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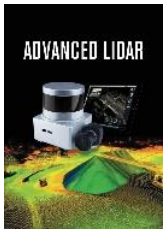

Documentation Methods from Tradition to the Present: Case Study Cappadocia

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Keywords
Lidar
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ABSTRACT

In addition to its natural geomorphological formations, Cappadocia is one of the rare regions of our country that is worth visiting with its unique topography and the traces of the different civilizations that lived here. The influence of geography on nature and people in the historical development process can be traced through the craftsmanship of tufa and rock as building materials by the various cultures and settlements founded and developed in Cappadocia Region. In early Christianity, the Byzantine Period, and the Middle Ages, the cultures of the region built underground cities, religious buildings, monasteries and churches, residences and farms, workshops, necropolises, and rock tombs. When Cappadocia is mentioned today, the first thing that comes to mind is rock architecture in this form. It is not easy to obtain realistic data by measuring these spaces, which are usually carved into a monolithic mass of rock, using traditional methods, which is a prerequisite for preserving this type of rock architecture that has become an essential part of our Cultural heritage. However, software developed in digital environments with evolving technology saves time and money regarding accuracy and realism. It offers researchers practical advantages in terms of usability, archiving, and rapid remote access to data. The photogrammetry-based Agisoft -Metashape program described here provides a foundation for future studies or applications by combining data obtained by laser scanning on the same platform with interior and exterior measurements of the building and its surroundings, making the necessary preparations for analytical surveying, and archiving them on platforms with multiple access.

1. INTRODUCTION

The region of Cappadocia, with its historical geography and various material and cultural layers, has a special significance in its cultural and historical development process. This series of partially hidden settlements and spaces inscribed in the topography carry cultural heritage values that create significant awareness with their different architectures, aesthetic expressions, and various techniques and materials they use. Accurate, realistic documentation of these structures, which are rapidly being worn away by nature, man, and time and have often lost their integrity, is crucial for future generations and today as a basis for interventions to be proposed for conservation (Figure 1).

Figure 1. Basil the Great Church, Mustafapaşa 2017

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Obtaining an up-to-date and detailed data set using traditional measurement and documentation methods that document every point of the building and its immediate surroundings are often incomplete because it involves a laborious process. Documentation studies conducted in the past mostly remained at the level of sketches providing general information about buildings and spaces.

With the rapid advancement of technology, documentation methods and techniques have evolved from simple measurement techniques, which have significantly changed over time, to a multi-dimensional and multi-dimensional documentation system created using non-contact digital technologies.

The use of methods and techniques such as UAV, GNSS, Photogrammetry, Laser Scanning, Lidar Scanning, and RTI to reveal surface details is vital for the accuracy of the documentation (Akçay 2016:1-16; Yılmaz et al., 2008). Holistic and detailed documentation of historical monuments also serves as a basis for conservation action plans. This is because the *Historic Building Information Model* (HBIM) forms the basis for both structural and conservation analyzes (Dore et al., 2015: 351-357; Yakar et al., 2010).

In this regard, the study's challenge is the concept of protection of historic buildings, which have an extremely important place in the extensive history and diverse architecture of the Cappadocia Region. Examples will be used to discuss traditional documentation methods from the past about the historical structures in question and the application practices of the new methods and techniques used in current documentation systems in light of today's technologies.

2. HISTORICAL GEOGRAPHY and ARCHITECTURE of the REGION

The region, whose geological date of origin dates back to 13 million years ago (Neogene Period), received its characteristic feature through volcanic movements and erosion (Tuncel, 1996:14). Erciyes Mountain (3916m) in Kayseri, Hasan Mountain (3253m) in Aksaray, and Melendiz Mountain (2963m), formed 60 million years ago near Niğde, began their volcanic activities in the 10th century. The lava ejected by the volcanoes, which continued its activity throughout history, caused the volcanic cover to spread in the land to the north, forming a very resistant rock layer of basalt and volcanic ash (Esin, 2000: 80-83). The climate, winds, steppe surfaces, lithological features of the rocks, and the Kızlırmak, Melendiz, and Mavlucan river beds, as well as the tributaries feeding these rivers, provide the geological formation of the Region (Ötüken 1987:7).

