

InsightART

– We measure the DNA of your art



Radiographic Artwork Scan



ARTIST:

Jakub Schikaneder

TITLE:

Card Players

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Painting Details



Title:	Card Players
Author:	Jakub Schikaneder
Dating:	after 1918
Signature:	YES – Schikaneder, bottom right corner
Medium:	oil on canvas
Size:	118 x 98 cm
Source:	private collection
Sponsor:	John Doe



Description of the Painting

There are two male figures on the painting, who are sitting opposite each other in a dark room, playing cards. The whole scene is very gloomy, presumably due to the presence of non-original overpainting, dark lacquer layers and surface impurities. Signature “Schikaneder” is located in the bottom right corner; however, its visibility is slightly worsened because of the presence of the top lacquer layers and the impurities.

The canvas is stretched on a wooden switch frame and the painting is set in a wooden gilded decorated frame. For purposes of the radiographic scan the painting will be taken out of the decorated frame.



Applied Radiographic Methods

The piece was examined using material sensitive X-ray microradiography with high resolution (MRXR) in a robotic scanner RToo developed by the InsightART company. OXFORD INSTRUMENTS X-ray was used as the source X-ray device. PCC detector Widepix 2(1)x5) was used in order to detect radiographic picture.

Scanner ID: 003

Voltage within the X-ray: 50 kVp

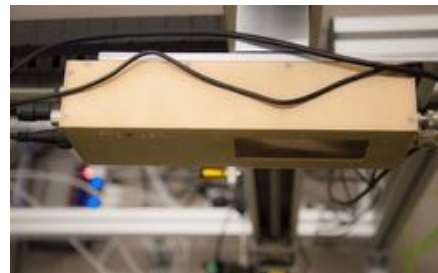
Current of the X-ray: 1 mA

Distance between the X-ray and the painting:

50 cm

Image resolution: 55 μ m

Length of the scan: 6.5 hours



PCC detector Widepix 2(1)x5).

RToo is capable of X-ray hyperspectral depiction, which measures the whole X-ray spectrum while scanning the piece. The spectral information is then available to be used in a variety of identifications for different heterogenous materials of the measured piece. The X-ray images can subsequently be colorised according to the specific energies of the detected materials, which then allows for extraction of specific materials only. Furthermore, the samples can even be measured using the movement synchronisation of the X-ray pipe and the detector. Using this method is then advantageous as the distance between the source and the detector can be small, therefore the intensity of the X-rays increases and accelerates the scanning speed.



Results of the Radiographical Scan

Key findings:

Performing the radiographical spectral scan of the painting has shown a number of key findings regarding the piece's overall technical condition, material structure overview and its historical connotations. The most important finding is the fact that the original piece was completely overpainted in the past, which caused a partial change of the individual painting motives. Thanks to the hyperspectral radiographic image, the quality, localisation and intensity of the non-original overpaints can be defined clearly. As an example, the non-original overpaint covers a rich still life situated in the front of the table, on which the men are playing cards. This still life pictures a glass carafe, glasses with beer, bread, butter, meat, vegetables and a knife on a wooden barrel.

Additional significant change involves the figure of the player situated on the left side of the painting. The original version was painted as a soldier in a uniform (most probably Prussian) from the World War I period. Originally, this figure had a military cap; however, it was partially scrubbed off before the application of the non-original overpaint. This figure's face has also been overpainted several times. Background of the scenery, the interior, is overpainted as well and this overpaint disables the original architectural interior concept from being visible. The level of overpaint layers thickens towards the bottom right corner of the piece. The overpaint changes to more of a coloured lacquer towards the right player's figure; its intensity weakens on this side.

On the top part of the painting, there is a horizontal seam stretching across the whole piece. This seam is not sawn; the original parts of the canvas are glued to a non-original oak linen underlay (rentoilage). The top cut piece of the canvas is clearly original, due to identical energetic response to the rest of the painting. Reasoning of the intervention is obscure.

