Alchemy in 3D: A Digitization for a Journey Through Matter

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***Abstract*—In this work, we will present the outcomes of the 3D diagnostic investigations carried out on the painting Alchemy by Jackson Pollock.**
Thanks to an accurate digitization and a careful processing, we were able to generate a very precise high-resolution 3D model that proved to be useful in different stages of the diagnostic and conservation campaign. The 3D model was integrated in the conservation process, along with the other diagnostic investigations; the geometric data was also used to produce images and video sequences for dissemination purposes.
The most interesting aspect of the work, however, was the idea of going beyond photo-realism and the use of the scanner-measured geometry to try to interpret and understand the traces and signs on the surface of the painting, in relation with the gestures and techniques used by Pollock while painting this masterpiece. Combining the knowledge of the curators and the metric data gathered in the digitization, we were able to discover and validate several interesting aspects of the painting, in the direction of trying to better understanding the painting process which was, in the idea of the artist, an essential part of the artwork.
The 3D model of the artwork played a central role also in the temporary exhibition created for the dissemination of the conservation and the diagnostic campaign to the museum visitors. This was also done following the idea of using the geometry to explain the gestures, actions and techniques of Jackson Pollock at work. The 3D model was used to create an interactive kiosk, to have the visitors navigate the model and access explanations of relevant geometrical details and to produce a 1:1 physical reproduction to give the public the possibility to physically interact with the artwork.

***Index Terms*—3D acquisition, painting, 3D printing**

I. Introduction

3D digitization technologies have found a fertile ground in the Cultural Heritage field, and have proved to be useful for technical applications in the study, conservation and restoration of artifacts. 3D digital models are also used a lot in the presentation of artworks, especially when targeting a wide audience. In the former case, for the technical use, 3D is regarded mostly as a source of "pure data", in terms of measurements, technical data and metric geometrical information. In the latter, the visualization and presentation exploits the "visual" side of 3D models, aiming at reaching the highest possible level of realism, in order to give the user the impression of looking at the original object. The important fact (which makes 3D so interesting) is that if the 3D data is captured properly, the very same information may be exploited in these two ways. These two opposite facets of the 3D data are not the only ones available. In this specific project, for example, we tried to use the *visual geometrical* facet of the 3D digital model to better *understand* the painting Alchemy by Jackson Pollock. Our idea was that, by isolating the geometrical component of the painting, and looking at it with the trained eye of the 3D expert and of the curator, it would be easier to read and interpret the signs and traces of the painting process, fulfilling the idea of the artist, that the painting process *is itself* part of the artwork.

Fig. 1. Alchemy, by Jackson Pollock

Alchemy (Fig. 1), by Jackson Pollock, is one of his most famous works, and a major contribution to twentieth century art. Dating back to 1947, it was one of its first experiment of what will be later called *"action painting"* and *"dripping technique"*. For the first time, Pollock placed the canvas on the ground, fixed on a wooden frame (borrowed from his mother), and proceeded in pouring/dripping/squeezing paint on its surface.
Alchemy, being one of its earliest experiments, presents a noteworthy variety of painting materials (metallic paint, industrial enamel), of non-paint media integrated in the structure of the painting (sand, pebbles, fibers, wooden sticks); all these elements were laid out using a plethora of different application methods (spatula, brushes, squeezed from the tube, dripped, splashed out of a syringe).
The traditional procedures of painting were revolutionized in the sense that the action of laying out the paint became itself an artwork, while the final appearance of the painting was not related to the notion of "descriptive shape" anymore, but was basically a record of the act of painting.
Similarly to a musical record, the traces of colors, paints and materials on the surface should somehow *play back* the gestures and movements of the artist at work.

