



# THEBAN NECROPOLIS PRESERVATION INITIATIVE

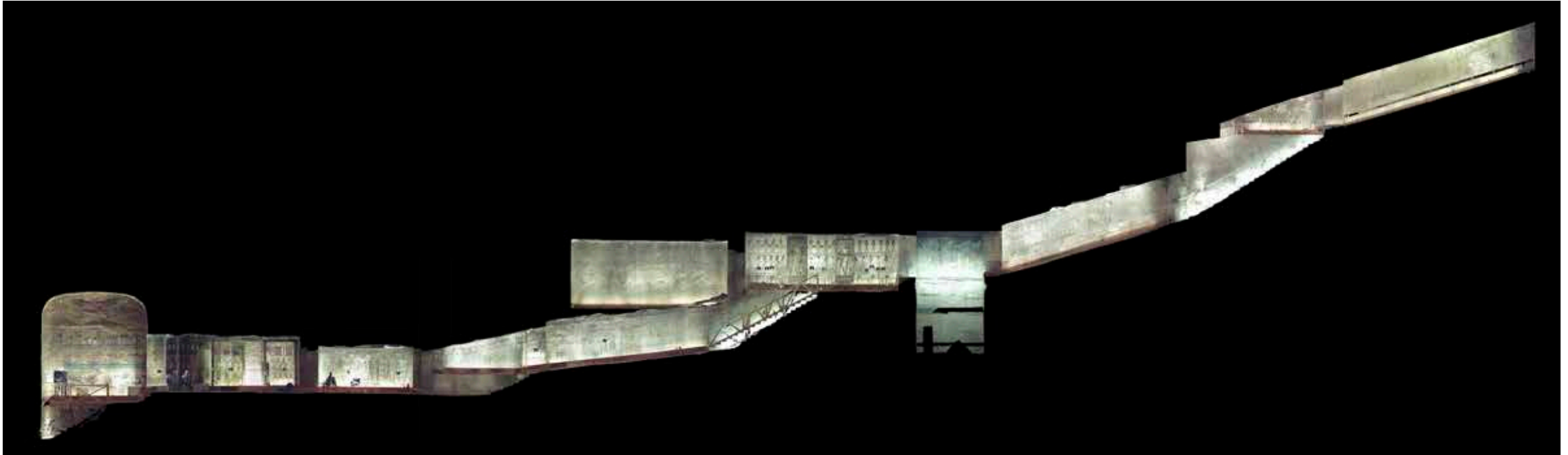
FACTUM FOUNDATION AND  
THE UNIVERSITY OF BASEL  
WORKING WITH  
THE MINISTRY OF ANTIQUITIES

A REPORT ON WORK  
COMPLETED IN 2016





THE THEBAN  
NECROPOLIS  
PRESERVATION  
INITIATIVE



The current phase of the Theban Necropolis Preservation Initiative work started in May 2016 and will run until it has achieved its core objectives. These are :

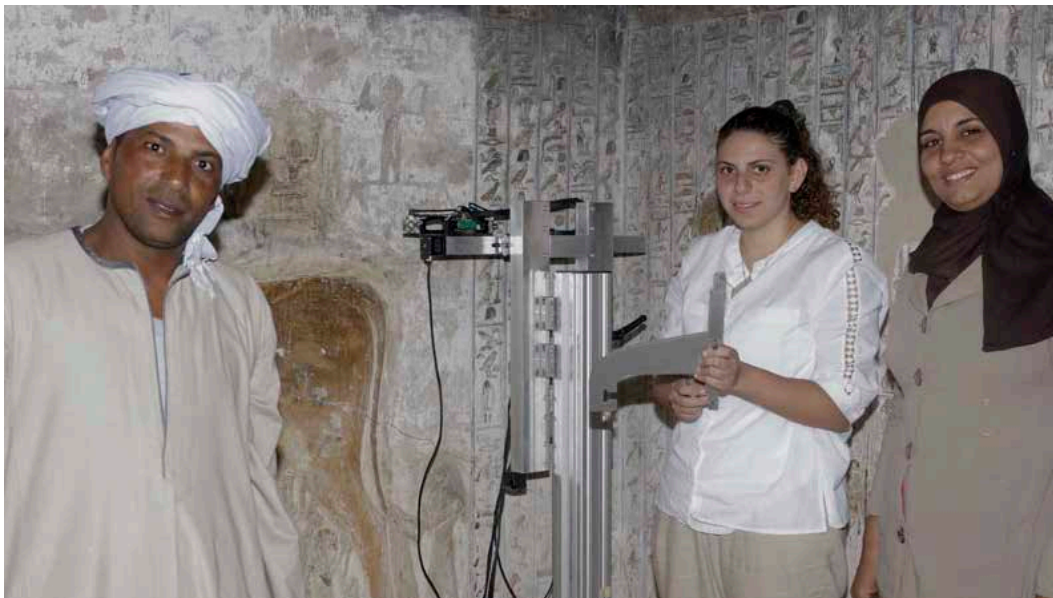
- The complete recording of the tomb of Seti I (estimate: end of 2018).
- The complete restoration of Stoppelaere House (the end of 2016).
- The opening of the 3D Scanning, Archiving and Training Centre in Stoppelaere House (January 2017).
- The transfer of equipment to create a fully operational 'documentation centre' and the full training of a local team capable of carrying out all aspects of the recording, processing and archiving work (the end of 2017).
- The creation of a visitor centre where the facsimiles are made at a standard that is unmatched world wide (estimate: the end of 2018).

The Theban Necropolis Preservation Initiative (TNPI) has already been operating for 7 years. In 2009 Factum Foundation employed Factum Arte to record the Tomb of Tutankhamun. In 2012 the facsimile of the burial chamber was given to the people of Egypt at a special Task force organized by the EU. In 2014 the finished facsimile of the Burial Chamber was installed into a building specially designed by Tarek Waly Center Architecture & Heritage next to Carter's House at the entrance to the Valley of the Kings. The facsimile and the related exhibition have been open to the public since then with the Ministry charging 50LE per ticket to Carter's House and the facsimile.

## THE THEBAN NECROPOLIS PRESERVATION INITIATIVE



Carlos Bayod and Aliaa Ismail scanning with two Lucida 3D Scanners.



Moussa Sayd Mohamed, Aliaa Ismail and Amany Hassan Mohamed.

This project is one of the most ambitious, coherent and advanced example of *Digital Preservation* currently being undertaken. The work that is being carried out is of importance both to heritage management in general and to the people of the West Bank in Luxor. The TNPI is making a real difference to the way cultural heritage is preserved and confirms that a great deal can be achieved when heritage managers work with technical specialists (digital artisans) to provide the optimum data for conservation monitoring, in-depth analysis and dissemination. The aim is to develop a sustainable structure that will help the Ministry of Antiquities to preserve the Valley of the Kings for future generations.

