# 2.5D Landscape

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## The Introduction:

This is a research blog that will be exploring how the visual data recorded by Lidar technology (3D laser scanning) in cultural preservation projects varies in quality. The artist and writer Hito Steyerl has termed the product of bad quality 3D scanning as '2.5D Space' (as opposed to true 3D space), in her essay 'Ripping Reality: Blind Spots and Wrecked Data in 3D' (Duty Free Art, 2017).

The probability for poor quality 3D scanning occurs in proportion to the 3D recorder's degree of interest. These degrees of interest can be seen within scans made by cultural preservation projects themselves, such as the CyArk Open Heritage Program. I want to use this residency to develop research/work that responds to this variation in quality in scans developed by projects such as CyArk Program.

But first, what is Lidar? Here is a clear and brief YouTube video from Geospatial World that describes how the technology works:



## The Overview:

Below is a jpeg produced from Lidar scan data of Ancient Stabiae, Italy. This scan gives a 'bird's eye' perspective of this heritage site:



This is another jpeg produced from the same data. It's again from above except this time its slight angle:



And the same site again, except this time it's in profile. Hopefully you have a sense of the shape of this site now:



The images above were made from scan data of Ancient Stabiae, Italy. This scan was made by the CyArk Open Heritage Program. For those of you unfamiliar with this site, here is some text from the <u>CyArk cultural preservation project</u>:

"Ancient Stabiae was established in the first centuries BCE and CE in a panoramic position on the edge of Varano hill. Chosen by the aristocracy and members of the Roman Imperial, Ancient Stabiae was home to luxury villas of the Roman elite. After the eruption of the Vesuvius in 79 CE, the city was buried under fourteen meters of dry lapilli (cinder) as were the nearby sites of Pompeii and Herculaneum. However, unlike Pompeii and Herculaneum, Stabiae rose from the ashes and became famous for the healing properties of its thermal spring water....

In June 2013, the non-profit Restoring Ancient Stabiae (RAS) Foundation partnered with CyArk to digitally preserve priority areas of the villas, including Villa Arianna, as part of a larger master plan to define and create Ancient Stabiae as a sustainable archaeological park. To accomplish this, CyArk utilized terrestrial LiDAR scanners in tandem with conventional survey methods to create accurate digital measurements of the villa. In addition to the digital preservation of priority areas at Ancient Stabiae, the RAS Foundation's master plan calls for new measures to transform the site into a museum-park that will soon provide the best place to study Roman villa culture."



I have been using Lidar technology and working with the scan data for about a year and a half now (to see my other work using Lidar have a look at <u>Offshore</u> <u>London</u> or <u>London Knowledge</u> on my website - the image directly above is from Offshore London, a current project in which I am scanning properties owned by companies based in offshore tax havens).

For this particular residency with Sink I am interested in exploring how the gradual decay in the resolution of the architecture and environment within the Lidar scan shows a hierarchy of interest in the information that is recorded.

Another way of explaining what I mean is that every Lidar scanner has a radius that it is able to scan within. Objects that are closer to the scanner are scanned in higher resolution. Objects at the periphery do not register so well. Once one gets to the periphery of the scanners' radius the resolution drops off, so much so that there are mere traces of the original forms. In this way one can see the scan itself as a set of territories, rippling outwards towards resolutions of less and less interest:



In my initial research on this residency I will be dissecting scans such as the one of Ancient Stabiae to look at the different 'resolutions of interest'. Here is an image I made last week that takes buildings from each territory of the Ancient Stabiae scan, where the decay in the resolution of the architecture can be more easily perceived as you go up the y axis:



#### 23/04/19 Update

Since the last update, I've been getting on with a few things. Below is another iteration of the previous image, in which I have ordered Lidar scans of architecture from the Ancient Stabiae scan in relation to their resolution:



I've also had the chance to read and re-read Benton Ching's fantastic essay, which he published through Sink, entitled the <u>'Digital Collection: Compression, Democracy</u> <u>and Dissemination'</u>. The whole thing is recommended reading if you are in any way curious about issues and debates regarding the digitisation of culture and artefacts by museums and galleries. In particular, however, I was struck by this bit in which he posits that digital copies, despite the intentions of the recorder, are not accurate translations:

'[it has been suggested] that any attempt to restore a work of art should never regress in time, or try to fix the meaning of the piece. Instead, to be involved in restoration is to be in the business of re-production: a continuation and extension of a piece.... Considered this way, digital copies continue to add meaning to the original, whilst simultaneously taking on novel meanings in their own right, with specific attention devoted to their materiality as digital objects.'