For this reason, looking at Alchemy just as a "flat painted image" cannot fulfill the artistic aim of the painting, making

impossible for the visitors to get in touch with the vision of the artist.
Since the requirement of safety and conservation prevents the museum to make the painting as accessible as it should be in order to have perfect fruition: visitors are kept at distance, the painting is generally screened by a transparent panel, the lighting is fixed, it is impossible to touch the surface, the painting is mounted vertically on a wall (while it was flat on the ground when Pollock worked on it).
While it is possible, by using the digital model, to create an "impossible" exhibition (allowing the visitors to get really close to the object, dynamically change the lighting direction, and view the painting from any direction), this is still a "basic" use of a 3D model.
In this project, we also tried to use the pure geometric information, visualized without color in a free-camera exploration, to help the curators to read back the sign and traces of the painting process and to gain new insights on the creation of this artwork.

A. *Alchemy under scrutiny*

Our work took place in the framework of a larger project of conservation and diagnostic investigations.
While being a relatively recent work of art, Alchemy was in need of an accurate monitoring and conservation. The exposition of the painting without protection in the gallery had caused an accumulation of dust and an opaque patina was coating the paint, requiring a deep cleaning. The painting has a huge amount of paint on the canvas, more than 3kg, that exerts on the canvas and on the wooden frame a much stronger pulling force than a "standard" painting; the canvas and the wooden frame had to be checked for signs of stress. Finally, Pollock has used for this painting unconventional paints, made for the automotive industry, or for indoor use and decoration, and certainly not formulated to be mixed together. Their duration in time and their chemical interaction is unclear, and their state of conservation had to be checked.

These reasons made the conservator of the Guggenheim collection decide to carry out a conservation and diagnostic campaign, with the goal of better understanding the artwork, while at the same time cleaning it. A complete set of diagnostic campaigns was performed to explore the shape and the materials of the painting: multispectral, XRF, analysis of micro-fragments. The campaign provided vital insight on the materials used, their conservation state and bringing out the minute details of the artwork.

One of the diagnostic investigations carried out in the campaign was the 3D digitization of the painting. The high resolution 3D model that was created was used in different moments of the conservation campaign, and it played a main role in the final exhibition that was prepared to present the results to the public.

II. Related work

It has been more than 15 years since the first non-experimental 3D scanning campaigns on Cultural Heritage artifacts took place. During these years, there has been an impressive improvement on both the hardware and software side, and the range of possible applications is still partially unexplored [1].
An overview of the uses of 3D acquisition technologies in Cultural Heritage goes well beyond the scope of this paper. In this Section, we will focus on a few examples of applications dedicated to painted surfaces.

Image processing techniques can be a straightforward approach for the analysis and documentation of painted or quasi-planar surfaces (like mosaics [2]) or even to automatize and support a restoration work [3]. Nevertheless, exploiting the intrinsic three-dimensional nature of painting and bas-reliefs may be important in a variety of possible applications.

The 3D acquisition of paintings can offer incredible insights on the state of conservation and on the structure of artworks, as shown by various diagnostic projects, like [4]. However, 3D digitization of paintings is not a trivial task with active devices due to several issues: materials involved, detail to be acquired, range maps registration. High accuracy devices like conoscopes cannot acquire large surfaces, while using structured light triangulation, accurate calibration is needed [5]. For this reason, alternative technologies, like RTI [6] are taken into account, while in these cases no accurate geometry information is obtained.

Alternatively, if the geometric information has to be exploited, simple acquisition protocols are created in order to be able to acquire data in a short time and without the need of highly trained personnel. This is the case of the reassembling of fragmented bas-reliefs [7] or frescoes [8], where geometric constraints are combined with the analysis of other features, like the color [9], [10].
Recently, Zaman et al [11] proposed a low-cost device that is able to acquire fine details in a short time, by combining stereo vision and fringe projection. The quality of results was proven by the production of 3D replicas of the acquired works of art, obtained with a new technologies devoted to paintings printing.

These types of printing are inspiring also other approaches, like the ones to enhance the detail of paintings and pictures [12], [13] by creating replicas for visually impaired people, and more in general to better understand them.
The paintings of Jackson Pollock have been the subject of scientific study, determining they present a *fractal* structure [14], [15]. These works, however, analyzed the paintings only as a 2D image, and they cannot be easily extended in 3D. They are nevertheless interesting, as they prove the shape of the painting contains information at different levels of scale.