The tomb of Seti I is now being fully recorded using a range of 3D scanning systems and composite photographic techniques. This tomb is the largest and most important tomb in the Valley of the Kings and it has been closed for about 30 years. There is now limited public access and the recording work happens at the same time as the visits. The engineering and restoration of Stoppelaere House, one of the great mud-brick buildings by Hassan Fathy (Egypt's best-known 20th architect) is now complete. This restored building will become the 3D Scanning, Archiving and Training Centre. A major transfer of skills and technologies to the local community is already underway. The training will be transferred to the new centre in Stoppelaere House in early 2017.

This booklet describes the work that has been carried out in 2016. All the work has been funded by Factum Foundation and from personal donations.







## THE TEAM WORKING IN EGYPT

The team who have worked on the projects in 2016 includes:

Adam Lowe, Carlos Bayod, Aliaa Ismail, Tarek Waly, Gabriel Scarpa, Pedro Miró, Moussa Sayd Mohamed, Abdel El Reheem Ghaba and Mahmoud Salem.

Tarek Waly Center Architecture & Heritage, office and builders:

Tarek Mohamad Waly, Shimaa Abdul Aty Shaheen, Dina Alaa Al Araby, Ehab Mohammed Zaquouq, Mohamed Safwat Attia.

Mohamed Salem Abdel Wareth, Mahmoud Mohammed Salem, Sayed Hamdi Al-Dawy, Ahmed Haggag Mohamed, Mohammed Abdel Wareth Salem, Abdullah Jamal Salem, Yasser Abdel Wareth Salem, Syed Mohammed Salem, Hassan Mohammed Haggag, Hassan Abdel Alrhman Al-Hefni, Abdel Rahim Mohamed Ibrahim, Abdul Rahim Hassan Al-Azab, Mustafa Ali Ramadan.

Abdel Shafi Mohammed Fahim, Goma'a Abdel Shafi Fahim, Mohammed Goma'a Mohammadayn, Ahmed Mahmoud Hassan, Mohamed Sayed Al-Tayeb, Hassan Tayea Hassan, Ahmed Al-Azab, Mohammed Abu Elewa, Mahmoud Reda Fahim, Salah Abdul Majid Mohamed.

We would like thank Dr. Mohamed Abdul Aziz, Dr. Moustafa Waziri, Talaat Abdelaziz, Bahaa Gabr, Mohamed Khalil, Abd El Nasr, Ayman Mohamed Ibrahim, Adel Arfan, Sheik Hassan, Badawy Idrees, Mohamed Ali, Amany Hassan Mohamed. Our gratitude to his excellency the Minister of Antiquities in Egypt, Dr. Khaled El Enany, extended also to former Minister Dr. Mamdouh Eldamaty, as well as Dr. Mahmoud Afifi, Dr. Hisham El Leithy, Dr. Mohamed Ismail and all the staff in the Ministry of Antiquities who are providing constant assistance for this great project.

We are grateful to the continued support of Markus Leitner, Jean-Pierre Reymond, Dr Antonio Loprieno, Dr Susanne Bickel, Fayza Haikal, Salima Ikram, Maria Golia, James Moran and many others.

Postprocessing in Madrid and long distance training: Belén Jimenéz, Luisa Tonelli, Otto Lowe and Francesca Piermattei.

More detailed information can be found on Factum Foundation's Website

[www.factumfoundation.org](http://www.factumfoundation.org)

[Projects / The Theban Necropolis Preservation Initiative](#)



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## FACTUM FOUNDATION AND THE UNIVERSITY OF BASEL



*Gabriel Scarpa and Aliaa Ismail working of a composite image of the East Wall of the Sarcophagus room.*



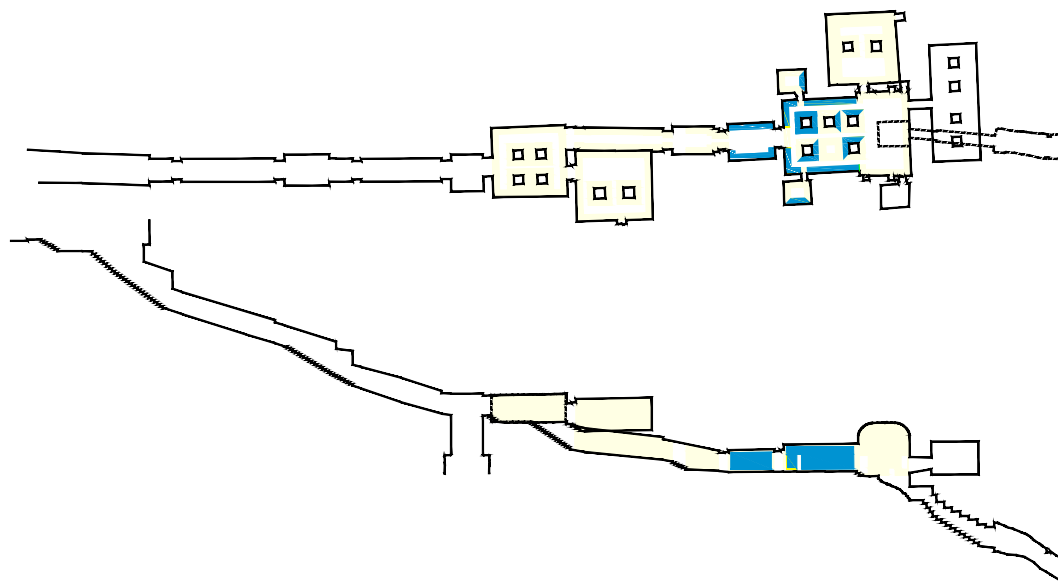
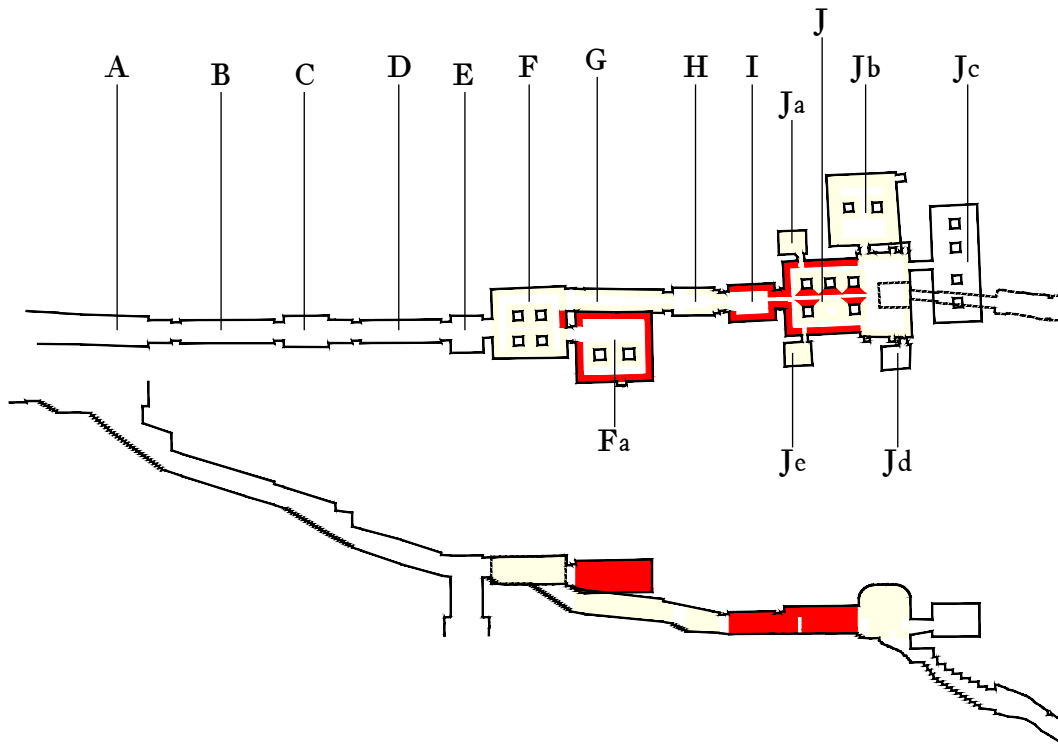
*Fragments from the tomb of Seti I in the Museum of Fine Art, Boston were recorded in 2016. In 2017 the team will focus on recording the fragments discovered by the University of Basel.*

