

# From Survey to the Project: Heritage & Historical Town Centres

Information on urban regeneration

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**From the Survey to the Project: Heritage & Historical Town Centres.  
Information on urban regeneration**

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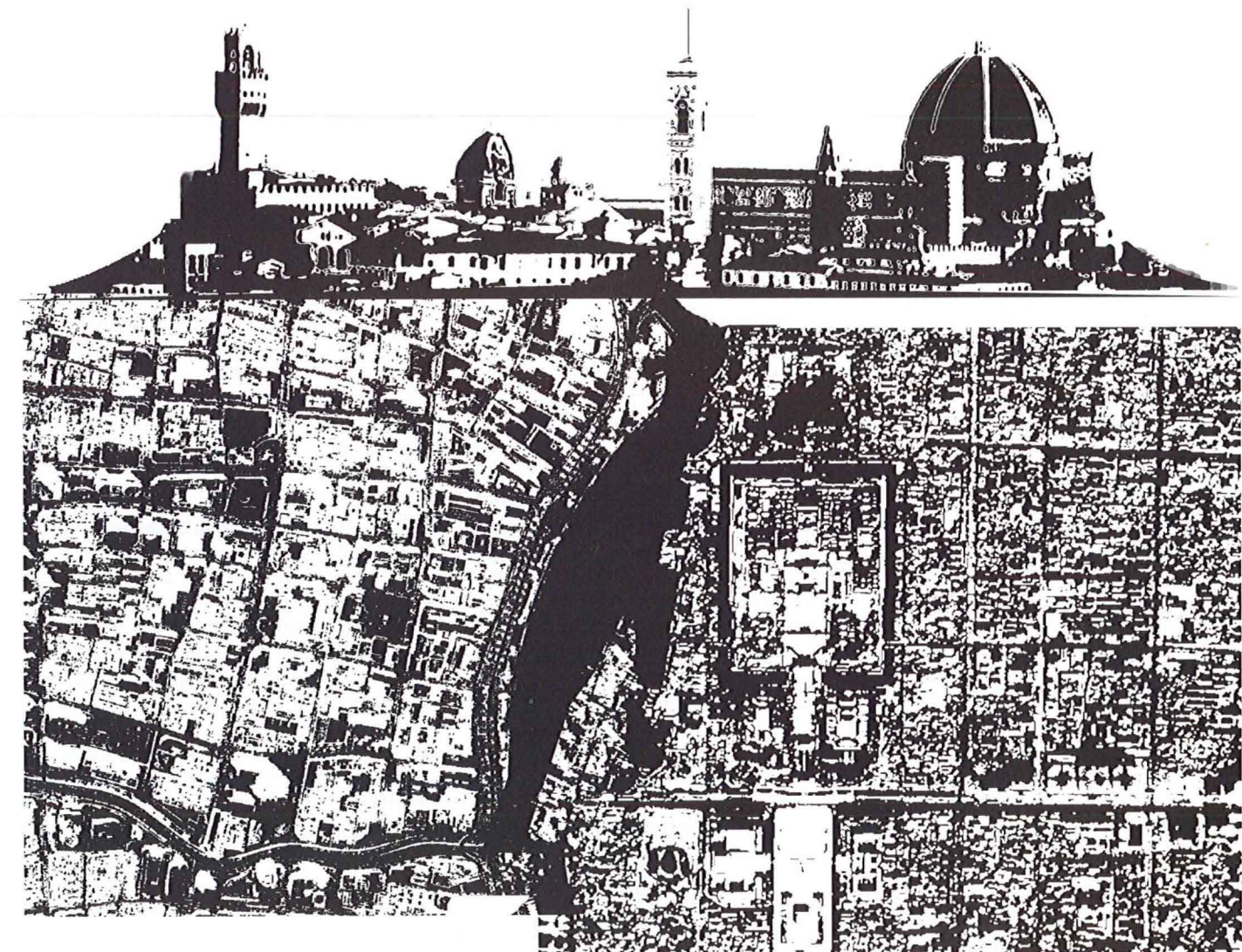
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## The Michelangelo Project: 3D survey for the updating and conservation of Michelangelo's architectural works in Florence

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The objectives, strategies and policies of the conservation of the cultural heritage must be based on the deep knowledge of the heritage itself, which, regardless of the chosen intervention, plays a vital role in the decision-making process. A consistent strategy is also a prerequisite for the project's safeguard and enhancement.