Finally, even when obtaining an accurate 3D model of a painting, there is still the issue of being able to visualize it properly. This can be achieved locally by using multiresolution techniques [16], but the main challenge is now the web visualization of high resolution data. As for the images, the Google Art Project (https://www.google.com/culturalinstitute/project/art-project) already proposed an efficient solution for high resolution images. Regarding three-dimensional data, the issue is to find the best tradeoff between geometry compression and available bandwidth [17]. Other important issues related to visualization on the web on 3D content are: the interaction paradigm, the realism of rendering, the integration of additional information [18].

III. 3D ACQUISITION AND PROCESSING

While the digitization and 3D model are not the primary focus of the work, it was nevertheless imperative to have a high-quality data, able to fulfill its designed roles of scientific data, visually rich representation and geometric data to be interpreted by experts.
Alchemy exhibits a surprisingly detailed geometry, and the presence of paints with a quite diverse optical behavior (metallic, shiny, translucent) posed severe difficulties for the digitization. Considering our target resolution, the size of the painting is also non-trivial: 221x114 cm.

We chose to use a structured light scanner, this technology could give us the required level of detail (0.1 - 0.2 mm) and is a bit more resilient to specular reflections with respect to other acquisition techniques.
We used a GOM Atos scanner (see Fig. 2). Each single shot covers an area of around 60x40 cm at a resolution of 0.2 mm (25 points per mm^2). In order to cover the whole surface of the painting, including its sides, with enough overlap to ensure rigidity during alignment and data redundancy to reduce sampling noise, we took 72 scans, for a total of nearly 120 millions of points. Two areas were acquired at an even higher resolution (100 points per mm^2).
The acquisition took place *before* the cleaning. This timing proved to be an advantage: the presence of dust and of the opaque patina, while not changing the underlying geometry, helped a lot in overcoming the problems of specular reflections and of metallic paint scattering.

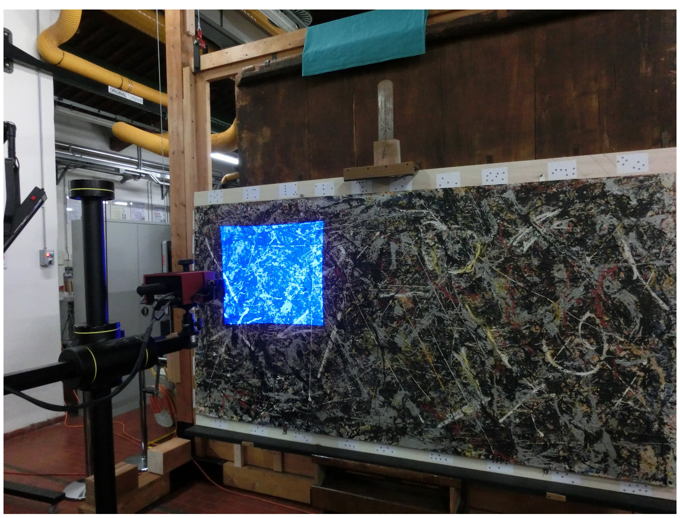

Fig. 2. The 3D scanning of the painting.

Even with its intricate surface detail, the painting is an almost flat surface. This type of geometry may pose severe problems when aligning the range scans in a common reference space. To solve this, we placed markers on the supporting panel, all around the painting. Additional markers have been used, on a mobile support, for the interior of the painting. These markers have been recognized by the scanner, ensuring a rigid and precise positioning of the scans. This initial alignment was later on refined using ICP methods (still using markers to avoid drift).