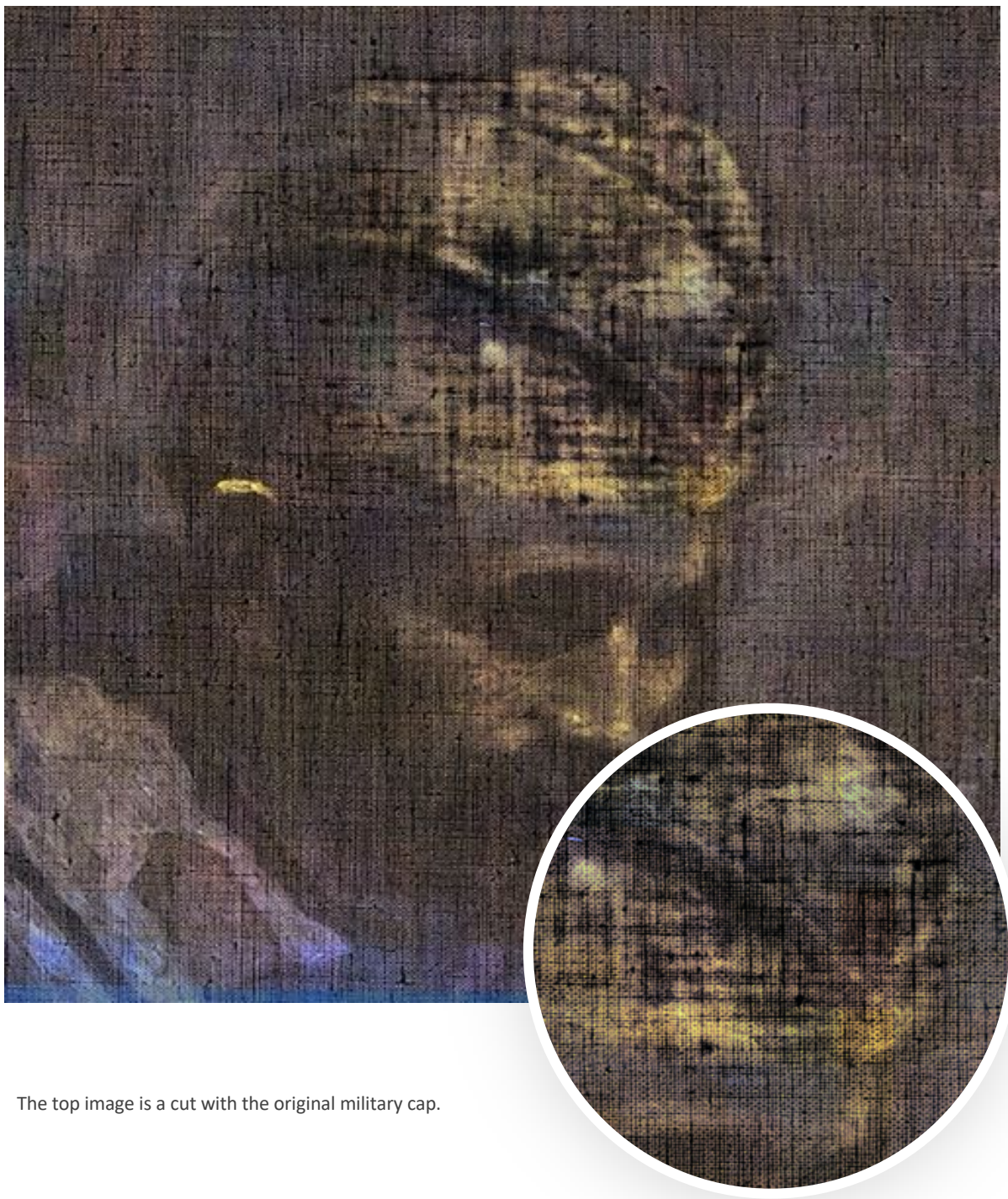




**Jakub Schikaneder,
Card Players**

The final spectral radiographic image reveals the original composition of the painting.