The aspect of documentation is even more important than the conservation of both the object – from a material point of view – and the memory of the historical, artistic and cultural values that the artefact passes on. Decades of experience in the political, scientific and technical definition of the safeguard of cultural heritage in our country have taught us that the times when cultural property was just localized and classified are over; nowadays, the measures taken for the protection of cultural heritage are more integrated and technologically advanced.

The result of survey procedures serves the following purposes:

- It witnesses and documents the *description* of the physical, material and conservation features of the artefact and of its context;
- It serves as a representational model of the surveyed object, where the processing of basic information by theme is a critical factor for the *assessment* of the artefact.



The more advanced the survey procedures – using sophisticated digital tools and methodologies – the greater the need to critically manage the acquired information and the formal, functional, constructive and spatial meaning of the surveyed object with respect to the use of these data.

In this respect, nowadays scientific surveys use a mixture of methodological know how and tools to analyse the metric, formal, spatial and physical features of the heritage, but also to reconstruct the historical background of the artefact and of the place, to reflect the different chronological stages, to ascertain formal peculiarities, to highlight the succession of time, to record any anomalies or static reasons, and to express its spirit.

### The Michelangelo Project

The *Michelangelo Project*<sup>1</sup> is a research project that uses the documents, surveys and 3D modelling relating Michelangelo's architectural works of art in Florence, with the purpose of updating the documentation and make these works of art better known.

The project was scientifically, technically and financially independent, and was promoted by the Dipartimento di Progettazione dell'Architettura dell'Università degli Studi

di Firenze (Department of Architecture and Planning of the University of Florence) and by the Dipartimento di Architettura-Centro Diaprem dell'Università degli Studi di Ferrara (Department of Architecture - Diaprem Centre – of the University of Ferrara). These two universities worked with competent agencies and institutions<sup>2</sup> to study the artefacts. The project was launched in 2003 and the works were due to finish in 2006. It was divided into stages, with yearly surveys, and its results are currently being processed and published.

### The Michelangelo complex

Michelangelo's architectural works in Florence is based on the long and fragmented building of the Laurentian complex, which comprises of the New Sacristy, the Laurentian Library, and other works of art in the church, which are all important features for the new urban image of time.

Cardinal Giulio De' Medici, who was elected Pope Clement VII in 1523, had been thinking of building a library and a sacristy in the family church – S. Lorenzo – a task that he entrusted to Michelangelo in 1519.

### The New Sacristy

Michelangelo started working on the New Sacristy of S. Lorenzo a year later, in 1520, designing it as a mausoleum for some of the family members: Lorenzo the Magnificent and his brother Giuliano, and also Lorenzo, Duke of Urbino and Giuliano, Duke of Nemours. The Sacristy was to mirror Brunelleschi's Sacristy.

At the beginning of 1525, Michelangelo told the Pontiff that the lantern had been completed, whereas the works for the tombs, the doors and windows had been delayed. In 1531, after several possible locations were considered for the tombs, the decision was made to lean them on the two opposite walls for the two Dukes and on the access wall for the two Magnificent.

After the interruption due to the sack of Rome and the siege of Florence, the works resumed in 1531 but when, in 1534, due to the death of Clement VII Michelangelo left Florence, the Magnificent's monument was still unfinished and the only completed works were the statues of the Dukes Lorenzo and Giuliano, the Allegories of Twilight and Dawn, and of Night and Day, and the Madonna with baby Jesus above the sarcophagus of the two Magnificent.

The sculptures were finished in 1559 by Tribolo and Montelupo.

### The Laurentian Library

Between 1389 and 1464, Cosimo the Elder had begun to collect some manuscripts in the family palace. These were later brought to their glory by Lorenzo the Magnificent, who had begun to think of building a public library that could host the collection. Although he was commissioned in 1519, it was only in 1523 – with the election of Cosimo's grandson, Giulio De' Medici, as Pope Clement VII – that Michelangelo began to work on the convent of S. Lorenzo to turn it into a library, with the intention of making not only the place but also the underlying cultural project visible.