The raw 3D data was processed with the MeshLab [19] software, used for data cleaning, alignment of range maps, creation of the triangle mesh and color mapping.
The result of the processing is a 3D model composed by 80 millions of triangles covering the whole painting, plus two models at higher resolution for the areas of detail, of around 100 millions of triangles each. On top of the obtained geometry, we mapped a high resolution image (50 MPixels) obtained with a multi-spectral scanner provided by the Istituto Nazionale di Ottica (INO-CNR), thus encoding in the digital model both high resolution geometric and color information (see Fig. 3).

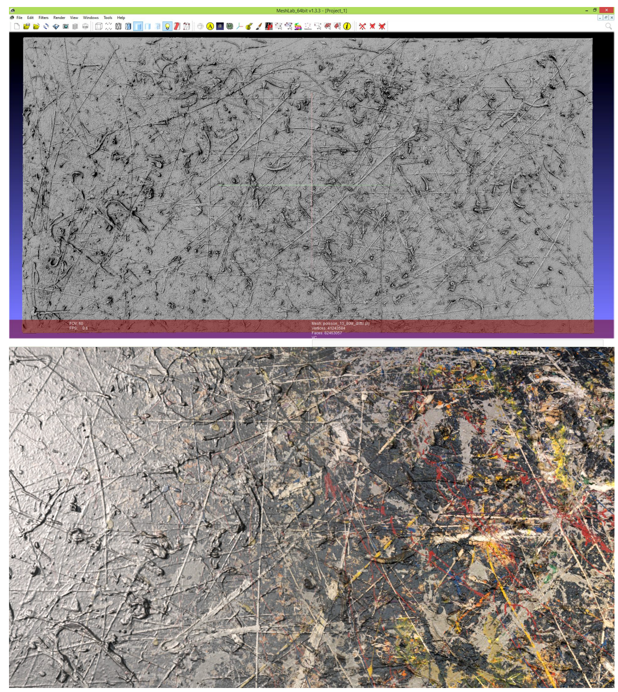

Fig. 3. Top: a screenshot of the 3D model. Bottom: A rendering of the final 3D model with a shifting material, showing both pure geometry (left) and color (right).

IV. TECHNICAL USE AND VISUAL USE OF THE 3D MODEL

As said in the introduction, the main and general uses of 3D models are related to its technical and scientific data, and to its ability to create photorealistic visualization. In this sense, this project was not different.

The obtained 3D model was part of the diagnostic data gathered during the campaign. It has been used, during the cleaning and the other analysis to help guiding the cleaning process, to validate hypotheses and to map the local information acquired with other devices.
The 3D model of an object has a strong potential as a ”reference system”, as it is possible to map other types of information (for example, the local analysis of the materials) onto the surface.
As usual in these cases, the 3D data produced (raw scans and 3D models) will also be stored in the museum archives, to be used as a technical documentation for any following conservation and restoration actions, as it represents a precise, scientific snapshot of the state of the artwork.

Fig. 4. A close-up of a 7x15 cm area of the painting. Even this small sample contains examples of paint squeezed out directly from the tube, oozed from a syringe, dripped from a brush or stick, and the presence of small pebbles.

At the same time, the 3D model has also been used to create realistic visual representation of the artwork. This included high-resolution images and photo-realistic video sequences, to be used as a dissemination material for the museum audience. These visual presentation techniques were also used in the creation of the interactive kiosk and of the video used in the exhibition (see section VI) and in the dissemination website.

These uses were indeed valuable for the campaign and the dissemination, but are pretty standard in modern digitization projects; however, due to the peculiar nature of the artwork, we also decided to use the same data for a different kind of ”understanding” of the painting.

V. Understanding painting through 3D

A visual inspection of the geometry of 3D digitized models is quite common, but is generally focused towards more ”metric” considerations. In this case, we argue that the close inspection of the naked geometry of Alchemy is the best way to study and understand the painting. While looking at the naked geometry of a painting to understand it may seem against reason, it has to be considered that, while the color was chosen and used by Pollock for specific reasons, it is also true that only the shape of the paint on the canvas is able to effectively describe the gesture and the act of painting, so important for this artwork.