Beginning in the Paleolithic Age, Cappadocia became a popular destination for human societies, which later formed towns belonging to various civilizations and cultures (Figure 2). Çatalhöyük, one of the earliest and well known settlements in Anatolia, and Aşıklıhöyük are located in this region.

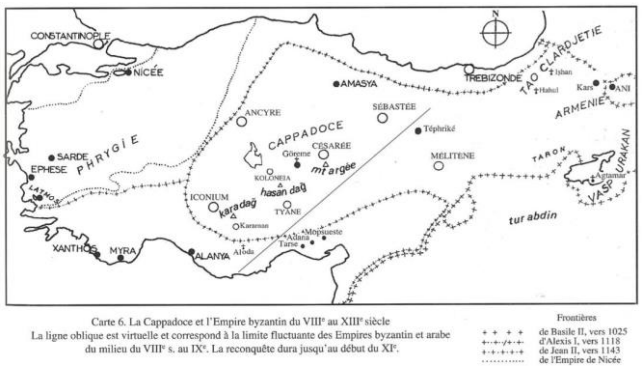

Figure 2. Cappadocia Region Map (Thierry 2002:75)

The word Cappadocia appears for the first time in Herodotus's work entitled '*History*.' The Persians gave the region a name that is the Hellenized form of "Katpatuka," which commonly held to mean "land of beautiful horses" (Hild and Restle 1981:63; Ötüken 1987:8; Kostof 1989:5). According to Strabon, one of antiquity's most prominent geographers, the Cappadocia Region's borders include the Taurus Mountains in the south, Aksaray in the West, Malatya in the east, and the Eastern Black Sea region in the North (Strabon 2012).

The oldest known written source about Cappadocia is a Hittite text from 2300 BC (Esin, 2000:65; Thierry, 2002:19; Ötüken 1987:8). During the Hittites period, commercial cities such as Kültepe (Karum/Kaneş) were located in the region, especially on the Mesopotamian trade route.

After the collapse of the Hittite Empire in 1200 BC, the Cimmerians (c. 700-650 BC), the Medes (c. 585 BC), and the Persians (c. 560-333 BC) continued to rule Cappadocia (Rodley 1985:5; Ötüken 1987:8; Thierry 2002:19).

The Cappadocia Region, which remained within the borders of the Roman Empire after the Persian domination, was accepted as a Roman province and Mazaka (Caisareia) city became the capital of the province (Hild and Restle 1981:64-65; Strabon 2000:15-19). The region, which was later included in the Pontos Region, was divided into second and third administrative units (Hild and Restle 1981:44; Thierry 2002:11-19) and became a part of the Eastern Roman Empire (Byzantine Empire) in 330 AD with the division of the Roman Empire into two (Hild and Restle 1981:70-84).

During the reign of different civilizations in Anatolia, a bridge between East and West in ancient times, many trades and migration routes passed through Cappadocia, and traces of different distant cultures were carried to these places. The geographical boundaries of the Cappadocia Region, one of the largest states on the Asian continent in Roman and Byzantine times, have changed several times over the centuries. It extended to the Salt Lake in the West, the Kızılırmak and the North Anatolian Mountains in the north, the Euphrates River in the east, and the Taurus Mountains in the south. Today it includes the east of Ankara, the north of Adana, the south of Yozgat and Sivas, and the cities of Kırşehir, Nevşehir, Aksaray, Niğde, Kayseri and Malatya (Hild and Restle 1981:42-48; Yakar & Yılmaz, 2008).

In the early years of Christianity, Christians prayed secretly in the caves of the Cappadocia Region.

Cappadocians used the rock carving technique to construct houses, temples, animal shelters, storage rooms, and burial structures in the existing topography. With the spread of Christianity in the region, they added to these structures churches, monasteries, and lavas for religious purposes (Rodley 1985:237).