The first half of 1524 was devoted to exploring different solutions to locate the library, which was to be built by

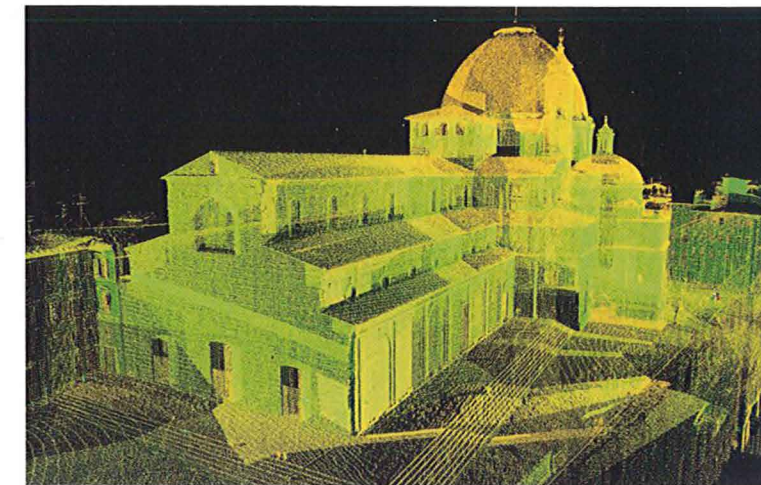


Fig. 2. Prospective view of the 3D nubs of the survey of St. Laurence Basilica in Florence

