in English and Spanish) by the Thyssen-Bornemisza Museum, made during our research and documentation campaign in Madrid in September 2015. The film can be seen online on a microsite that has been created on the museum website.

http://www.museothyssen.org/microsites/Proyecto_VERONA/verona_project_thyssen.html



- A guest lecture by Susan Jones on VERONA at the Metropolitan Museum of Art in New York. The talk was held during the exhibition *A New Look at a Van Eyck Masterpiece* and was part of the 'Sunday at The Met' conference program *Rethinking Jan van Eyck: Discoveries from New Technical Investigations of His Paintings*, 17 April 2016.



- For *Science Connection*, the Federal Science Policy journal, Susan Jones and Bart Fransen were interviewed by Catherine Bourguignon about VERONA, its concept and the value of the project. See: *Science Connection* 51, June-July 2016 (in French and Dutch).



- Zaal Z, the museum journal of the Royal Museum of Fine Arts in Antwerp, includes an article on the Saint Barbara by Jan van Eyck in the Antwerp collection. It talks about the new technical documentation of the VERONA project and announces the publication of the scientific imagery online in open access.



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Structural partner:

Bruges Museums:

Till-Holger Borchert

Museum partners:

Antwerp, Royal Museum of Fine Arts:

Manfred Sellink, Elsje Janssen, Lizet Klaassen, Lies Van Biervliet

Antwerp, Rockoxhuis:

Hildegard Vandeveld

Berlin, Gemäldegalerie:

Stephan Kemperdick, Babette Hartweg, Gabriel Montua

Bruges, Groeningemuseum:

Till-Holger Borchert, Guinevere Souffreau, Anne van Oosterwijk, Griet Steyaert

Dresden, Gemäldegalerie:

Uta Neidhardt, Konstanze Krüger, Christoph Schölzel

Frankfurt, Städel Museum:

Jochen Sander, Stephan Knobloch, Annegret Volk, Fabian Wolf, Yannic Jäckel

London, National Gallery:

Gabriele Finaldi, Susan Foister, Caroline Campbell, Marika Spring, Larry Keith

Madrid, Museo Thyssen-Bornemisza:

Guillermo Solana, Mar Borobia, Dolores Delgado, Ubaldo Sedano

Paris, Musée du Louvre:

Cécile Scaillièrez, Philippe Lorentz

Rotterdam, Boijmans van Beuningen:

Friso Lammertse, Christel van Hees

's-Hertogenbosch, Noordbrabants Museum:

Paul Huys Janssen, Sara Verboven, Joris Westerink

Sibiu, Brukenthal National Museum:

Dana Damboiu, Alexandru Sonoc

Vienna, Kunsthistorisches Museum:

Sabine Pénot, Elke Oberthaler, Ina Slama

Washington, National Gallery of Art:

John Oliver Hand

ControlAtom:

Peter Immesoete, Frederic Delcourt

Universiteit Antwerpen:

Geert Van der Snickt

Vrije Universiteit Brussel:

Ann Dooms, Bruno Cornelis

Universum Digitalis:

Frederik Temmermans

Website Closer to Van Eyck:

Ron Sponk