

Modern methods of digitization of historical objects.

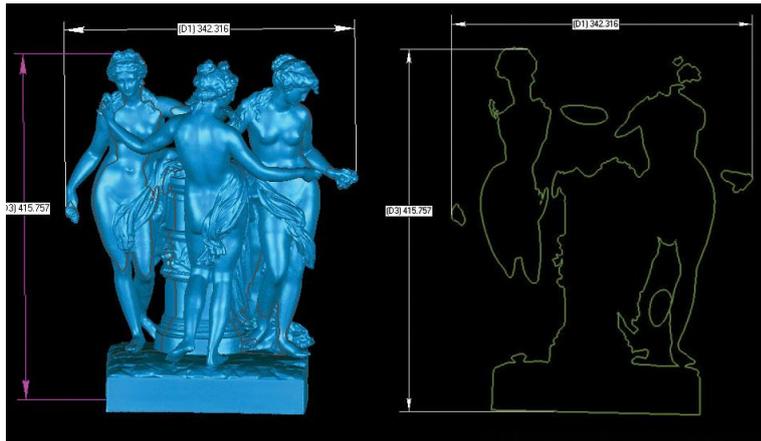


source: thehistoryblog.com

Museums are in place to preserve the heritage of the past for the future generations. They should protect the history, teach future generations and be a reminder of the past eras and events. Archaeologists conducting intensive excavations around the world to discover as many monuments of the past, conduct thorough research and discover the past centuries. Despite that we have a lot of knowledge about the past, some periods are still a mystery to us. Archaeology and history are those science fields, which require to sacrifice a big amount of time, attention, concentration. History is also an art of interpretation. Written sources usually do not affect all aspects of people's lives, but only the most important from the point of view of those who created them. While in written sources were devoted to the life of the ones who ruled, about the lives of ordinary people we know only a little. Archaeologists are discovering older and older monuments and everyday learn some new and interesting facts. Their job is mainly to interpret findings. At the beginning of all observations were

written down manually, and since photography was not as advanced as it is today, they had to make the most accurate drawings. All of these methods and techniques led to a number of a methodological and interpretive mistakes.

Today, when technology comes in every aspect of our life, history has less and less secrets for us. Through research and many complex techniques, we can even penetrate what is inside of the mummy. The method of recording digital video or audio is called digitization. Digitization is useful for inventory of monuments, archive studies, archeology and generally in museums. An extremely useful device in today's museums is a 3D scanner. It is a remarkable machine that by using light or laser scans the object. What you can receive is a cloud of points or mesh of triangles. The data is recorded in CAD model. The better the scanner is, the better is the result. Today's models are equipped with remarkable accuracy. The human eye is not able to capture as many details as 3D scanner



source: smarttech3d.com

does. In addition, the scan helps to avoid many mistakes. Minimizes subjectivity of the documentary. When archaeologist is sketching a vase, which he just dug from dirt, he was not able to give exact dimensions of the object. Even if he is also the great artist. Man will never be as accurate as the machine. The scanner can have an accuracy of up to 20 microns! For comparison, a human hair is about 50-70 microns. The scan takes only a few minutes and is very safe because of the type of light that is used. Have you ever wondered why you should not photograph with the flash in museums? Because light can damage the delicate structure of many historical objects like paintings. They are kept in rooms designed for their protection, even when it comes to the type of used light. The archaeological 3D scanner uses the same kind of safe light. White light, which does not affect the scanned object. Similarly, white light is used in the archives to scan documents that are extremely delicate. Imagine that the scanner is able to reproduce even the path that beetles had left in a piece of bark, and the streaks that left the artist's brush on the canvas. This is a very advanced device.