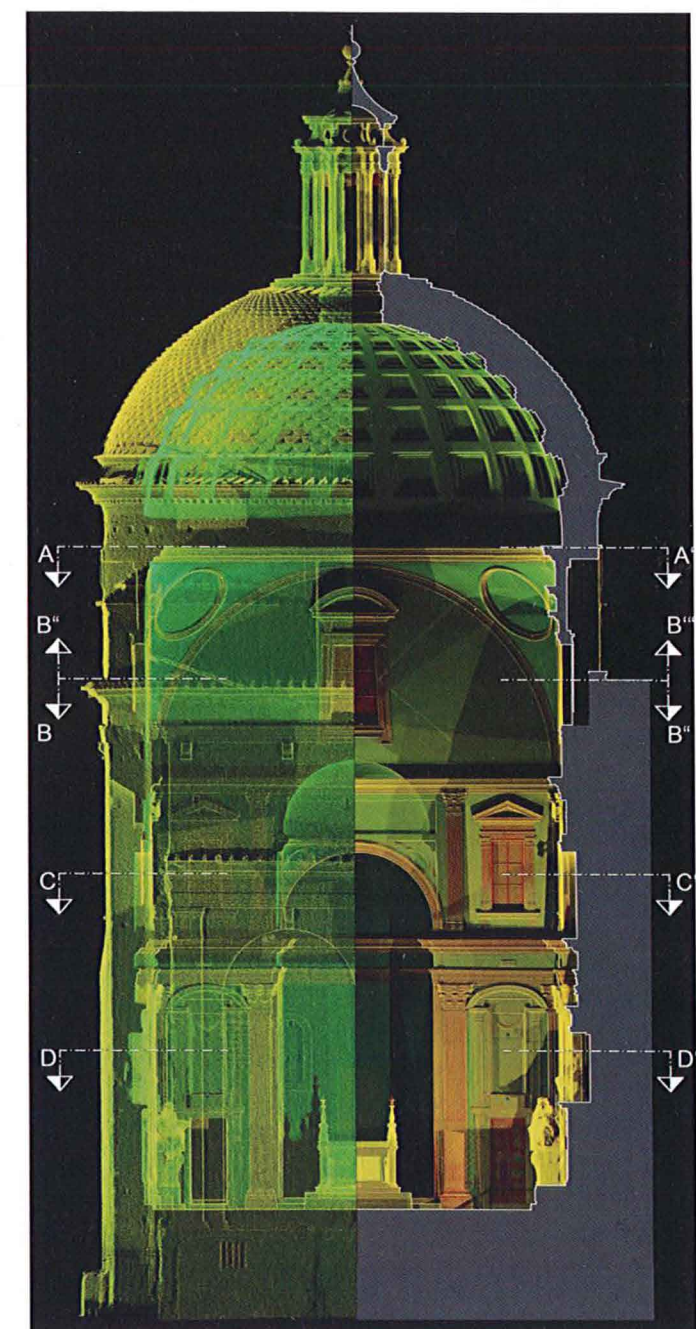


Fig. 3. A section of the 3D nubs of the new sacristy of St. Laurence Basilica



Fig. 1. View of St. Laurence complex in Florence



Fig. 4. St. Laurence Library from the cloister

raising and consolidating the convent's rooms below, with works going on all through 1525. This structural solution led to the inevitable choice of the architectural features of the room, with alternating windows and pillars due to the building's static features. According to the archives, in April 1525 the final choice was made to build only one staircase at the centre, because of the presence of four walls and two flights of stairs that were previously conceived as separate and leaning on the walls.

In 1526 the room was nearly finished with a few pillars placed. The works were interrupted in 1534 – while the carpenters were working on the plutei – because Michelangelo left Florence. Between 1537 and 1568 the works were repeatedly resumed and completed following Michelangelo's drawings; when he left, the wooden decor, the plutei, the ceiling, the floor and the windows had already been chosen as features of the library.

The vestibule staircase was built by Bartolomeo Ammannati in 1559 and the library opened to the public on 1571. In 1841, the Tribuna d'Elci was inaugurated. This was built by Pasquale Poccianti, and was donated by Angelo Maria d'Elci to host his precious book collection.

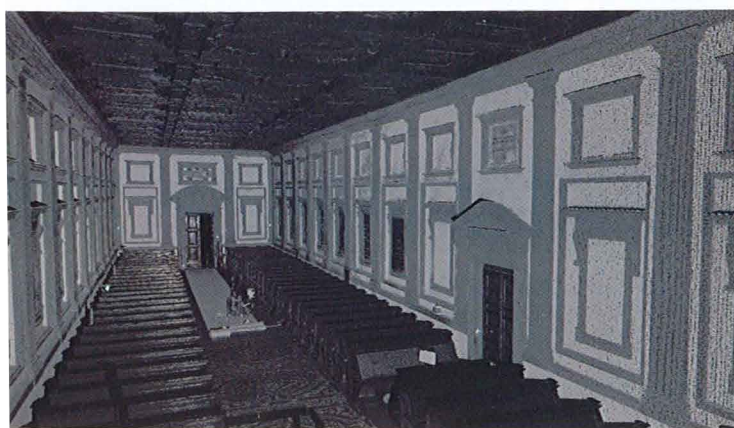


Fig. 5. Interior view of the 3D nubs of the main hall St. Laurence Library

### The Tribuna delle Reliquie

In 1525, Clement VII expressed his desire to have in S. Lorenzo a ciborium on four pillars, to hold vases and family relics. Michelangelo suggested three different locations. In 1531, after the interruptions due to the sack of Rome and the siege of Florence, the building works began and the Tribuna was placed against the counter façade wall, at the centre of the church entrance. The relics were placed on it in November 1532.

### Research methodologies

The documentation of the artistic and cultural heritage is assisted by advanced technologies to carry out updated surveys of the geometric, morphological, material and conservation features of the existing heritage, in order to develop open analytical information sets.

A structured database of three-dimensional and high quality data on the environment and architectural or artistic artefacts can be read at different levels, which should not necessarily be limited to a strict time relation, but can be integrated and developed among different disciplines in time.

The collection of survey data through laser scanner<sup>3</sup> was made both at urban environment level – with the purpose of documenting spatial relationships with the urban structure, micro-environmental relationships and the state of conservation of the external features – and inside the Laurentian complex, where the surveys focused on the metrology, linguistic, constructive and material documentation relating to the architecture.