The top image is a cut with the original military cap.



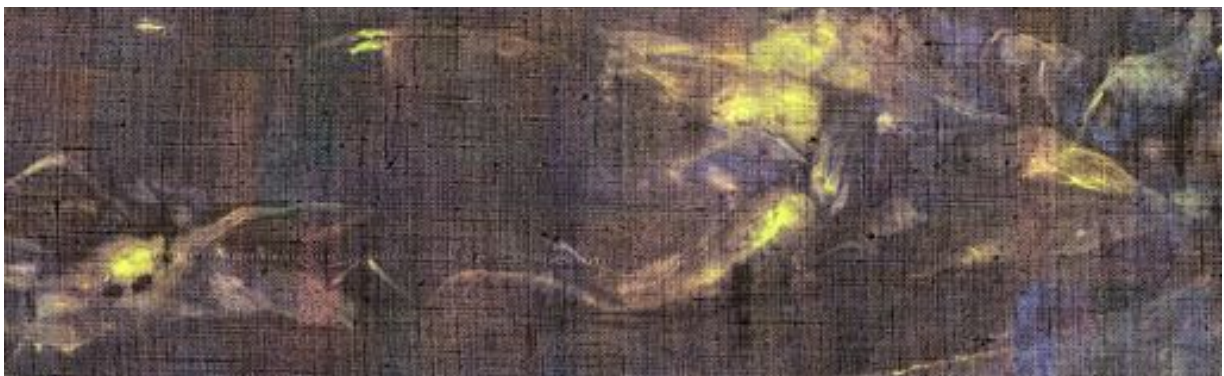
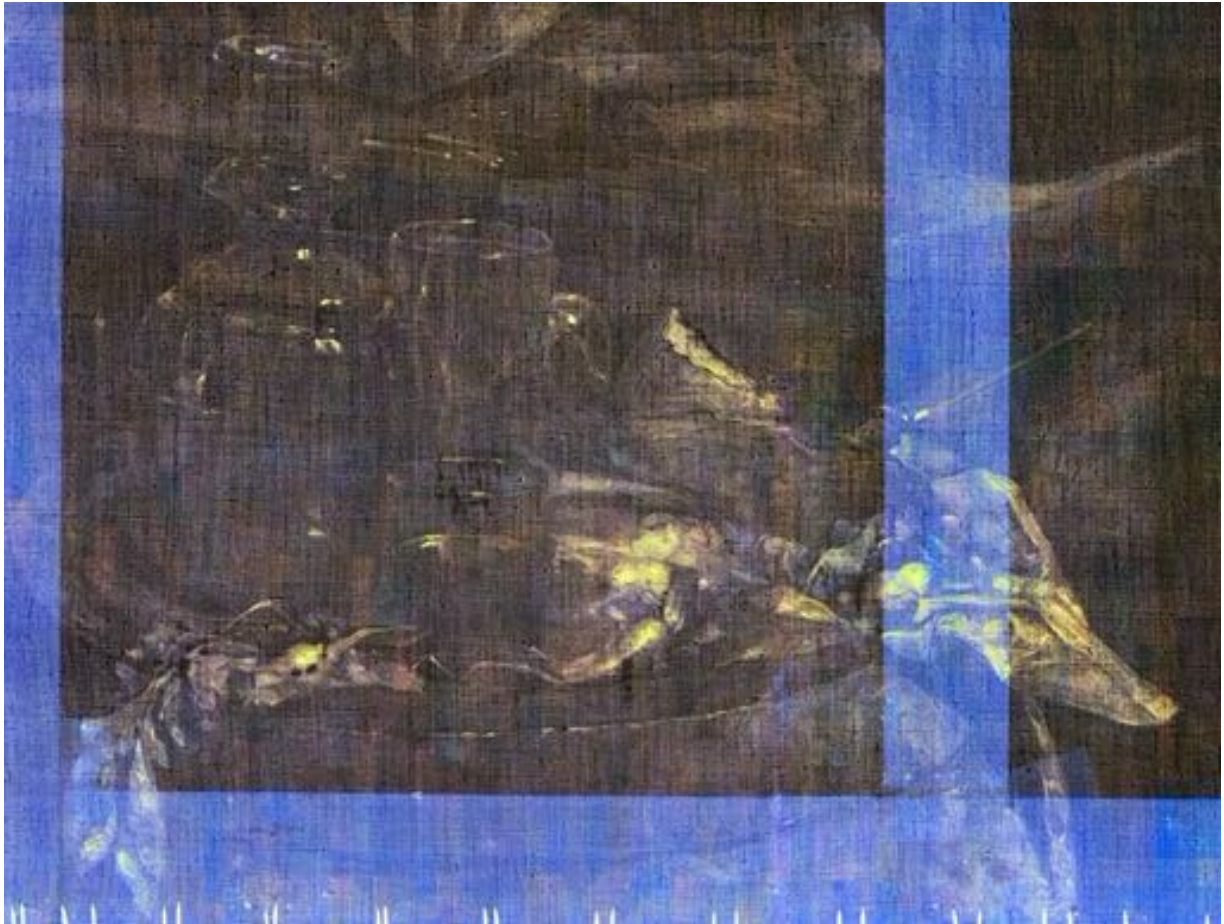