The Region of Cappadocia, under the influence of monasticism, became one of the most critical cross centers of the Orthodox sect of Christianity in 300 AD. The clergy withdrew from the people and often chose high, rocky areas far from the city to be closer to God. The Cappadocia Region has been a region where different communities lived throughout history. Its topographical features were suitable for secret organizations and hiding places and created easy places to live. Göreme, Ürgüp, Çavuşin, Zelve, Ihlara, and the Soğanlı Valley are other areas where religious places and monastic churches are concentrated (Thierry 1971:129-171).

From the first half of the 7th century AD, Arab raids interrupted Byzantine rule (Kostof 1989:25), and artistic activities declined with iconoclasm. With the arrival of the Turks in Anatolia after 1071, a period of rapid change began for the region (Haldon, 2003:34). It is said that with the Seljuk religious and administrative policy, the Christian community continued its worship, but the monasteries and churches lost their former vitality (Ötüken 1987:5). The decline of social and political unity in the region led to the migration of the Christian community from the region and the abandonment of settlements and land (Vryonis 1971:148; Orhan & Yakar, 2016). In the Seljuk and then Ottoman periods, the sedentary culture, art, and architecture were continued using traditional techniques and materials.

Nowadays, the geographical boundaries are defined as "Cappadocia region" based on morphological characteristics by giving the coordinates of the area within the boundaries of Nevşehir province and Soğanlı valley within the boundaries of Kayseri province under the name "Priority Region in Touristic Development" (Özata 2015:5).

Figure 3. Paul Lucas, Cappadocia Stone Print Image (Fırat 1998:485)

The first scientific research in the region, which attracted attention in the West, was carried out by European researchers at the beginning of the 19th century. These early studies mainly concerned the architectural and art-historical evaluation of rock-hewn spaces, monasteries, and churches. The region, which attracted much attention, later attracted a growing number of explorers and travelers. In these first documentations of Cappadocia, drawings, charcoal drawings, simple sketches, and maps were used instead of photographs (Figure 3). With the development of photographic technology, attempts have been made to document the murals inside the churches that reveal the history and significance of the building.

2.1. The Architecture of the Region:

In the Cappadocia Region, the surface forms created by cuts in the valley slopes or monolithic rock masses in harmony with the topographic structure of the settlement have strongly influenced the region's architecture.

Many religious complexes, monasteries, and the structures that supply them were built in Cappadocia, which became an important cross center after the early Christian period. In addition to the churches, residential areas were created with many premises such as dining halls, kitchen halls, workshops, storerooms, and lavra.

Building complexes whose outer surface is the continuation of the natural topographical structure but whose interior is chiseled into space and designed with many units are considered religious architecture, especially the architecture of churches, plan typologies and reflections of Byzantine Period architectural styles. In general, in Cappadocia, the simple single-nave churches with the basilical plan with three naves, the central vaulted, closed, or open churches with the cruciform plan, more common in the countryside, were popular (Soykan 2019). There are two examples, such as the Keşlik Monastery Church or the Saklı Church, which were built by imitating the capital church architectures and combined with traditional materials and techniques as far as the topography allowed (Soybaş 2019; Ertürk 2020). Unexpected changes in materials and damage that occurred during the construction phase led to changes in the building's plan typologies and architectures. The damages or section losses that occurred during the period of use were tried to be repaired by procedures such as filling the wall with the masonry. In case of major destruction, the building was abandoned, and a new one was hewn in a nearby rock mass and attempted to be excavated.

The volume of the spaces created by carving into the existing rock mass was first determined with the help of an auxiliary line, and then, starting from this line, work was usually begun inward. The direction was sometimes intentionally changed by considering the formation of the rock structure, existing cracks, and soft layers. The heights of the spaces are generally adapted to the imitated architectural style, the side spaces and additional spaces are simpler, right angles and corners are bypassed.