### The survey of Michelangelo's plutei

One of the project developments is the *Survey of Michelangelo's plutei in the Laurentian Library*, which was carried out with the agreement of the Laurentian Library itself<sup>4</sup>; the study of the plutei of Michelangelo's Library, which was carried out during the restoration, in 2004, was the documental basis of the restored decors, for which high-tech surveys of 4 significant plutei were carried out, in order to build a general metric, geometric and material database for the conservation of this exceptional piece of historic and artistic heritage.

The project was divided into 5 stages, which are some of the navigation items of the multimedia support that was created to publish the results:

- Integrated three-dimension survey;
- Building of the database;
- Creation of the photographic archive;
- 3-D modelling of the plutei;
- Development of the online navigation model of the plutei.

### Conclusions

The implementation of integrated surveys and the subsequent thematic and critical surveys led to the building of a sizeable and high quality database which is currently being circulated.

The results of the Michelangelo Project are being made known with communication tools which vary according to the recipients and the different information levels needed.

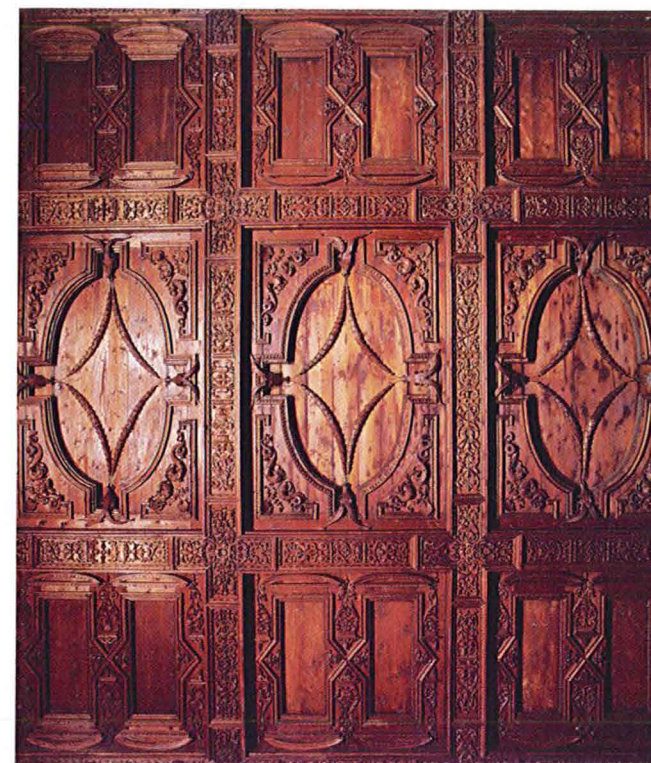


Fig. 6. The wooden ceiling of the main hall of St. Laurence Library

The three available channels have been designed as both working and cultural tools, and use hyperlinks to study the works of art on the Internet.

### Website

Some of the website pages describe the research project in its various stages, with two-monthly progress reports.

### IT database

An IT database was made for each of the surveyed buildings. The information were arranged at different levels, to facilitate maintenance.

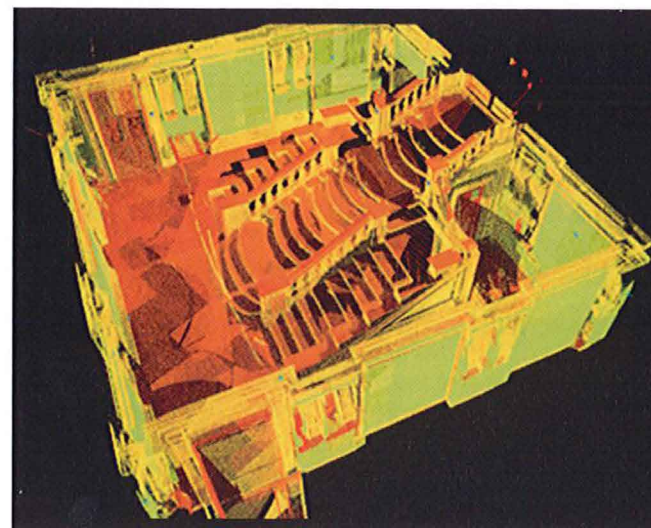


Fig. 7. Prospetic view of a Section of the 3D nubs of the St. Laurence Library hall entrance

### Notes

<sup>1</sup> The Directors of this research program are Prof. Marcello Balzani from DIAPReM Centre – University of Ferrara – Department of Architecture, prof. Stefano Bertocci and Dr. Paola Puma from the University of Florence – Department of Architecture and Planning.