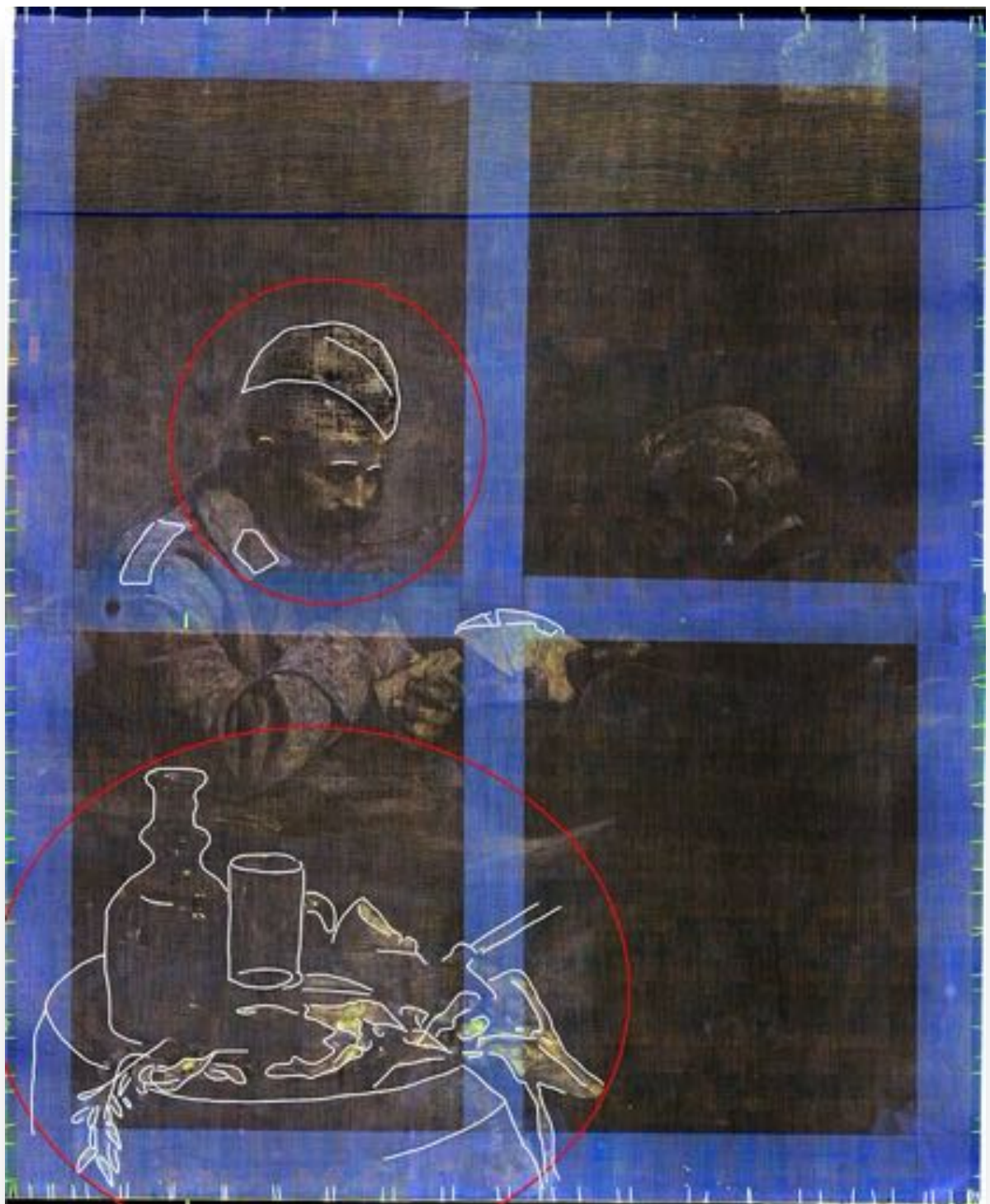
Image on the top depicts a cut of the original still life underneath the non-original overpaints. The bottom image shows an enlarged detail of the revealed still life.