It is possible to see the hand and arm movements of the masters and the traces of the tools they used in these places, most of which are believed to have been created by local masters. Since the rock material in the region is

a type of ignimbrite, which is easy to work, the spaces could be easily built using the technique of carving and digging. Insufficient wall and floor thicknesses of the spaces created by the quarrying of tuffs, whose structural features work under pressure, and the large openings of spaces such as churches cause fractures and cracks in the tuffs. These structures and spaces, which have survived to the present day, are no longer used, and the architectural integrity of most of them has been damaged, and they have turned into ruins, destroyed mainly due to their exposed parts.

While some of these structures and spaces carved into the rock, distributed on Cappadocia region and bearing the traces of the past, are used today with similar functions, some have acquired new ones. While some are warehouses affiliated with legal entities and the private sector, some are included in units affiliated with the hotel and tourism sector. Some of the mentioned structures have been put under protection by including them in public institutions and ensuring their participation in daily life with new functions such as open-air museums and museums. However, a large part of our cultural heritage on this subject, especially in rural areas, has unfortunately been abandoned to its fate.

3. CURRENT DOCUMENTATION METHODS

Until the recent past, measurements and drawings of architectural documentation, plans, sections, and views were made and transferred by hand using simple techniques, instruments such as measuring devices, plumb bobs, spirit levels, and levels. However, it is challenging to document the real/exact dimensions and nature of the spaces created during rock carving and determine the height in places where transport is impossible and the depth and planning directions in the spaces within the rock. However, heights, elevations, depths, lengths, and diagonals measured by traditional methods and measurement techniques allow a general sketch to be drawn without measuring every point of space (Figures 4, 5). Considering the damages and losses of the documented building, it becomes more challenging to make accurate and real documentation and to measure and document the buildings and places located in difficult areas and heights, together with their immediate surroundings.

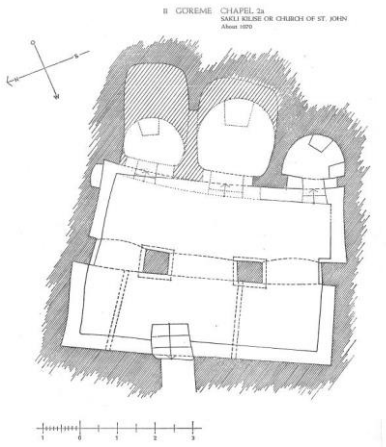

Figure 4. The Hidden Church (Restle 1967)

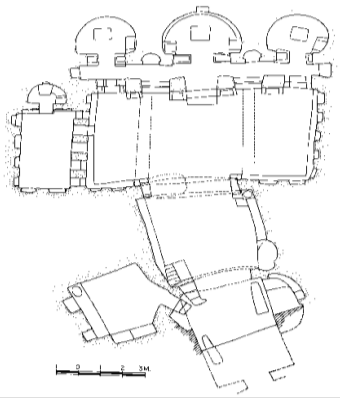

Figure 5. Buckle Church Plan Drawing (Epstein 1986)

In parallel with today's rapidly advancing technologies, systems and techniques have evolved, tools and equipment have been updated and modernized, and documentation methods used in many different fields and disciplines have begun to be cross-applied. Nowadays, digital captures that can be made with the technique of aerial remote sensing, photographing and scanning with drones and lidar, scanning tools that can transmit any point of the interior of the near environment and spaces, laser, for example, scanning with Faro, photogrammetric images allow to obtain more detailed and comparable data. In addition, ground scans with geo-radar or electrodes provide access to invisible data underground.

In addition, thermal imaging cameras that allow to see the destruction of the building and experiments on materials and strengths in the laboratory environment support this documentation and go into detail.

Documentation, which is a prerequisite for the protection of these sites, which are essential parts of our cultural heritage, and for subsequent preservation decisions, provides access to analytical survey data such as damage conditions, degrees, types, materials, and techniques, in addition to surveying the building, making the documentation truthful and accurate. Thus, due to the investigations in question, proposals can be made to restore the building, such as protection, consolidation, and conservation.

