Everything ages – from the materials used to build a boat to the skin that covers our bodies. And as things age they change. Factum Arte is a company devoted to studying and recording these changes in works of art. In the process they address the relationship between originality and authenticity and give a new meaning to the word "unique". For example, you may have a priceless sculpture that you can't live a day without gazing at. What to do when you are cruising on your yacht? The Madrid based firm Factum Arte could well be the source to turn to in order to reproduce and preserve your masterpieces.

Clockwise from left: 1. The installation on Leonardo's Last Supper - 2. A 3D facsimile of the table from the painting in Milan's Palazzo Reale for a 2008 event by Peter Greenaway; the event involved multiple projections onto the surface of the painting transforming the still image into a breath-takingly dynamic experience *(images © Factum Arte/Alicia Guirao)* - 3. Adam Lowe studying the finished facsimile in Palladio's refectory on the Island of San Giorgio Maggiore in Venice; the exact copy of Veronese's masterpiece has been put back into its original position on the end wall of the refectory, making it possible to understand the relationship between the painting, the building and the light. A facsimile of this accuracy has raised many questions about the relationship between originality and authenticity and about the best ways to protect and preserve both architectural and painted heritage *(images © 1,2 Factum Arte/Alicia Guirao; 3 Factum Arte/Gregoire Dupond)*.

Factum Arte, giving a new meaning to the word "unique"

text by Clare Mahon, images by Factum Arte

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The use of facsimiles is becoming central to the conservation and protection of original artworks and modern technologies such as ultra-high definition scanners and 3D printers have opened up a whole new world of possibilities in high quality art recording and rematerialisation. Far beyond making "fakes," new technologies can be used to create facsimiles that assume an important role in the preservation and conservation both of privately owned masterpieces and world famous heritage sites, changing attitudes and opening new possibilities in the management and protection of art.

Founded by British artist Adam Lowe in 2001, Factum Arte, a renaissance style workshop, is based in Madrid and consists of a team of about 40 artists, technicians and conservators dedicated to digital mediation. They have adapted and created bespoke, non-contact scanning equipment and written software to collect and process massive amounts of data which are then translated into two and 3D forms that replicate the original in colour, surface and dimension proving that cutting edge technology and industrial techniques can be used in the world of fine art both for creation and conservation.

While Factum Arte works closely with contemporary artists such as Anish Kapoor, Marina Abramovic, Mariko Mori and Jan Hendrix, to name just a few, some of their most interesting projects have been large-scale reproductions, in both two and three dimensions, of dismembered artworks that have been "reunited" and recomposed in situ, righting historical wrongs and giving art lovers the chance to admire masterpieces in the settings they were created for.

One of the most famous Factum Arte projects is the reproduction of Paolo Veronese's "The Wedding of Cana." The painting was commissioned by the Benedictine monks of San Giorgio Maggiore in Venice and hung in their refectory until 1797 when it was plundered by Napoleon's troops. During the 19th century it was considered the most famous painting on the planet – dwarfing the small painting of an enigmatic lady that now hangs in front of it. The painting is almost seven meters by ten meters and was cut into seven pieces before being taken to France. It was re-composed at the Louvre and to date is the largest painting there.

The Giorgio Cini Fondation in Venice approached the Louvre about the possibility of making a reproduction of the painting and an agreement was reached. Factum Arte's technicians were allowed into the Louvre after closing hours to scan the heavily restored original painting. An exact facsimile was made from the 1,591 files that Factum gathered and on the 210th anniversary of the looting the facsimile was hung in place of the original in the refectory. Two years later its fame had spread and Peter Greenaway created a 50 minute presentation where images were projected onto and around the rematerialised painting with dialogue that he scripted and an original soundtrack.

"We live in a time where technology has come of age and what was formerly impossible has suddenly become possible. Even a few years ago the word 'facsimile' would fill most people with horror," says Lowe. "There would be questions raised about falsification and a theme-park approach to culture. This prejudice is slowly changing. At the same time people are travelling to historical sites in ever-larger numbers and even their sincere appreciation can put the places they visit in danger. The facsimiles we are making are building bridges between new technologies and craft skills and helping to preserve the most unique creations in the world."

Another site where Factum is making a big impact is in the 15th century Basilica di San Petronio in Bologna. There 3D scans have not only recorded the façade at the highest resolution possible but they have also been used to record the things that are and were inside the church. The Polittico Griffoni, one of the great altarpieces painted by Francesco del Cossa and Ercole de' Roberti in 1472-3 was broken up and sold off in separate lots in the 18th century. In this case Factum Arte is working with nine museums around the world to scan all the known pieces of the altar then reconstruct the whole in the chapel it was created for.

A significant Factum Arte project that opened in April this year is the entrance to the Valley of the Kings in Luxor. An exact re-creation of Tutankhamun's burial chamber is part of an initiative by the Factum Foundation for Digital Technology in Conservation and the Friends of the Royal Tombs of Egypt to engage with the thousands of tourists who visit the site and help them understand how a site that was built to last for eternity has been seriously damaged in the 90 years since its discovery - even loving art can damage it.

Through the work of Factum Arte the most precious and delicate creations of human inspiration are being recorded, recreated, reunited and protected using technologies that are so advanced that they seem otherworldly. Far from being "fakes," Factum Arte's recreations are an inspiration and offer insights into the complex history of great works of art.

Clockwise from left: 1. Scanning Canova's sculpture of Paolina Borghese in 3D (Villa Borghese, 2013) - 2. Using the Lucida scanner (designed by Manuel Franquelo) in London's National Gallery to record Francesco del Cossa's painting of San Vincente Ferrer, the central panel of the Polittico Griffoni; the Lucida laser scanner is capable of recording dark colours, gold and highly reflective surfaces at resolutions that allow the data to be used to monitor the condition of the paintings and re-materialise it as a physical object if desired - 3. Pedro Miro, leader of the recording project on the facade of the Church of San Petronio, working with a NUB 3D structured light scanning system to record the figure of San Petronio by Jacopo della Quercia - 4. The entrance to the facsimile of Tutankhamun's tomb located underground next to Howard Carter's house at the entrance to the Valley of the Kings *(images © 1,3 Factum Arte/Alicia Guirao; 2 Factum Arte/Gregoire Dupond; 4 Factum Arte/Ferdy Saumarez Smith)*.