Factum Foundation has been working with the University of Basel as its academic partner since 2009. The relationship was initiated in collaboration with Professor Erik Hornung and the Society of the Friends of the Royal Tombs of Egypt. Since 2015 Dr Antonio Loprieno and Dr Susanne Bickel have been the main contacts. There is a contract between the Ministry of Antiquities, Factum Foundation and the University of Basel covering all the work being carried out. TNPI has received practical support from the Swiss Embassy and the Embassy of the European Union. Until now Factum Foundation has taken the leading role in the recording in the tombs of Tutankhamun and Seti I and has been instrumental in the restoration of Stoppelaere House and the supply of equipment to facilitate the recording and the training. Now the infrastructure is in place the collaboration will go into its next phase.

In January 2017 the work in Stoppelaere house will be complete and the *3D Scanning, Archiving and Training Centre* will be operational. During a meeting with Minister Khaled El-Enany, the Swiss Ambassador Markus Leitner, Adam Lowe and Tarek Waly in November 2016 it was decided that the Centre will be formally opened in late January 2017 by the Minister for Antiquities in the presence of the Swiss Ambassador and representatives from Factum Foundation and the University of Basel. It will begin training the first people working within the antiquities service in the spring of 2017 (Amany Hassan Mohamed, Heba Sayed and Abdel Nasr). The training will be run by Aliaa Ismail, a graduate in Architecture and Egyptology from Cairo University who has been leading the training and recording in the tomb of Seti I throughout 2016. She will be assisted by Abdel El Reheem Ghaba and Mahmoud Salem who have been trained in the use of the Lucida Scanner and the processing of the data. They will be supported by at least one person from Factum Arte who will ensure there is a coherent and dynamic learning environment.

The *3D Scanning, Archiving and Training Centre* will provide the technical means for the University of Basel project in the Valley of the kings, lead by Dr Elina Paulin-Grothe and Dr Susanne Bickel, to record the many fragments they have discovered in colour and 3D. These will then form an important part of the archive relating to the tomb of Seti I.

## RECORDING THE TOMB OF SETI I



Composite photography - marked in red already recorded areas.  
Lucida 3D Scanner - marked in blue already scanned areas.

After months of planning and securing permissions Adam Lowe (Director of Factum Arte and Founder of Factum Foundation), Aliaa Ismail (the leader of the Theban Necropolis Preservation Initiative's Training Centre) and Carlos Bayod (head of Factum Arte's Lucida 3D Scanning department) began recording the tomb. The recording work in 2016 took place in 2 seasons – From May to the end July and from October – December.

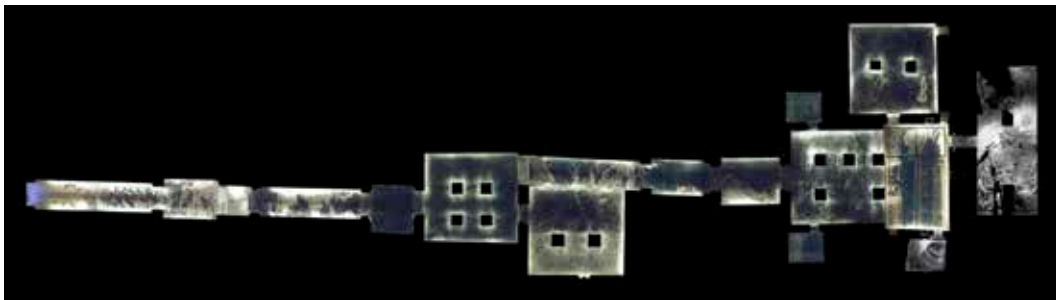
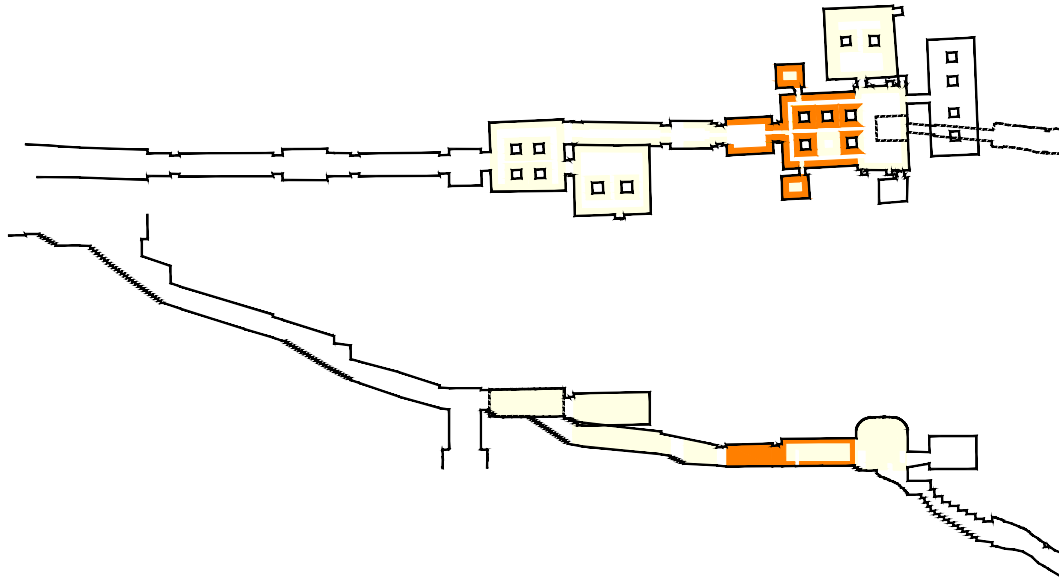
Working hours in the tomb are from 8 – 3pm every day except Friday. In summer and Ramadan work was carried out from 7 to 13, 5 days a week.