In the past, the measures and actions to protect these areas and places were limited to specific areas and structures. *Göreme Historical National Park and Cappadocia* were included in *The World Tangible Cultural Heritage List* in 1985 because of the need to preserve their natural topographical features and esthetic significance and their values as examples of interaction between interaction the environment and man. Residential areas such as Göreme, Paşabağları, Zelve, Ihlara, and Gümüşler Monastery are now partially protected by being converted into open-air museums.

Today, with communication and technology development, document integrity can be achieved on a common platform by combining them through intermediate programs from different areas. UAV/drone shooting parallel to the field or slope at a certain distance from the air, coordinate measurements made by satellite remote sensing method, mobile lidar scans just used with laser scanning inside and outside the building at close range, which is mainly useful for detailed documentation

based on small structures and objects, can be converted into 3D images by analyzing mobile lidar scans, which can be used as a basis for architectural projects in the computer environment.

3.1. UAV/Drone Shooting and Photogrammetric Studies

Studies using UAVs and unmanned aerial vehicles are conducted in the digital environment, where these data are processed after the outdoor shots are taken in the area where the structure is located. For outdoor shootings to be made with the remote sensing method, specific permits and the training and certification of the person who will be flying must be separately notified to particular agencies, and a permit obtained. The timing of the flight, weather conditions, light distribution, and quantity all affect the quality of the shot (Şasi 2020:8).

Exterior shots should be planned to capture the settlement and the immediate region where the building is located. Problems may arise in documenting the pure structure, project design deliverables such as the site plan and silhouettes.

The study begins by flying over a specific route and altitude above at least five fixed control points placed here in the building and its immediate surroundings after establishing the boundaries of the area to be documented. GPRS/Cors primarily determine the coordinates of the control points and depending on the size of the area determined from a certain height distance and the desired clarity, photos can be taken, and measurements are taken as often and repeatedly as desired. The photos can be taken at a specific frequency so that they overlap in the desired rhythm. With each image taken, the distance traveled, and the GPRS coordinates of the area covered are also determined and transmitted (Şasi 2020:8). Additional programs that support shooting, such as DJI GS Pro and Map Pilot Pro, may also manage the area shots and the quality of the work. For example, 466 photographs were taken in an area of about 7 hectares in Göreme Saklı Church, Cappadocia, where this study was conducted, at an altitude of about 80m, with a flight of 2349m (Figure 6).

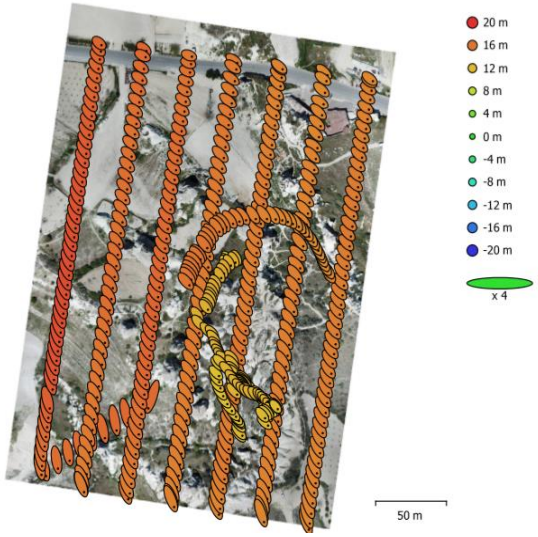

Figure 6. Camera Locations and Error Estimates (Ertürk & Kaderli 2020)

To produce a site plan, the photographs and coordinate data were analyzed in the computer using Agisoft-Metashape (software that generates 3D spatial data for photo scan digital images) (www.agisoft.com) and transformed into a three-dimensional DEM map using point cloud data. During this process, sensitive GNSS data received from Ground Control Points (GPC) placed in the surveyed area are also transmitted to the software and can be combined with geographic information systems and placed on the map in accordance with the country coordinates.