The ability to use the scanner also extremely accelerates research and archiving. Everything is recorded in a few minutes in the form of a cloud of points on the computer, and then can be freely analyzed and processed. Any size,

texture, and also the angles are immediately analyzed by the computer program. You can instantly scan in color or add color and texture when editing in later stage. Very often, what archaeologists found is broken or destroyed. Often they only find some larger or smaller fragments of the object. Then, after scanning such vessel or fragment the person can reconstruct it in a

graphics program. See how it could looked like in a reality. Give its color and texture. Digitization offers many possibilities. You can create a virtual department of the museum, where everyone from every corner of the world may visit the museum at the other end of the world not even moving from home. There is only one "Mona Lisa", and not everyone can afford to travel to Paris. The Louvre was one of the first museums that digitized their collections and made available in the form of tours. When in 2003 researchers examined the Greek sculptures under the ultraviolet light they discovered that there are some remains of paint. It revolutionized the way we thought about ancient art. All of these grossly white sculptures, which can be seen in museums today were once colored. After scanning with 3D scanner it was possible to impose original colors on them to represent their past appearance without affecting the structure of the sculpture.

Archiving includes a presentation in 360 degrees, almost like in a computer game. Creating panoramas and virtual tours. The better is it made the stronger impression of reality and presence in a given location. Not only can scan objects such as sculptures and paintings but also buildings. Create virtual tours through the cities, which have evolved over the centuries. In Poland, there is a lot of wooden architecture, such as churches.

Scattered in different regions of the country, in small villages stand wooden masterpieces. The wood is not as durable building material such as stone, so the protection of these objects is difficult. It is a great shame, if you cannot save them. Photography does not reflect every detail. 3D scanning makes it possible to reproduce any element, keep it, and also allows us to create a virtual tour of the facility. It is almost like you were actually there. Even if the building does no longer exist. With the computer documentation we can also rebuild the object in the same form as it was before.

Very problematic to preserve are also, for example, sunken ships and all the wooden parts that are in them. After the extraction of the wreck

common technique is to record the object, save the parameters and then



sinking again *source: 123inspiration.com*

in the protected water reservoir. Any manipulation and lack of caution can lead to irreversible damage to such a sensitive monuments. Scanned object in 3D will be kept forever. You can then make the appropriate measurements and calculations, make a virtual cross section, decompose into prime factors. Reach all the smallest corners and analyze each piece. 3D visualization is also useful when the object itself cannot be exhibited in the museum. It may be in the maintenance phase or not be lent to other institutions. Often, when the exhibition is imported from abroad, it misses the most valuable pieces because of the safety factor. Visualization of the missing museum piece will then fulfill the whole exhibition.



source: ipartner.ro

Digitizing includes several methods. Those are: 2D photo-optical method, which is session with a digital camera. 2D scanning method with scanning camera, the effect is flat scan. 3D laser scanning method, which is extremely accurate, but not always suitable for all type of object. 3D scanning optical method with structural light, that technique is used in Smarttech scanners. Light can be blue, green or white, and each of them has different properties. The green light is the most

accurate, while the white light is the safest for the historical objects. In addition, white light reproduces colors and is the best method for a digital inventory in exhibitions. The scanner shows bands of light on the scanned surface and based on their bending generates a point cloud,

which in the form of a CAD model can then be analyzed and processed freely. This gives us endless possibilities.

However, digital archiving raises some concerns. After all, the digital image is not the same as a real object, and nothing can replace contact with the real art. That's why in 2009 the London Cart was presented. Its intention is to help clarify the issues involved in digitization. This card will help to increase the rank of digital visualization objects. Helps to clarify the applicable test methods and forms of presentation of the analyzes. Each science should have its methodology. Universal methods which are deigned to avoid making mistakes, are measurable and easy to reconstruct. London Cart also aims to disseminate digital visualization of historical

objects and to reach a wider audience. Calls for constant and unlimited access to the data, because the cultural heritage belongs to all of us. Computer visualization should not be the only solution, and should be used in situations where other methods are not sufficiently effective.

Nowadays digitization is an integral part of the history and its existence is extremely important for the preservation of the past artefacts for the future generations. Maybe in the future everyone will be able to have a contact with all the cultural heritage from every place on the globe. For now, we can enjoy the virtual tours on our computers and analyze ancient sculptures thanks to the newest generation of 3D scanners.