As we said, considering this painting as a flat image is misleading, as the final colored appearance does not convey the full story. Conversely, looking at the naked geometry, brings out much more clearly the underlying structure of the traces of paint. In this work we also employed a lot the non-photorealistic rendering techniques to make the geometry even more readable, taking further distance from the photo-realism paradigm.

The 3D models (the whole artwork at 0.2 mm and the detail areas at 0.1 mm) had more than enough detail to isolate the traces of paints, their superimposition order, and help understanding the motion and actions of Jackson Pollock, as visible in Fig. 4.

During the cleaning and the design of the exhibition (see section VI), we spent a lot of time with the restorers and conservators just browsing through the geometry, observing the color traces and markings on the painting surface, interpreting the different shapes and details. As we will see, these observations have also been used for dissemination when creating the interactive kiosk (Section VI-A), using the same geometries to explain to visitors the different techniques used by Pollock during his work.

Unfortunately, this operation is done mostly by observation, as the shapes must be *interpreted* by experts: the ideal situation was having curators and restorers (for their knowledge of the artwork and of the painting technique) and an expert of 3D (to help manipulate the 3D data, control rendering and taking measurements) working together.

While the methods and algorithms of geometric processing may help isolating specific details, measuring and doing calculations, it is hard to think of automatic processes able to extract meaningful higher-level knowledge out of the geometry of the painting, due to the very diverse painting techniques and the intricate details.

Looking at the geometry with the conservators, even in a small area like the one shown in Fig. 4 (7x15 cm), it was easy to identify the different traces left by the various techniques used by Jackson Pollock at work, and accurately perceive how

these traces are superimposed, going over and under, creating a landscape-like impression.
In this small area, it is possible to observe traces of paint squeezed out directly form the color tube (the wide flat trace with raised borders on the right), oozed out of a syringe (the smooth tear-shaped trace with the long tail), dripped from a brush or stick (the thin almost-vertical line one third on the left side), as well as the effects that Pollock used to build-up the texture and grain of the surface, like the inclusion of pebbles (the small lump near the bottom-right angle) and the corrugation of the paint due to the uneven layering (all over the image).

Fig. 5. On the bottom-right corner, geometry shows clearly the traces of the brush and the spatula used to lay down the base layer.

Some details are hidden because of the multiple-layer nature of the painting. The base layer of lead white has been applied using a spatula and a wide brush, and this is clearly visible in the X-ray. But looking at the bottom-right corner of the painting (Fig. 5), the curved traces left by the brush and the sharp marks of the spatula can still be seen in the geometry. This was known to restorers, but having now the possibility to clearly see these traces of the geometry, it was possible to find *other areas* in the painting showing the same kind of marks.

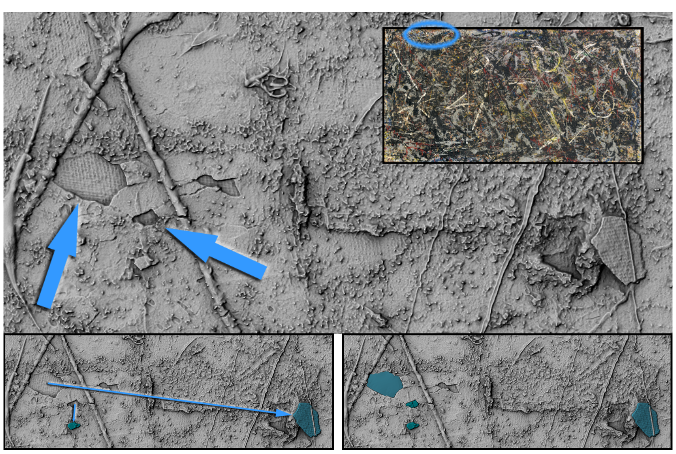

Fig. 6. Fragments of the lead white base layer detached and re-adhered to the artwork surface during the painting process.