Elevation curves can be added to these documentations created from the outside of the building and its surroundings using the point cloud or the map DEM (Digital Elevation Model), and the desired cross-sections between points can be created (Figure 7).

Figure 7. Saklı Church, Section (Altın Oran 2020, Saklı Kilise archive)

In 7 steps, the program Agisoft- Metashape can transform data into 3D spaces in various representations and 3D modeling in volumes. Interconnected commands and intermediate transformations such as Dense Cloud, Mesh, Texture, Tiled Model, DEM, and Orthomosaic are possible with Align Photos (Figure 8).

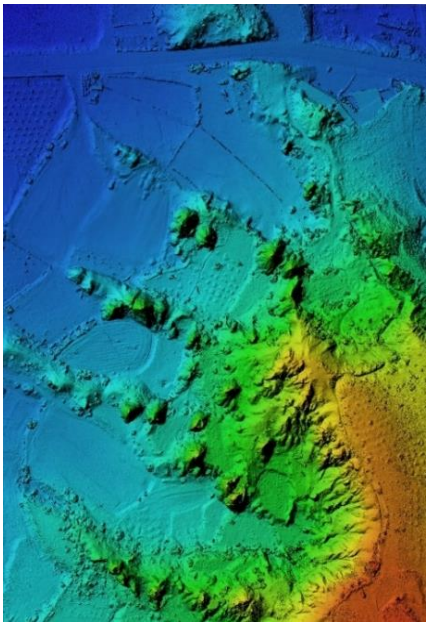

Figure 8. Hidden Church, DEM Map (Ertürk 2020)

For a certain repetition and registration, for example, at least 60%, for an accurate result, each photo is combined with the previous image and the next photo to 80% and converted into a point cloud (dense cloud) together with the coordinates and shooting points from the numerical data, and the triangulation method is used to create the surface, process the solid model (mesh) and then the photoreal mesh to create the 3D model (Akçay & Gürel 2018:1-18) (Figure 9). The scanned area, valley, monolith mass, and entire outer volume of the structure can be created in real dimensions without escaping into a 3D perspective if the fixed points and coordinates (guide and ground control points) taken at the start of the program are transferred to the program and matched with individual photographs. With the export command, this collected data can be transferred to the dxf, dwg-extension-Autocad environment at the appropriate scale, and a base for survey drawings and damage assessment studies can be created.

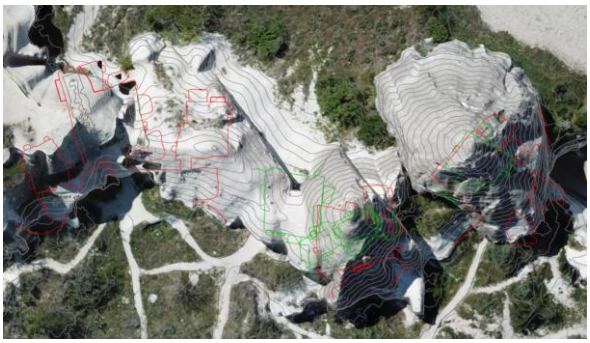

Figure 9. Saklı Church Elevation Curves (Ertürk 2020)

3.1.3. Laser Scanning

In recent years, laser scanning technology has evolved and is now being used to document and survey complex structures with difficult shapes and areas requiring detail (Reshetyuk, 2006; Karşıdağ & Alkan 2012; Yaman & Kurt 2019:6). 3D models of the scanned structure can be obtained with the necessary software without physical contact with the structure and with the desired precision (Kaya, et al., 2020:58). Although terrestrial scanning technologies are used in many different fields, they are widely applied to cultural heritage recording (Lichti & Gordon 2004; Fabris et al., 2009; Yunus Kaya et al., 2020:61; Çelik et al., 2020).