The joint research group was composed by: Lorenzo Bianchini, Tommaso Brogini, Diego Cacciamani, Michele Cornieti, Massimiliano Masci, Giovanni Pancani, Giacomo Garziano (Florence group), and Federico Uccelli, Federico Ferrari, Nicola Santopuoli (diagnostic survey) Roberto Meschini, Guido Galvani, Alessandro Grieco, Matteo Fabbri, Cecilia Traina, Nicola Zaltron, Alessandro Ramini, Dario Schivo (Ferrara group).

<sup>2</sup> The institutional partners involved were: Soprintendenza Speciale per il Polo museale fiorentino (special board for Florence museums), Soprintendenza per i beni architettonici e per il paesaggio e per il patrimonio storico artistico ed etnoantropologico per le provincie di Firenze, Pistoia e Prato (Board for the architectural heritage, the environment and the historic, artistic, ethnic and anthropological heritage of the provinces of Florence, Pistoia and Prato) and Biblioteca Medicea Laurenziana (Laurentian Library), Opera Medicea Laurenziana (Laurentian works of art).

<sup>3</sup> The surveys have been carried out as follows: Direct survey of the *New Sacristy*, March-July 2003; Laser scanner survey of the *New Sacristy*, May-July 2003; Direct laser scanner survey of the *Vestibule of the Laurentian Library*, March-July 2004; Laser scanner survey of the *Urban context of the complex of Tribuna del S. Lorenzo*, September, 2004; Survey of Michelangelo's *Plutei* in the Laurentian Library, September, 2004.

<sup>4</sup> The Laurentian Library commissioned the following research topic to two Departments involved: Testing and implementation of advanced survey procedures and methodologies for the knowledge, circulation and conservation of the architectural works of art in the Laurentian Library in Florence, and Michelangelo's plutei (for partner institutions: dr. Franca Arduini, dr. Maria Matilde Simari).

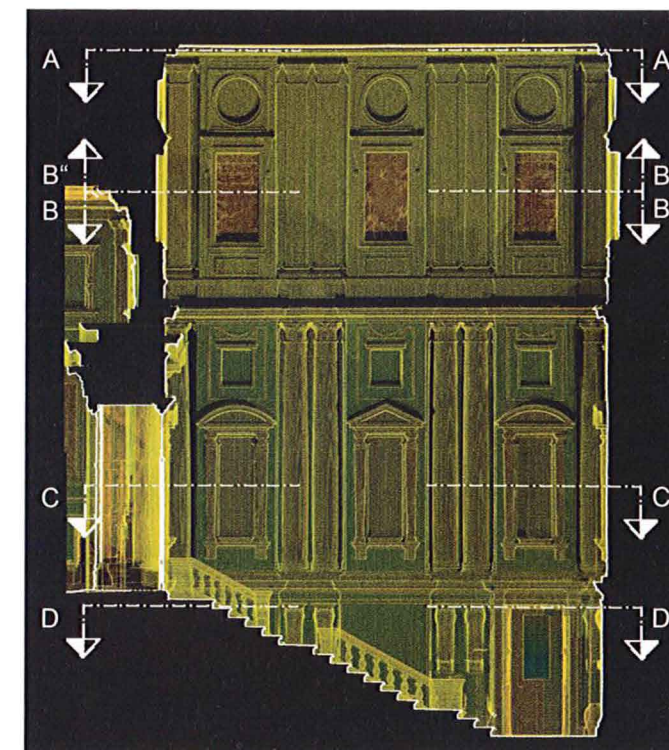


Fig. 8. Section of the 3D nubs of St. Laurence Library entrance hall

# 米开朗基罗的方案：关于保护和更新佛罗伦萨米开朗基罗建筑设计的三维测量

**Paola Puma**

佛罗伦萨大学  
建筑设计学院

米开朗基罗计划  
用于文件修订、米开朗基罗在佛罗伦萨建筑的估价的3D浮雕

马切罗·巴尔扎尼，斯台法诺·伯多齐，劳拉·布马  
保护文化遗产的知识策略：浮雕的作用

一个文化遗产评估的战略的目标、策略、政策已经被提出来了，它是以今天坚实、与时俱进的待处理的遗产中的知识遗产为基础的。不管怎么说，事实上，所选择的干预措施是很明显的，就像已知获得的详细的数据一样，在接下来选址，战略的有机开展过程中起着重要的作用。这个战略是和知识的保护紧密相关的，需要获得保护、评估工程的许可。