In some cases, the metric nature of the geometry does help in confirming the interpretation. For example, in the top-left area of the painting it is possible to see the canvas in many locations. In these small areas (few mm^2 in size), the base layer of lead white paint is detached, showing the underlying canvas. However, at a close inspection, the shape of two of the missing areas perfectly matches fragments of paint nearby. This is because the fragment detached and re-adhered nearby. Looking at the geometry, it is easy to see this strange occurrence (Fig. 6). The interesting part is that this happened *during* the painting process, as on the re-adhered fragments it is possible to see new traces of paint.
One of these areas (the larger one) was well known by the conservators, but we found *a new one*, thanks to the increased clarity of the geometrical model. The metric nature of the model made possible an exact check, by cutting the re-attached parts of the 3D model and placing them back in their original position.

VI. THE TEMPORARY EXHIBITION

The curators of the Peggy Guggenheim Collection, in order to present to the public of the museum the result of the cleaning and of the diagnostic campaign, decided to prepare a temporary exhibition centered on the painting.
The exhibition "ALCHEMY BY JACKSON POLLOCK. Discovering the Artist at Work" (ALCHIMIA DI JACKSON POLLOCK. Viaggio all'interno della materia), was inaugurated in the Peggy Guggenheim Collection in Venice on February the 14th 2015, and lasted until September.

The exhibition also exploited this idea of decomposition. Starting from the painting in the first room, the visitor will see videos of Jackson Pollock while painting and will read his letters and other documents of the period. Then, the exhibition shows the materials used: the paints (still in their original cans), the instruments used to paint (brushes, syringes, wooden sticks) and the wooden frame used to lay down the canvas. The final room contains the results of the scientific analysis, shown using a video, a slide-show presentation and multiple interactive kiosks.
The path of the exhibition guides the visitor in a journey inside the painting, showing it as a whole but also as a sum of its "ingredients" (the paints), its "instruments" (the painting tools), and the "recipe" (the painting process, shown in the video and recorded in the shape of the painting).

The 3D model has been used a lot in the setup of the exhibition, mostly in the last, more technical room. Beside being used in the video and presentation, the 3D model had a pivotal role in the creation of two installations: an interactive kiosk and a 3D printed replica of the surface (at 1:1 scale).

A. *The interactive kiosk*

The idea of the kiosk was to give to the visitors the opportunity to freely explore the geometry as we did with the conservators and restorers.

The interactive kiosk (Fig. 7) has been designed to work on a large touch-screen (50 inches), with a minimal and easy to use interface.
The kiosk was developed heavily customizing the tools provided by 3D Heritage Online Presenter (**http://3dhop.net/**), an open source initiative focused at the web-based visualization of Cultural Heritage content. The tool uses HTML5 and WebGL to interactively display high-resolution 3D and, being written in JavaScript, can be easily tailored to the needs of a specific project. The high-resolution 3D model of the whole painting

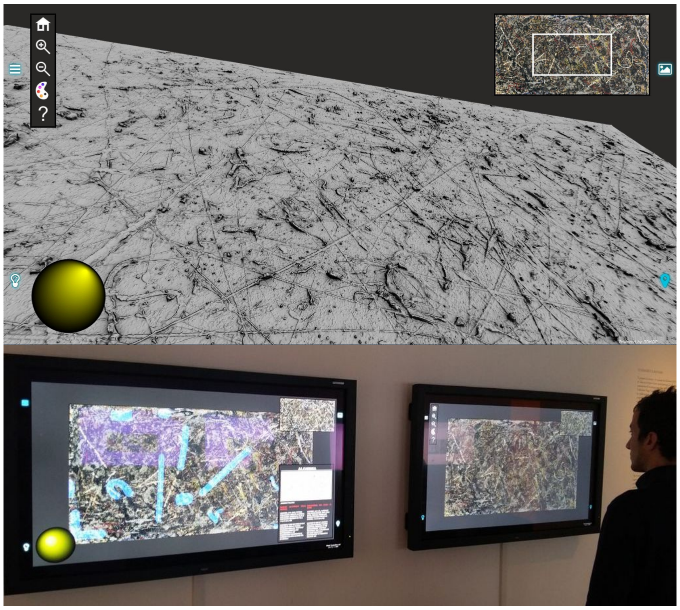

Fig. 7. The interactive kiosk created for the the exhibition, running on large-format touch-screen.

is managed using a multi-resolution rendering engine [16], to ensure interactivity and high-quality rendering.