Work was always carried out in the presence of an Inspector. The current inspector, Amany Hassan Mohamed has been very helpful and is also learning how to use the Lucida Scanner and back up the data. Moussa Sayd Mohamed has been helping in the tomb, providing logistical support and helping to set up the scanners.

The following work has been completed in the Tomb of Seti I:

- The entire tomb was accurately surveyed and measured in 3D using a FARO Focus 3D x 130 Scanner a Terrestrial Laser Scanner, which is also able to record colour.
- The Hall of Beauties (Room I) was recorded in high resolution 3D Laser scanning, composite colour and some parts using photogrammetry.
- The Connecting passage between the Hall of Beauties and Room J was recorded in composite colour and photogrammetry.
- 80% of Room J has been recorded using high-resolution 3D Laser scanner, the remaining 20% was recorded using photogrammetry. Five columns were recorded in composite colour. Only five of the twenty sides of the five columns have been photographed. The remaining part will be recorded at the start of the 2017.
- A section of the south wall of Room F has been recorded with high resolution photogrammetry.
- Room Ja and Je were fully recorded in composite colour photography for photogrammetry.
- Some areas from Room Fa have been recorded with composite photography.

## RECORDING THE TOMB OF SETI I



*Photogrammetry - marked in orange already scanned areas.  
Top view of the FARO Scanner 3D data.*

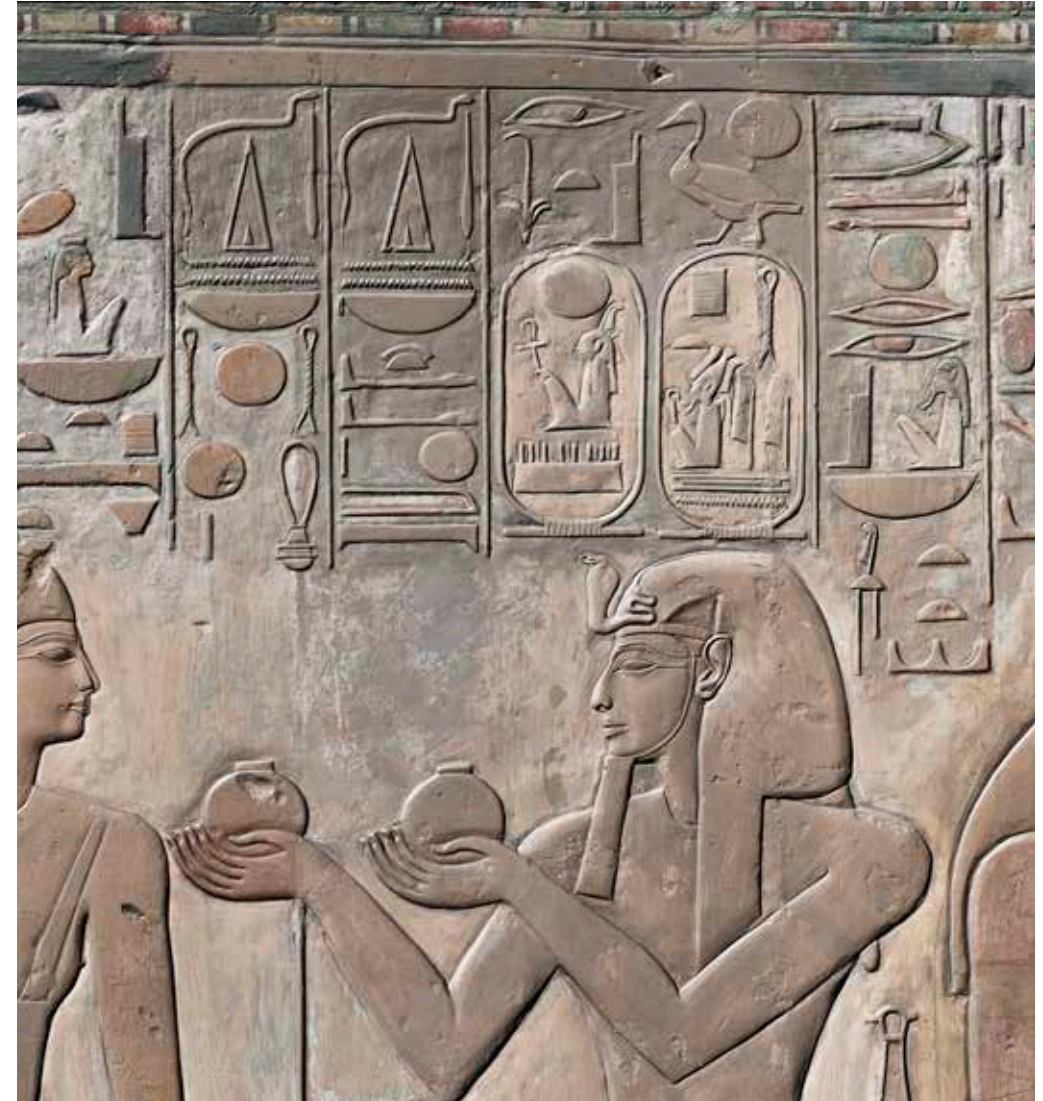
- The West wall from the Sarcophagus Room has been photographed. This wall was recorded with about 2000 photographs.
- Detailed photographs were taken to produce a record of the rooms before and after recording.
- Colour reference notes were taken in the Hall of Beauties, Room J and the Sarcophagus Room.
- Data processing. High-resolution Lucida Scanner records raw video that must be processed into tonal range image tiles which can then be output as 3D data. All the raw video data is stored on external hard drives until the archive system can be finally installed in Stoppelaere House. Composite 'colour-recording' photographs are then stitched together and registered with sub-pixel accuracy over shaded renders generated from the tonal images using PTGui and Adobe Photoshop software. Photogrammetry 3D recording is used to complement the areas where the high resolution 3D scanner has not been able to reach. During the processing the photogrammetry data and the 3D scans are merged together.
- The data processing is currently ongoing on the West Bank and in Madrid. As local people are trained more of the data processing will take place in the Stoppelaere House. The aim is to store all the data in a digital archive in Stoppelaere House where it will be freely available for study and condition monitoring. The copyright on the data will belong to the Ministry of Antiquities and all commercial benefits on current and future applications will belong to the Ministry.