文献资料方面也变得越来越重要，关于保存方法的选择，不管是物品的物理属性方面，还是在时间洗礼后手工制品所具有的非物质的历史、艺术、文化方面的价值。我们国家在文物保护方面具有数十年的经验，无论从政策、科技上说都是先进的。实际上，就像我们所认为的超越那个光是对要保护的文物进行分类、定位的时期，我们的文化艺术遗产保护活动手段的质量取得了很大的飞跃，手段更综合了，技术更先进了。

这项战略中浮雕工程的一系列价值在于：

- 手工艺术品的的外部特征、材料特征、储存特征的描绘的证明和记录价值

- 作为调查主体的代表性式样的价值，信息的主题根本上代表了手工作品价值的基本重要方面。

米开朗基罗计划

我们所展示的米开朗基罗计划是一项研究计划，它有记录片，浮雕，米开朗基罗在佛罗伦萨的建筑的3D模型，还有一些画作修复的项目的纪录片，和关于那些作品的传播和评估的资料。

这个计划在自动化科学技术方面由佛罗伦萨大学的建筑保护学院、费拉拉大学的建筑学院支持。在计划的实施中，两所大学与相关的所有单位、教育机构在手工艺术品的研究中进行了合作。这个计划，于2003年开始，持续到2006年。每个计划是以年为单位来规划的，目前正在发展和成果宣传时期。

米开朗基罗系列

米开朗基罗在佛罗伦萨的建筑的系列是根据劳伦佐图书馆的新圣器收藏室为代表的劳伦佐系列的大块和小块交替出现的建筑绘画得来的。对他创作有影响的还有当时城市里的新图画和教会工厂。红衣主教德·美第齐，在1523年本该被选为教皇克莱门特七世，他很早就开始幻想在圣罗伦佐的家族教堂中有一个隐秘的圣器收藏室，里面存有米开朗基罗1519年的作品。

新的圣器收藏室

米开朗基罗一年后，于1520年，在圣罗伦佐家开始了新的圣器收藏室的工程，设计美第

齐家族成员的墓地，乌尔比罗大公爵的陵墓、内穆尔大公爵的陵墓、紧靠着未完成的《圣母玛丽娅和耶稣》是洛伦佐的和他被谋杀的兄弟朱利安尼的陵墓。

1525年初，米开朗基罗告知教皇，教堂顶上的圆形天窗已经完工了，当时墓碑、门、窗的建筑工程正在缓慢进行中，在设想了很多种摆放墓碑的方式之后，于1531年采用了

为两位大公建造两道墙作为这个伟大工程的入口。

在由于罗马的迫害和佛罗伦萨的包围所造成的工程结束后，工程又继续了，那时是1531年，但1534年，由于克莱门特七世的去世，米开朗基罗离开了佛罗伦萨。这个伟大的工程还没有结束。只完成了罗伦佐大公和朱利安尼的雕像，以及《夜》以及《晨》、《暮》，和在两面墙上的圣母和圣婴系列的创作。

雕刻部分是由特利波罗和蒙特路波于1559年完成的。

洛伦佐图书馆

从1398年到1464年老科西墨开始在家族宅子中收藏洛伦佐带来的及其豪华的手稿，与此同时，形成了建立一个公共图书馆来收藏这些藏品的想法。尽管工程可以追溯到1519年，但只在1523年，当科西墨的孙子——朱利安尼·德·美第齐被选为教皇克莱门特七世后，米开朗基罗才真正地开始设计洛伦佐的图书馆，才开始使得圣洛伦佐图书馆现出雏形。他不只设计了图书馆的周边环境，也设计了图书馆的文化氛围。1524年的一半时间都用于探讨大厅的选址问题的解决方案。从加层的进行到位于地下的修道院的加固，涉及到后来整个1525年的工程。在这个结构方面的解决方案中，为了大厅的建筑风格，采用了一些必要的办法，修改了窗户和立柱的部分。有记录记载说1525年4月做了只设一个大厅的最后决定，增加了工程的难度，怎样才能用先前有的2个楼梯连接4面墙呢，因为先前设计的是2个分开的、靠墙的楼梯。