Comparison of the black and white and coloured radiographical images highlights the advantages of spectral imaging. It is easy to recognise the layout of individual pigments outlining the original painting on the right, coloured radiographical image. Moreover, the seam in the top part is highly visible due to the structure of the pictured canvas corresponding with the rest of the piece. Therefore, the imaged section was a part of the original canvas, but possibly there was a reduction of the canvas material in matter of millimetres or even centimetres. This is also confirmed by the coloured radiographic image as its pigments depict identical energetic values for both the added part of the canvas and the bottom part of the painting.





Sketches of the individual overpainted originals of the painting. However, the changed composition of cards held by the player on the right side was performed by the author while creating the original painting.





Localisation of the topmost level of the non-original overpainting; the right side of the painting is covered only with a soft layer of oil paint, whereas the bottom right part is characterised as coloured glazes.



Utilisation of Spectral Radiography in the Restoration Process

The results of the spectral radiography scan of an artwork were used to correctly set up the restoration procedure to scan the non-original layers of overpainting. Through the knowledge of the exact distribution and levels of the non-original interventions can the restaurateur thoroughly inspect and uncover the original painting by Jakub Schikaneder.



The coloured radiographic image on the left uncovers the original composition of the piece before it was covered with the non-original layers of overpaint. Presented in the middle picture is the painting during the restoration phase. The picture on the right side shows a detail of the soldier's head during the process of the non-original layers scan.



Utilisation of Spectral Radiography in the Restoration Process



On the left side is the overpainted piece before restoration, while on the right side is the uncovered and restored artwork in its original form.



Conclusion and Recommendations



According to the findings, this artwork was intentionally changed from its original concept; however, the intentions are not clear. Nonetheless, the original painting was in a good condition and preserved under the non-original layers of overpaint. Thus, it was possible to reverse the look of the painting to its original form during the process of restoration. The resulting radiographic images conclusively defined the range and location of the non-original layers, thus becoming an important piece of information during the restoration process. The signature in the bottom right corner was not overpainted, only covered with lacquer and is located on the original layer of paint. This fact proves that the signature is original.