RECORDING  
THE TOMB  
OF SETI I

The systems used for data capture



All systems used by Factum Foundation are 100% non-contact and meet the highest conservation standards. At no time during the recording is there any physical contact with the wall. No markers or colour charts are attached to any part of the wall at any time.

We are currently using mains electricity with voltage stabilisers.



## RECORDING THE TOMB OF SETI I

FARO Focus 3D x 130



*FARO Scanner at the Entrance of the tomb.*

The Terrestrial Laser Scanner (TLS) FARO Focus 3D x 130 HDR is a mid-range device that uses phase shift technology, offering accurate scanning from 0.6m up to 130m. It can capture millions of 3D measurements at up to 976,000 points/second, with a ranging error of  $\pm 2$ mm. The integrated colour camera records a HDR photo overlay of up to 165 megapixel colour.

The Faro scanner was hired in Madrid while in future we intend to hire the Faro scanner in Cairo. This complete survey of the tomb significantly improves on the 3D recordings done by the Theban Mapping Project. Preliminary discussions have taken place with Kent Weeks and it would be desirable to add these 3D recordings to the Theban Mapping Project website if funding is available.

Seti I tomb was surveyed from 70 different scan positions. The accurate point cloud obtained of entire tomb of about 2.132 million points, with an average distance between measured points of 1.5 mm to 3 mm.





## RECORDING THE TOMB OF SETI I

Lucida Laser Scanner



The Lucida Laser Scanner was specially developed by Manuel Franquelo at Factum Arte for the recording the coloured 3D relief in the tomb of Seti I. Its design started in 2001 following the first season's work in the tomb. The system has now been perfected and is entirely built by Factum Arte. The software is also specially designed for simplicity and ease of use without compromising its quality of working applications. The main advantage of writing our own software is that it bypasses the normal commercial constraints imposed on software usage.

The Lucida records tonal video using 2 precision cameras placed either side of a low level laser. This black and white information is then converted into 3D data. At present we extract 100 million independently measured points per sq meter. The video data is also stored as raw video. In the future this can be processed at even higher resolutions.

The Lucida Laser scanner is a close range scanning system that works at 8 cm from the surface of the wall. The scanning head is mounted onto a lightweight mast and the horizontal and vertical movement (X and Y axis) is regulated by a CNC controller. In the case of the Lucida the depth (Z axis) is manually set. The scanner has a depth of field of 2.5 cm and records an area of 48 x 48cm in one hour.

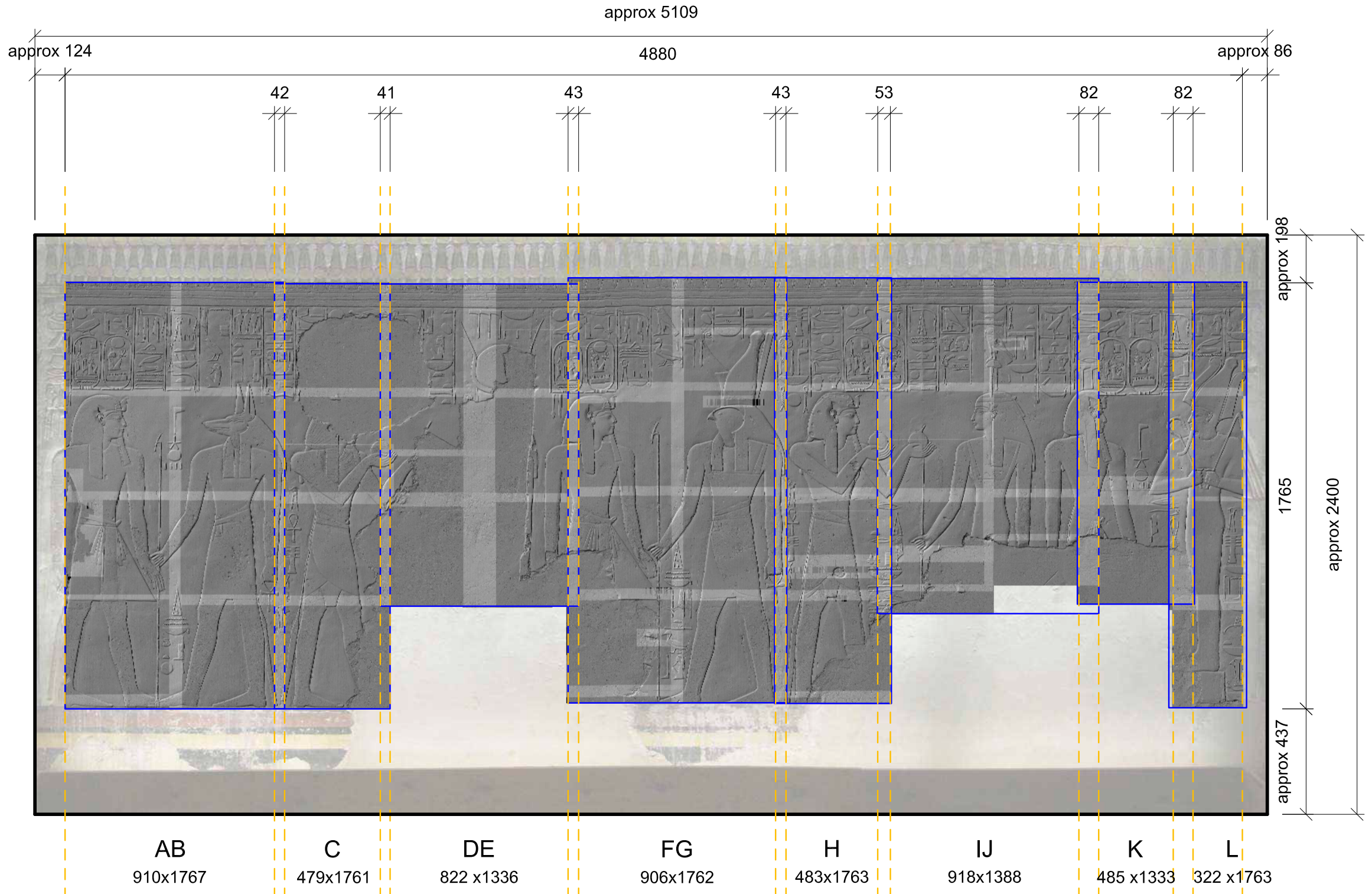
The main areas of each wall were recorded with the Lucida Scanner. Throughout 2016 there have been 2 or 3 Lucida scanners at work at any time in the tomb.