1526年，大厅快要完工了，在大厅里放了一些柱子。工程于1534年中断了，当时木匠正在做书柜，米开朗基罗离开了佛罗伦萨。在1537年到1568年间，由于米开朗基罗的设计方面的原因，工程多次中断后又重新开始，在他离开的时候，事实上，木质装饰的设计，立柱，屋顶，地板，窗户都已经作为建筑的元素被描绘好了。

楼梯是由巴尔多罗密欧·阿曼那提于1559年建成的。图书馆于1571年向公众开放。1841年，为了庆祝艾尔奇的当选，安杰罗·玛丽亚捐赠的巴斯挂乐·博其安迪的建筑作品作为珍贵书稿藏品被展出。

文物的祭坛

1525年，克莱门特七世有了在圣洛伦佐宫的四歌柱子上放置一个圣体盘的愿望，在其上面放置家族的文物和圣杯。米开朗基罗在工程中断以后于1531年提出过3种不同的放置方案，在去罗马离开佛罗伦萨之后。祭坛建筑工程就像我们现在看到的那样实施了：靠在面对面的两面墙上，中间部分位于教堂的入口处。圣体盘于1532年11月被安放。

研究的方法论

文化艺术遗产记录手段的全面发展有赖于今天的科技进步，在物品的面貌、几何、形态、材料等特征的修复技术都很先进。正是因为遗产保护的施行，才使得信息分析设备得以使用。

结构数据库的建立有赖于两方面的相互作用。一个是大量的用于建立三维立体坐标的资金投入，另一方面是周围继承来的高质量的数据和建筑、艺术的手稿。实际上，这些材料的运用不应该限制在单一学科的短时期的运用，应该综合的发展的跨学科的长期利用。

在整个城区开展通过激光扫描仪获得数据，为了记录城市结构和背景空间的关系，记录微环境关系和外在保存条件的关系。在洛伦佐工厂的内部，尽最大可能地调查了有关计量的、语言的、建造的、建筑材料的记录资料。

米开朗基罗书柜的评估

一个工程进步的代表就是对位于洛伦佐美第齐图书馆的米开朗基罗设计的书柜的评估，该活动是在洛伦佐美第齐图书馆的许可下进行的。工作室，由于2004年恰好在修复。有些米开朗基罗图书馆的书柜是根据修复后的圣器的记录文件建造的。其中，4根最典型的柱子是最先进行科学评估的，最后运用通过对这个历史艺术遗产的保存和评估得来的韵律知识、几何学知识、材料学知识建立一个全面的数据库。

工程被划分成5个时期，代表了一些在结果报道中的多媒体支持的导航声音。

- a) 三维综合评估
- b) 数据库的创建
- c) 建立图片档案
- d) 书柜三维模型的实现
- e) 关于书柜的在线可导航模型的实现

### 结论

用于综合测评的方法论的使用，连续的相关主题的重要的调查的使用，让我们得以建成这个目前正在推广的，数据量巨大，数据质量高的数据库。

米开朗基罗计划的推广要靠各种沟通工具，还需要不同群体的必要信息。

现在有3种想到的可利用的渠道，一是作为价值评估用的知识，二是作为文化工具，使得人们能更正确地接触这些艺术作品，三是用于在因特网上和大家分享。

### 相关活动的网站

上发布的网页的目的在于展示研究计划的主题，每两个月更新一次以展示最新的研究进展状况。

### 相关信息数据库

为和建筑行业相关的人建立了一个信息数据库，里面有各种合理安排的各种等级的数据，甚至包含了所有关于评估和维修工程管理的资料。



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