Glossary

- 1) **Underdrawing** – author's drawing layout
- 2) **Underpainting** – bottom layer of the final original version of the painting
- 3) **Overpainting** – original or non-original composition change of the piece
- 4) **Pentiment** – author's change of the artwork's composition
- 5) **Gesso** – bottom/preparation layer on the canvas
- 6) **Craquelure** – a fine pattern of dense cracking formed on the surface of materials
- 7) **Lacquering** – top, protecting layer of the painting
- 8) **UV luminescence** – reflection of ultraviolet rays from the surface of the artwork
- 9) **IR reflectography** – reflection of infrared radiation from the surface of the artwork
- 10) **Emission research methods** – capturing the reflection of a specific spectrum of electromagnetic radiation
- 11) **Transition research methods** – capturing the change in the intensity of the specific spectrum of electromagnetic radiation after the penetration of the investigated object
- 12) **Invasive research methods** – research methods requiring destructive intervention into the artwork
- 13) **Non-invasive research methods** – research methods that do not require invasive intervention into the artwork



About InsightART



Our company focuses on the analysis of art pieces using the X-rays. RToo, the robotic scanner we have developed, uses the newest and most modern imaging technology – pixel detectors. The results it brings involve higher resolution, more sensitivity and a radically higher number of imaged information, which is displayed faster and with more precision than before. As an example, NASA uses a smaller version of this detector on the International Space Station and plans to take it to Mars. Jan Sohar, an experienced entrepreneur, founded InsightART in 2016 together with a particle physicist Josef Uher and a restaurateur Jiří Lauterkanc. Jiří Lauterkanc and Josef Uher both massively contributed to the development of the RToo machine.

Featured by:



RToo Robotic Scanner

The InsightART company developed a modular robotic system specifically for research on artworks. It was developed on basis of the best and most advanced imaging technologies available, namely the pixel detector offering the resolution of 55 microns. This technology allows us to collect the highest number of information in the highest quality that is possible to achieve using today's X-ray imaging techniques. Using this technology can help restaurateurs and art historians immensely, making their delicate work much easier.



The Most Detailed Imaging

Photon detectors are able to create **black and white images** of artworks, while X-rays allow **coloured imaging**. The colours then allow for better differentiation of individual layers, pigments and other information important for the everyday tasks fulfilled by restaurateurs. Moreover, RToo is equipped with **automatic image layering software**, which helps with connecting individual images together and thus provides a perfect and well-rounded resulting image.



2D and 3D Scans

The system contains two flexible robotic arms, which are able to perform both 2D scans of paintings and **3D scans of artworks** such as sculptures, or archaeological findings.





From Restaurateurs to Restaurateurs

The biggest difference between RToo and other technologies used in the given field of expertise is the fact that RToo was developed in collaboration with renowned restaurateurs. As they are the ones who know the most about what is needed in the field, we were able to develop a **technology that is both sensitive to the artworks and capable of providing precise visual data needed by the restaurateurs.**



Multimodality

Possibility of implementing additional modules for exploration of paintings that offer a wide range of imaging modalities:

- Macro-photography
- IR reflectography (spectral)
- UV fluorescence imaging
- 3D photogrammetry visualisation
- Hyper-spectral imaging
- XRF imaging
- X-ray diffraction
- Air-coupled ultrasound
-



CT (Computed Tomography)

RToo is a multimodal platform and will merge several technologies of the future. CT was the first modality added to RToo in late 2019. It enables the RToo to scan the piece from different angles, therefore the traditional rotating table is not necessary. **It is even possible to scan only one small part.** RToo is therefore the ideal tool for 3D scanning of artworks, such as **sculptures, archaeological findings, or antiquities.**



References

InsightART has participated in X-ray analyses of a significant number of pieces created by well-known artists and cooperated with several private collectors, and even with public institutions, such as the National Gallery in Prague or the National Gallery in Copenhagen.

We have scanned:



La Crau with a View of Montmajour

Attributed to Vincent van Gogh
Private collection

Madonna and the Child

Raffael Santi
Private collection



Dancer

Edgar Degas
Chrudim Puppetry Museum



Contacts

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We are thankful that you have decided to choose InsightART for the X-ray analysis of your artwork. Each work of art is unique and provides a source of inspiration and information that is valuable to you, us, and the international artistic community. Therefore, we highly appreciate the confidence you have put in us and we are looking forward to more similarly successful collaborations and ventures.

InsightART Team