I've had this notion in my head over the last week or so while I have been exploring the way that the Lidar scans I'm working with play with perspective. I've been particularly interested in the way that the sense of perspective in the Ancient Stabiae scan I'm looking at is only possible to read when the camera is positioned in a similar direction to where the scanner was when it was making the original image:



So creating a sense of correct perspective in these scans is conditional on where you decide to place the camera. So far so obvious. However, if you place the camera to far away from where the scanner was when it made the original scan (just over 90 degrees from the last image let's say), and the superficiality of the scans becomes clearer:



This is due to the object in 2.5 space originally being scanned being scanned from one particular vantage point. As it has not been scanned from all sides, it only makes sense when viewed from near the original position of the scanner.

With 3D software one has the opportunity to view and make images of any 3D scanned object from all angles; one just needs to position the camera and make the image. Here is a video of the building scans in rotation, showing some of the potential viewpoints:



I've wanted to play with this to create new cityscape compositions using scanned buildings from the Ancient Stabiae scan.

I've been experimenting with making images of each building in the scan from a series of different camera angles, scales and resolutions individually before compositing them together into a new image using layers and masks. What I've ended up with from these experiments are large images (20 GB in size and 2meters on the longest side) that play on the strange sense of the depth that one gets from viewing the original scans from a multitude of angles in 3D software (pictures overleaf):



Since my last update I've been doing a lot of experimentation with how I can use animation and video to elaborate on what I've previously been exploring using still imagery.

Firstly, I've made a very quick video that illustrates how detailed some of the composite images that I've been making are. This video zooms out of a 20 GB 2 meter wide composite image (my computer is dying) I've recently made using a Lidar scan of the Ancient Stabiae heritage site in Italy.

As explained above, I've become interested in the illusions of depth and distorted perspectives that are created when this technology imperfectly scans the built environment around the site:



As I've got towards the end of this residency, the more I've begun to experiment with animation of the Ancient Stabiae scan; in doing this, the more I've realised how deceptive some of the surfaces that the Lidar scan has produced are. I've noticed this particularly in the rotation of buildings, where once you feel like you've grasped the perspective it gets taken away from you again.

There are other effects of distortion and illusion to be found both within the centre of the scan itself and also at the periphery. I've made a short 2.5 minute film that plays

around with some of this tricky material. I chose suitably creepy music by Kevin MacLeod to heighten the melodrama:



30/04/19

**Residency Summary** 

Over the course of this residency, I've been mining a 3D laser scan of the Ancient Stabiae heritage site in Italy, which was made by the CyArk project.

I've been interested in the scan in two main ways:

1) The Lidar scan as evidence that the quality of recorded information in the 3D depends on proximity to the Lidar scanning device.

Objects that are further away are imperfectly recorded; objects which are closer are recorded in higher density. Responding directly to the latter, my first series of visual experiments was specifically interested how could I show this hierarchy of scanning resolution. What viewpoint of the original recorder could be traced from this?

I tested out a series of composite images that showed the way that the resolution of architectural objects scanned gets less intense the further outside the centre of the scan one goes. I produced a couple of composite images using this method:



2) I then moved onto experimenting with the Lidar scans's tenuous relationship depth and perspective, with the aim of connecting this to questions about the medium's role in recording objects of historical value.

While I don't think I achieved the latter connection, Towards the end of the residency I made an animated video which explored how deceptive the surface of Lidar scans are:



I also made a series of composite images that illustrate the multiple angles and scales from which buildings in the scan can be viewed en masse:



While these experiments are limited in the nature of their exploration because of the residency's duration, they are tools that I will now be extending beyond this residency and applying to other lidar scans. Thanks for watching the experimentation develop, it's been an interesting exploratory process. Thanks to Sink for supporting the developments.

More of my work using Lidar at the below links:

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