Figure 10. Saklı Church (Ertürk 2020)

In the documentation studies from the ground, the immediate surroundings and the internal volume of the building can be scanned with a laser scanner with HDR photo function, and a large number of point clouds can be converted into models with laser programs such as Scene (Faro brand laser scanning program), which obtain the real 3D values (Figure 10). The point data generated by recycling the rays that can be reflected from the laser device to any point of the building can be converted into a point cloud by the program. Depending on the laser scanner used, the settings for sharpness and resolution may vary. With the camera, which is usually integrated in the devices, photos are taken in a complete 360° circumference and transferred to the point cloud, and textures and colors are processed. In this study, for size and scale control, it is important to determine the coordinates of the reference and guide control points using GNSS.

After the ±0.00 point of the building or terrain has been determined, the clip boxes of the desired sections can be opened and plan, section, view orthophotos can be taken (Figure 9). The orthophotos can be transferred to scale into the Autocad program and placed. In this way, a basis can be created for the necessary plan, section and view drawings for the survey (Figure 11).

Figure 11. Saklı Church, Sectional Perspective (Ertürk 2020)

Figure 12. Keşlik Monastery, Archangelos Church, Sectional Perspective (Soybaş 2019)

A software like Scene2go can also be used to easily access large file sizes in the scaled documentation portion of the data. Known documents, 3D models stored in the computer environment, and various databases, photographs, jeans, and various measurements can be retrieved by back-reference as needed (Figure 13, 15).

Figure 13; 14. Saklı Church, Narthex, Scane2Go Program (Altın Oran 2020, Saklı Kilise archive)

3.1.4. Mobile - Lidar Scanning (Light Detection and Ranging or Laser Imaging Detection and Ranging)

One of the latest current applications in documentation today is mobile tablet-Lidars-. At the same time, it can scan the desired area or structure by hand using the camera and laser scan on the mobile lidar tablet, which also has the smartphone option - Lidar Scan - with different capacities and processing speeds, and then create a 3D model by processing this data. Cameras with a fast focus can also detect depth. These limited capacity devices are more successful at scanning small objects such as chairs, doors, alcoves, tables, or a single room scale but have difficulty processing and recording data as area and volume increase. To use these tablet features, you need to install additional programs such as 3D Scanner, Matterport, Polycam. With its easy-to-carry features on a mobile device, the digital documentation technique and method, which is also used in areas such as modeling small objects in various areas, interior architecture, decoration, and various digital games, is very practical and fast. It can precisely work in different topographies, geographies, hard-to-reach places, small volumes, and areas where other instruments have difficulty entering and shooting.

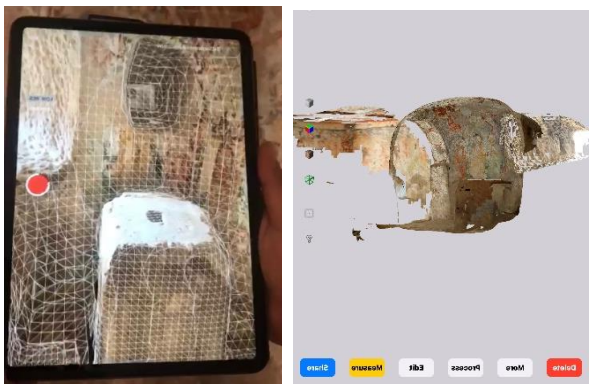

Figure 15. 3D Scanner, Lidar Scan, Mesh
Figure 16. Scanner, Lidar Scan, Mesh Textured

The lidar scanner operates at the photon level and nanosecond speeds. It can measure the distance of objects in the environment up to 5m and can be used indoors and outdoors. Depth software frameworks combine depth information measured by the lidar scanner with data from cameras and motion sensors and can be augmented by computer vision technologies on the bionic chip to provide a more detailed understanding of the landscape, structure, or object. Because the close integration of all of these factors can provide a variety of AR experiences (Apple 2021). It is believed that in the future, devices will be developed that can succeed up to a certain distance to increase their capacity and clarity.