Some noise in the data has been noticed due to the fact that we are photographing and using the Laser scanner at the same time.

I\_E Diagram

RECORDING  
THE TOMB  
OF SETI I

Lucida Laser Scanner







## RECORDING THE TOMB OF SETI I

Composite Photography:  
Colour and Photogrammetry

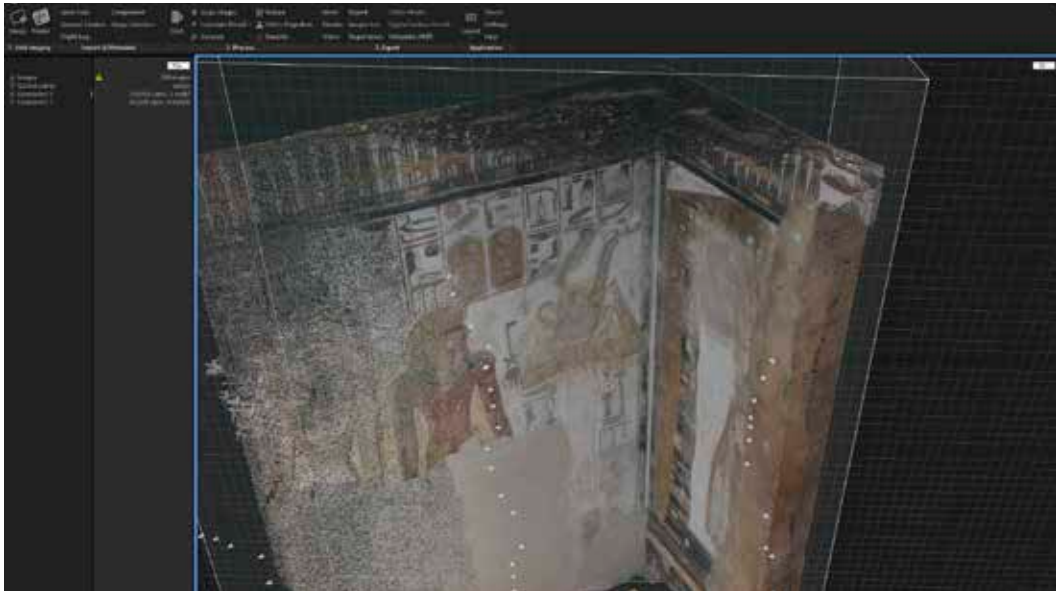
Composite photography involves the production of a high-resolution image or form from the stitching of a mosaic of individual images. The photographs are taken on a Canon 5DSR 35mm camera using a variety of lenses and lights. All the lights used in the tomb meet accepted museum conservation standards. The camera can either be tripod mounted or fixed to a pan and tilt head. The approach to taking the photographs varies depending on their use. Photogrammetry requires one approach and colour recording another.

- Photogrammetry capable of extracting sub-milimetric data is an emerging technology. Factum Foundation currently employs 2 software packages and is working closely with Autodesk and Capturing Reality to increase both the quality of the data, the processing times and the ease of use.

- Colour Composite photography is often referred to as Gigapixel photography due to the vast amount of data that is recorded. The aim is to record the entire tomb at a scale of 1:1 with image files of about 500 PPI. Some areas with enough room space to work in (like the East and West wall of the sarcophagus room) the resolution can reach 600 PPI after the perspectival distortions are removed. In other areas with limited space, such as between the pillars in Room J, the resolution will not exceed 300 PPI. The Hall of Beauties has been recorded at between 400 and 500 PP. These files can be enlarged to about 5 times actual size with out loss of image quality. The floors, walls, columns and ceilings of the entire tomb are recorded using a variety of different lenses.







*Both 3D information and colour can be obtained using composite photography. For colour recording the main aim is to keep the light constant and record accurate colour information. For 3D data overlap and the correct approach to the photography is critical. Top - 3D and colour. Bottom 3d data recorded with a 35 mm camera.*

## RECORDING THE TOMB OF SETI I

Composite Photography:  
Colour and Photogrammetry







*Colour recording: A section of the wall in the Hall of Beauties from the composite colour data. When this data is mapped over the 3D data the colour and surface of the wall can be studied in great depth and replicated if required.*





## RECORDING THE TOMB OF SETI I

Reference Photography  
and Colour Reference



### Reference Photography

In addition to the high-resolution composite photographs an archive of reference images is also being made. These record the condition of the tomb before and after scanning, the work that is taking place, the individuals involved and any detail that is relevant for research or for facsimile production.

### Colour Reference

Colour appears different under different lighting conditions. Factum Foundation's aim is to record data that will be of such high quality that the whole tomb can be replicated in its present condition. To do this we must have accurate references about the colour of the tomb under the current lighting conditions. Both standard photographic colour charts and physical colour reference sticks are used. These are held close to the surface of the wall but not in contact with it. The colour reference sticks are made specially for each area of the tomb and these are taken to the place where the facsimile is being made - At present this is Madrid but the aim is to do this on the West Bank, Luxor. It is easier to do the colour checking on site than thousands of miles away.





Stoppelaere house was built in 1951 by the Egyptian architect Hassan Fathy for Alexander Stoppelaere, chief restorer of the department of Antiquities at this time. The house was designed to be a guest house for the department of antiquities and the headquarters/apartment for Alexander Stoppelaere. It occupies a prominent position at the entrance to the Valley of the Kings, perched on the top of a hill near Carter's House, the Facsimile of the tomb of Tutankhamun and the Japanese Mission house. The house provides ample evidence of Fathy's mastery of forms resulting from the expression of mud brick vaulting techniques, and contains many architectural details that are characteristic of his work. Stoppelaere House has been unused for many decades and had fallen into disrepair but it is one of Hassan Fathy's few surviving works from the early period of his activity.

Like the earlier houses on the west bank, Stoppelaere House was expressly designed as an expedition house and contained spaces for drafting and working. It is ideally suited to be converted into a centre for 3D scanning, archiving and training. The work to restore the building and convert it for its new use was carried out by Tarek Waly Center Architecture & Heritage using local mudbrick builders and other workers.

#### Preservation Status

The house has been subjected to various forms of decay caused by the weather, limited settlement in the surrounding soil and the erosion of the hill. Due to poor plumbing there has also been ground water erosion under the building. It is a mud brick structure and therefore in need of continuous maintenance. It has been empty for a unknown period of time and was left without adequate maintenance. This resulted in a severe deterioration in the condition of the house. Many features of deterioration could be seen with the naked eye, others were revealed in the surveys that were carried out.