The touch screen gives the possibility to navigate the model using the interaction paradigms used for tablets and smartphones. This ensures the visitors will have a very fast learning curve. Using different modalities of touch and pinch, the user can rotate, zoom, and pan, so that every possible view position can be reached. The navigation is constrained to the volume of the painting, and the map on the upper left corner can be used as well; this helps the user in controlling the navigation without getting lost.
With a simple on-screen control, it is then possible to change the illumination by manipulating the light direction: while very simple, this feature is able to bring out even more detail from the geometry. The interaction of the moving light with the geometry radically changes the perception of the surface, making it look more ”alive” and three-dimensional.

The kiosk starts by showing the naked geometry of the painting, to mimic the same rendering we used with conservators, employing a non-realistic shader that enhance the perception of the geometric detail. As said, we firmly believe this visualization helps a lot in presenting and reading the painting traces, also for non-experts. It is nevertheless possible to turn on the color information (ad-hoc shaders were developed to bring back photo-realism in this rendering mode).

Finally, the visitor can view and select ”hotspots” which are zones of interest, where the details of the captured geometry gives insights on the painting process and on the gesture of the artist. These areas, some already presented in Section V, have been selected to show to the visitors some of the different techniques used by Pollock, again exploiting the clarity of the 3D digitized geometry. The hotspots are displayed on-screen with transparent blue areas (Fig. 8). The user can touch them to zoom on the associated area, and obtain additional information on the box in the lower left corner of the screen.

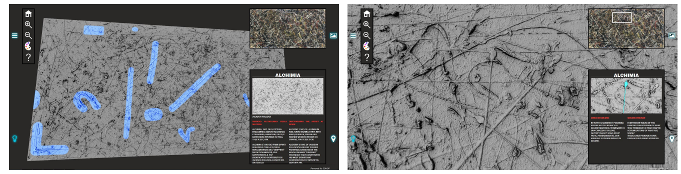

Fig. 8. The hotspots in the kiosk, each one showing relevant geometric features linked to information about a specific painting technique used by Pollock.

The interactive kiosk, being based on web technology, can also be experienced online, directly inside the web-browser. At the web address **http://vcg.isti.cnr.it/alchemy**, it is possible to access the viewer, view a descriptive video and see the areas digitized at higher resolution.

B. The reproduction

The amount of geometric detail of the painting is not very visible when looking at the original object from a distance considered safe for a museum, the complexity of the surface and the uncommon thickness of the paint made us and the conservators think that the painting could be much better appreciated by *touching its surface*.
Since this is clearly impossible on the original, a physical copy may give the possibility to interact and better understand the painting. We decided to employ 3D printing technology to create a 1:1 tactile reproduction of the painting; not an easy task, considering the size of the painting and the fact that, in some parts, the thickness of the paint is more than 1 cm.

Fig. 9. The 3D printed reproduction of the painting, installed in the exhibition.

Again, the idea was to separate the geometry from the color: a colored copy of the painting was considered not useful, since the original was already present in the exhibition.

Moreover, the reproduction of color information could not accurately reproduce the diverse optical properties of the different paints used by Pollock, and would have produced a poor replica, not helpful at all. For these reasons, we opted for the printing a mono-chrome copy showing only the geometry of the painting.
The 3D printed reproduction, shown in Fig. 9, was created by OCE' (**http://global.oce.com/**), a company specialized on the printing of museum-grade reproduction of paintings, starting from the same 80 millions of triangles model used in the whole project.
The possibility to interact and touch this color-stripped reproduction provides a somehow unconventional experience, but lets the user better understand the complexity of the artwork in a completely new way. The printed reproduction was a success, people were at the begin intimidated by the size of it, and the idea of touching an artwork, but soon after the inauguration, all the visitors were happily using the replica.