The 3D Scanner program, which also takes photos with laser scanning, can create real models by converting the scan to triangular surfaces with the Mesh command in Agissoft (Figure 15), converting it to solid, and then dressing it with textured texture (Figure 16). 3D models, like other programs, can be perceived in different planar dimensions and can provide sections from anywhere (Figure 16). The created models can be shared with various program extensions such as OBJ, GLFT, GLB, STL, FBX. As with other laser scans, time of day and light settings are essential for getting the best possible digital documentation efficiency. However, some programs offer different scanning degrees (3D scanners).

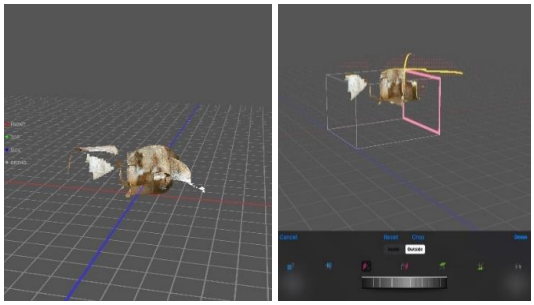

Figure 15. 3D Scanner, Lidar, 3D Scanner Program, Edit, Planar 3D Image
Figure 16. 3D Scanner, Lidar, 3D Scanner Program, Edit, Crop With Box, Sectioning

4. GENERAL ASSESSMENT

Archaeological material, cultural remains, and architectural structures that document our attachment to the past through different cultural layers in the process of historical development shed light on our history and allow us to understand the lives and experiences of the past, have value as a cultural heritage that should be protected at the primary level. The transfer of these values into the future, objectively and as information, and their protection is only possible with detailed and realistic documentation methods.

In ancient and late antiquity, settlements, structures, and places in the Cappadocia region were formed by man-made tufa processing into the bedrock, using the region's typical construction style. Murals, especially on religious buildings adorned with various decorations, are designed as topography permits. Some of these structures and locations have been converted to other uses, such as hotels, warehouses, barns, open-air museums, or abandoned by the private sector, legal entities, and public institutions after losing their original use over time. Time, natural climatic changes, processes of destruction by the material itself, section losses have been and are being destroyed under the name of the human factor (vandalism) and tourism, with the increasing interest in the region in recent times. Those who have managed to be in a better condition today are, for the same reasons, waiting defenselessly for the damage that may occur soon.

Instead of documentation studies that were done in the past using traditional methods, today,

measurements, evidence, and documentation are done using various methods and techniques, new technologies, and rapidly developing technology. Through the joint use of different acquisition, scanning, and recording devices (UAV, Laser Scanning, Lidar Scanning), more comprehensive holistic and realistic models are created, and these models are converted into the desired program formats.

Combined with UAV and drone imagery, indoor and outdoor terrestrial laser imagery used primarily for site plan-based outdoor coverage, and mobile lidar scanning that has been successful in hard-to-reach areas, this can yield highly detailed, easily and quickly access data that can be used for conservation projects, analytical studies, and other analyses.

Moreover, these documentations can provide evaluations not only for the investigation carried out for protection, the determination of the current situation, but also for the convenience they can provide in restoration, decisions about conservation interventions, the effects of the destruction of the structure, the damage simulations that can be predicted for the possible future, and the structural changes. It can also be used for new designs, such as new building additions, re-functioning, shelter roofs.

Using multiple documentation techniques and methods (cross/interdisciplinary) in documentation studies conducted under challenging areas and topographies such as Cappadocia and in areas lacking clear architectural formation results in a holistic, real-world data system. 3D models that can be created outside of 2 dimensions provide all the architectural data associated with the structure and provide convenience in archiving and storing these documents by allowing quick remote access, conservation processes, structural analysis, and restoration applications where theory is put into practice.

Author contributions

Conceptualization, Methodology, Writing-Reviewing, Field Survey

Conflicts of interest

The authors declare no conflicts of interest.

Statement of Research and Publication Ethics

The authors declare that this study complies with Research and Publication Ethics

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