### Interventions

Due to the condition of the house, many interventions were needed in order to rehabilitate the building and convert it for use as the 3D scanning, Archiving and Training Centre. Structural interventions were essential. The first critically important work was to stabilise the existing structure through the insertion of a reinforced concrete 'foundation' that ties the building together. The domes, external walls and the entire structure were then restored or rebuilt and everything possible has been done to prevent future deterioration. The restoration was made using the same techniques and recycling natural materials previously used in building the house. Some limited modifications to the technical specifications were made to enhance the quality and functioning of the building.

New German windows were installed. These are dust-proof and sealed. The Doors and lattice work have all been remade by local carpenters. The entire interior has been restored to the highest standard and new electrical wiring, plumbing and air-conditioning has been installed to adapt the house for its new use. Exterior elevation restoration and landscape redesign has also been carried out. All the interventions took into account the need to provide the conditions for advanced digital recording technologies and archiving systems. The contemporary needs were always considered in conjunction with the importance of preserving the architectural values of the house.





At the heart of the Theban Necropolis Preservation Initiative is the 3D Scanning, Archiving and training Centre that is being established in Stoppelaere House. The transfer of equipment, technologies, skills and working practices to the local community is essential for the long term preservation of the cultural heritage of the area.

The aim is to create a centre where the complex information that is being recorded in the tomb can be processed, checked and stored. This will be done in conjunction with a training programme that will produce a growing local team capable of doing all aspects of the work. To achieve this aim the centre must be equipped with the best equipment that will be updated as new technologies become available.

In 2016 this work was carried out in a mud brick house near Medinet Habu under the direction of Aliaa Ismail and a team from Factum Arte. Abdel El Reheem Ghaba and Mahmoud Salem have already received training in setting up, recording and processing.

As this team grows the centre at Stoppelaere House will be able to provide services to other missions working in the area. The long term aim is that the revenues generated by this work will run the centre, benefit the local community and provide the Ministry with an additional income.

During 2016 all the equipment required to run the 3D scanning was supplied to Egypt by Factum Foundation along with the computers to process the data and archive it. Camera equipment and software related to photogrammetry, additional computers and a server to enlarge the capacity of the archive are still needed. The aim is to provide these in 2017. As the team grows more equipment will be needed.

The main work that will be undertaken in the Centre at Stoppelaere House will be training in the following tasks:

- Setting up the Lucida,
- Operating the Lucida
- Processing the data as a tonal render
- Stitching the data into tiles.
- Converting the tonal render into a 3D file (an image into a form)
- Learning the principles of composite photography
- Using composite photography to record colour
- Using composite photography to record 3D (photogrammetry)
- All stages of processing the colour and 3D photographic data.
- Merging Laser scanned and photogrammetric data

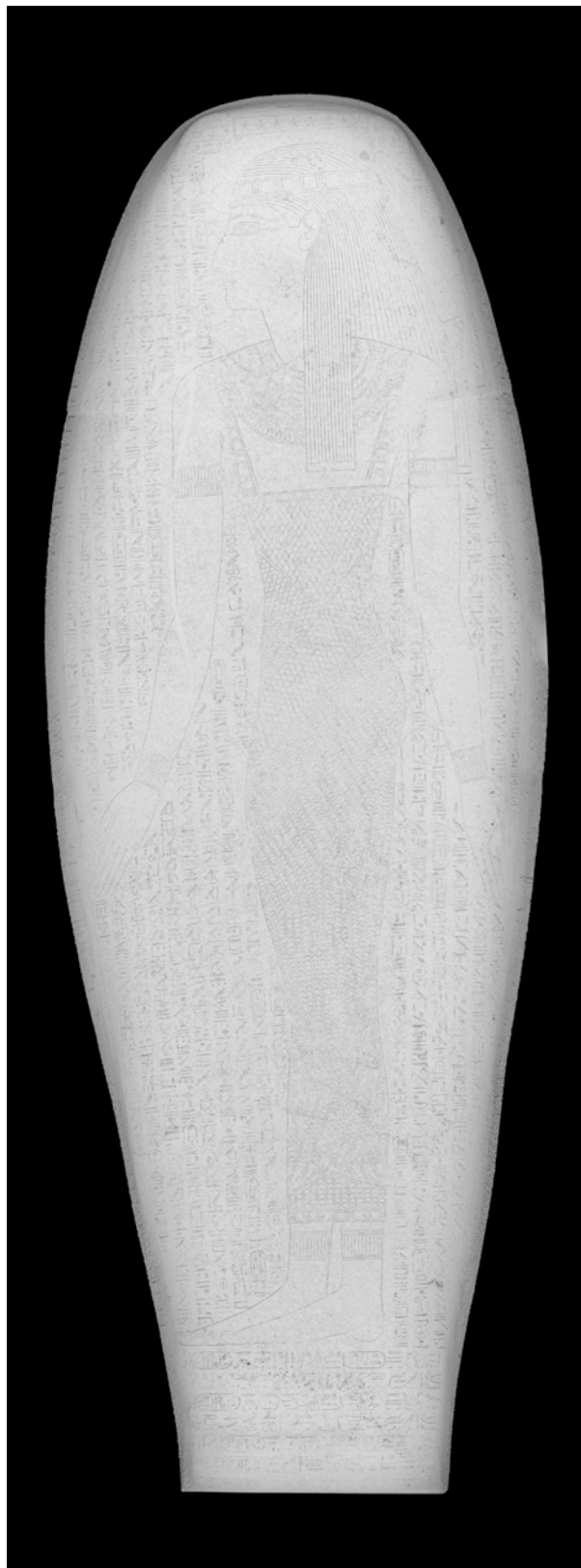


- Using Lidar scanners.
- Understanding the different recording systems and when to use them.
- Training individuals to work in vulnerable heritage sites.
- Offering advice to other missions in the area.

The aim is that Stoppelaere House will be opened in late January by the Minister of Antiquities and the Swiss Ambassador with members of Factum Foundation and the University of Basel. The contract with the Ministry allows for use of Stoppelaere house for the next 10 years. The aim is to use this period of time to build a centre that will become a practical example of how technology can be used to preserve cultural heritage.