VII. Other research directions

The work presented in this paper was done with the harsh time constrains of the conservation campaign and the preparation of the exhibition. Unfortunately, these circumstances left out some interesting research direction, which would have required much more time. Now that the exhibition is going on well, we will try to explore these ideas; we have at least three different directions to pursue:

- **A systematic mapping of the painting marks**: the painting is the result of the superimposition of many application of paints, laid down using different techniques. the 3D model is a detailed documentation, but is not structured: an extremely helpful documentation would be a mapping of all the paint marks. In this way, knowing which paint streak is on top of which other, it would be possible to faithfully recreate the sequence of gestures and actions of Pollock. Again, the geometric information could greatly help this process, and some specific geometry processing algorithms could also be applied to partially automatize the process or just support the expert in selecting and isolating the marks.
- **Changing the exploration paradigm**: the interactive kiosk lets the user change arbitrarily his point of view, but still using a pretty standard navigation paradigm (horizontal/vertical panning and tilting, plus zoom). Since the navigation greatly influence the perception of the object, we could think of changing its paradigm. For example, mimicking the point of view Pollock used during painting (orbiting over the painting), or having the user "fly" over the geometry like over a terrain. Would that help the visitor in its exploration and understanding?
- **From the 3D to the Gesture**: a quite ambitious goal would be to try deriving, from the 3D shape of some paint marks, the actual gesture of Pollock while painting. It may be possible for specific, simple, painting techniques (like the paint squeezed out of a syringe), by using an inverse physical simulation. The presence of video recording Jackson Pollock at work could help in setting up the simulation, but also to validate the results.

A different idea could be to try extending to 3D the analysis techniques used in [14], [15] to study the *fractal* nature of Pollock's work. However, to obtain useful result, it would be better to have more than one digitized artwork.

VIII. Conclusions

This paper presented the outcomes of the 3D digitization of Alchemy, a painting by Jackson Pollock.

The use of a high quality triangulation 3D scanner and a careful processing resulted in a high-resolution 3D model. The geometric data was integrated in the conservation process, together with a number of other diagnostic investigations. The 3D models were also used to produce images and video sequences for dissemination purposes.

The most interesting use of the 3D models, however, has been the work carried out in conjunction with the conservators, where the naked geometry of the artwork has been used to investigate the relationship between the shape of the painting and the gestures, actions and techniques of painting.
The nature of the painting and the high-resolution model made possible the discovery and the validation of several interesting aspects of the painting, in the direction of trying to reach a better understanding of the painting process which was, in the idea of the artist, an essential part of the artwork.

Moreover, the 3D model of the artwork played a central role in the temporary exhibition created for the dissemination of the conservation and diagnostic campaign to the public. This was also done following the idea of using the geometry to explain to the museum visitors the gestures, actions and techniques of Jackson Pollock at work.
In particular, the 3D model was used to create an interactive kiosk, where it was possible to navigate the model and access explanations of relevant geometrical details.
Then, a 1:1 physical reproduction gave the possibility to the public to touch the rich geometry, to physically interact with the shape of the artwork.

In this project, we decided to go beyond the absolute realism paradigm that often characterize this kind of projects (especially in the dissemination), heading towards a non-realistic visualization focused on isolating specific parts of the whole object, to study and disseminate aspects of the artwork that are generally only studied and explained only qualitatively. While it is true that we are still in a stage of "assisted" interpretation, the curators could base their observation work on scientific, metric data instead of simple naked-eye observation, and the museum visitors could touch with their hands and clearly see those signs and traces left by Jackson Pollock as landmarks of his art.

The results of the 3D digitization, a dissemination technical video, images of the work and of the obtained 3D models can be freely accessed at the webpage **http://vcg.isti.cnr.it/alchemy** for an even wider dissemination.

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