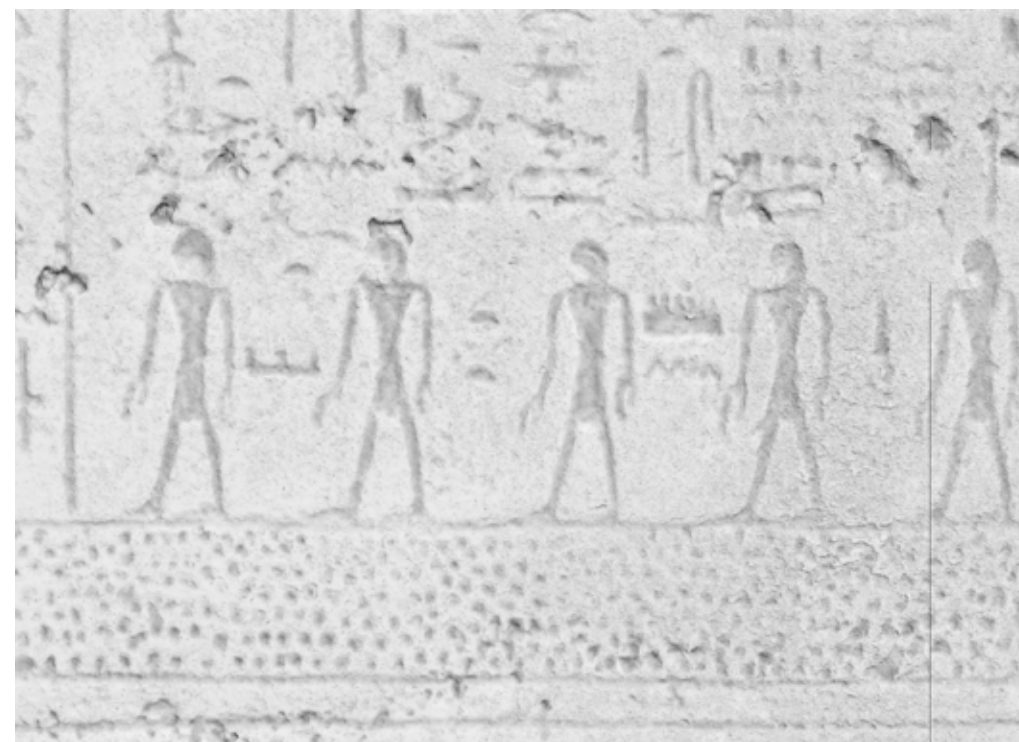






## RECORDING THE FRAGMENTS IN MUSEUMS AND COLLECTIONS OUTSIDE OF EGYPT

Sarcophagus  
in Sir John  
Soane's Museum



The photogrammetric recording of the sarcophagus of Seti I in Sir John Soane's Museum in London was carried out between the 14th and the 19th March 2016 by Adam Lowe, Pedro Miró, Manuel Franquelo and Ferdinand Saumarez-Smith from the Factum Foundation.

Almost 5000 high-resolution images were stitched together, in collaboration with photogrammetry software company, Capturing Reality. The resulting 3D model will facilitate an in-depth study of the surface and shape of the sarcophagus. The facsimile of the sarcophagus is now being made. The facsimile will be a digitally restored version of the sarcophagus as it looked at the time it entered Soane's collection. Joseph Gandy's watercolours show it as a white alabaster form with blue inlay, but time, the English climate, and attempts to conserve it have changed its appearance.

The recording of the sarcophagus was the result of the close relationship that has been developed between the museum and the Factum Foundation. A virtual model of the sarcophagus is part of the 'Digital Soane' project that has created a publicly-accessible interactive website that was recently launched.







RECORDING THE FRAGMENTS  
IN MUSEUMS AND COLLECTIONS  
OUTSIDE OF EGYPT

Sarcophagus  
in Sir John  
Soane's Museum







## RECORDING THE FRAGMENTS IN MUSEUMS AND COLLECTIONS OUTSIDE OF EGYPT

8 Fragments in Boston



In the years following its discovery, sections of the decoration were removed and there are now hundreds of fragments in museums and collections around the world. The largest are in the Musée du Louvre in Paris and the Archaeological Museum in Florence. There are also a large number of smaller fragments that were found in the rubble outside the tomb by a team from the University of Basel.

A fundamentally important part of the recording work that is being carried out by Factum Foundation is the complete recording of all the fragments that were removed from the tomb since its discovery in 1817. In 2016 a group of Fragments were recorded at the MFA in Boston, Next year recording will also take place on the fragments discovered by the university of Basel. Permission has been granted to record all the fragments in the British Museum and in a private collection. Permission has been applied for to record in Berlin, Florence and Paris.

In addition to recording fragments removed from the tomb Factum Foundation is also seeking to record any existing squeezes, wax squeezes are thought to exist at MFA Boston and in the British Museum. Some paper squeezes exist at the Griffiths Institute in Oxford (one has already been recorded) and others are being sought. These objects contain vital evidence about the surface of the tomb and also help to understand the damage that can be found in the tomb. Understanding why the tomb looks like it does is an important part of understanding its meaning and importance.



## PLANS FOR 2017

The 16<sup>th</sup> of October 2017 will mark the 200<sup>th</sup> anniversary of Giovanni Battista Belzoni's discovery of the tomb of Seti I in the Valley of the Kings - one of the largest, most lavishly decorated and important tombs in the Valley.

In 2017, to celebrate the discovery of the tomb Factum Foundation and the University of Basel hope to achieve the following things:

- Open and fully equip the Stoppelaere House 3D scanning, Archiving and training centre.
- Train at least 3 more local people in the skills required to record, process and store data at high-resolution.
- Scan the Sarcophagus room and ceiling and record part of Room F.
- Tarek Waly Center Architecture & Heritage will be commissioned to carry out a feasibility study for the construction of a 2000 sq meter visitor centre for the production of the facsimiles located near Carter House.
- Record Fragments in the British Museum, private collections and other locations.
- Disseminate the importance of high-resolution digital recording in the preservation of cultural heritage.

This project aims to demonstrate that 3D and colour recording at a resolution capable of producing an exact physical facsimile are an essential part of heritage management. 21<sup>st</sup> technologies can be developed and used to assist in the preservation of great works of art, without inflicting damage on the original object. They can produce digital archives that can be accessed virtually for study and conservation purposes but they can also bring skills and employment to the West Bank and attract a new generation of visitors.

The tombs were built to last for eternity but not to be visited. Their justified fame attracts many visitors but in the 200 years since its discovery the tomb of Seti I has suffered terrible changes. Fortunately Belzoni's drawings from 1817-20, Harry Burton's photographs from 1920's and Factum Foundation's recordings since 2016 help reveal the different types of decay and the changing condition of the Tomb.

If tourists can visit the west bank and understanding the fragility of the sites in the Theban Necropolis they will become a positive force in its long term preservation.

It is a privilege to be able to carry out this important work for the Ministry of Antiquities.