

An Example of a Map-searchable Database: The Dubrovnik City Councils' Deliberations 1400-1450

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This paper presents a map-searchable database whose purpose is to enable further in-depth research of a particular city during a specific historical period – Dubrovnik, in the first half of the 15th century. It consists of transcriptions of previously unpublished archival documents that have been transcribed and submitted in full length. These transcriptions can be found in a database in accordance with the location of the building or the space they record. Since contemporary Dubrovnik's urban tissue differs from its appearance in the first half of the 15th century, a special map was created – representing Dubrovnik at the time – as an introduction to this database. The map is further subdivided into segments and used for web programming, providing a map-searchable database which takes three steps from the map to the text.

This database's potential uses are presented in a case study of the *Beccaria*, a medieval slaughterhouse and butchers' shop. Apart from abundant information on its maintenance, usage regulations, and the implementation of these processes, special attention has been given to a deliberation that sheds light on its expansion in 1428. This change was visualized in the form of schematic 3D models, enabling better understanding of the development of the city.

Key words:

Dubrovnik, Late Middle Ages, archival documents, map-searchable database, 3D models.

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INTRODUCTION

The aim of this paper is to present a map-searchable database of transcriptions of previously unpublished archival documents and the context in which it was created. This work was carried out as part of the “‘Dubrovnik Civitas et Acta Consiliorum’ (DUCAC), Visualizing Development of the Late Medieval Urban Fabric” project [Plošnić Škarić 2015].¹ The DUCAC project was conducted at the Institute of Art History, Zagreb, with the support of the Croatian Science Foundation, from September 2014 until September 2017. The project emerged from the experience of more than sixty years of urban development research at the Institute of Art History [Grujić and Zelj 2011a; Vukičević-Samaržija 2011] and from the methodology of visualization of the research results, which was developed within the Visualizing Venice project [Huffman et al. 2018].² The map searchable database that was designed by N. Katičić and A. Plošnić Škarić represents a separate, and the most important result of the project.

DEFINING THE PROJECT'S CORE RESEARCH TOPIC

The methodology of research of urban form that was developed at the Institute of Art History comprised a synergy of results achieved using different research approaches. The first is the production of architectural drawings, including floor plans, facades, and cross-sections, made by the Institute's Architectural Department. They enable an understanding of the development of the built tissue and are necessary for the establishment of building typology.

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¹ <https://ducac.ipu.hr/project/>

² <http://www.visualizingvenice.org/visu/>

The second is the use of the results of archaeological excavations. Some of these archaeological excavations were prompted by scholars from the Institute, according to the needs of current research. The third research approach is the analysis of architectural sculpture for the purpose of understanding the provenience of styles and motifs, as well as for distinguishing the masters and stonemasons' workshops that were active in the city. And the last, but by no means the least, are examinations of archival documents, comprising those transcribed and published by other scholars, as well as those found, transcribed and published by scholars from the Institute. These archival data contribute to an understanding of the changes in the built forms.

This methodology has been applied in studies of many urban centers in Croatia, and Dubrovnik's urban form has always been the focus of extensive research campaigns. Among abundant results and references, only those important for defining the DUCAC project's research will be mentioned here. First is the plan of the city of Dubrovnik at the ground floor level and the detailed drawings of the facades of the most important cross-sections of the city, made at the Institute [Prelog and Grujić 1971; Grujić 2013a]. Second are the results of the archaeological research inside the Baroque cathedral, where the remains of two former buildings were found – those of the Romanesque and of the Byzantine cathedral [Zelić 2016a]. With regard to the research of archival documents and their relationship with the urban form and distinguished buildings, just a few results are pointed out here, all of which were published by the project's researchers prior to the project's launch [Benyovsky Latin and Zelić 2007; Grujić and Zelić 2011b; Grujić 2013b]. Considering all the achieved results and the scholarly knowledge of Dubrovnik's late medieval urban form, in 2013, when the project proposal was submitted, the state of the art implied the necessity for more extensive archival investigation.

The archive of the Dubrovnik Republic is one of the best preserved in the Mediterranean. Among numerous volumes, the thorough study of which would require the work of several generations, it was decided to examine the volumes containing the deliberations of the city councils from the first half of the 15th century. These volumes are preserved from the year 1301 until the end of the Republic in 1808. Those that were passed by the end of the 14th century have been completely transcribed and published. The work began in 1879, and the last book was published in 2011 [Lonza 2011], with the full bibliography. The data from these published volumes, as well as those from the unpublished ones, were used by urban historians [Folnesics 1914; Jeremić and Tadić 1940; Fisković 1947a; 1947b; Beritić 1955; 1956; 1958; Mitić 1962–1963; Janeković-Römer 1999; 2003; Novak Klemenčič 2003; 2005; 2011; 2014; Seferović and Stojan 2006; D'Atri 2008; Rudić 2008; Grujić 2010; 2013b; Grujić and Zelić 2011b; Kralj-Brassard 2012]. Their studies mainly focused on specific buildings in the city of Dubrovnik, and they cited data from the city councils' deliberations to a significant extent. This prompted the need to proceed with the study in order to understand the relationships between the space-policy of the Dubrovnik government, its implementation, and the real changes in the urban fabric – changes not only to specific buildings, but to the whole urban tissue. The researchers from the DUCAC project therefore decided to continue from the point where the work on the completely transcribed and published deliberations ended, i.e. from the beginning of the 15th century. This material was aimed at providing new insights into the data that were so far mostly unknown and hardly accessible, existing only in handwritten originals in the archive.

ARCHIVAL RESEARCH

There are 35 volumes from the first half of the 15th century containing the deliberations of Dubrovnik's three councils, the Major, the Minor, and the Senate [DADU]. They have 7,972 *folia*, i.e. 15,944 pages, written predominantly in Latin (Fig. 1). Although the best practice, when unpublished archival documents are concerned, is to make full transcriptions, the duration of the DUCAC project – three years – led its researchers to focus on topics of interest to art historians. Therefore, the deliberations that were transcribed during the project were those revealing information on the urban fabric – more precisely information about its construction, use, maintenance, as well as the management of these processes. Every deliberation that shed light on these topics was transcribed in full. Most of them are five or six handwritten lines long, but there are also those that cover several pages.

The work was done in sequences: first, the pages from the volumes were photographed, then converted to PDFs, then read on computer screens, and simultaneously transcribed (Fig. 2). Transcriptions were made by A. Marinković (242 deliberations), D. Zelić (1,137 deliberations) and A. Plosnić Škarić (1,983 deliberations), and then edited by D. Zelić and A. Plosnić Škarić. In total there are 3,362 transcribed deliberations (approximately 1,5 million characters). There were only 170 deliberations transcribed and published in urban history studies before the beginning of the project, and 364 references (signatures) published as well. All these deliberations were completely transcribed and edited again, in accordance with the principles set out during the project. Furthermore, the study resulted in 2,828

previously unknown deliberations that were found, transcribed, and published as part of the project. Their transcriptions can be found in the book, where the deliberations are structured in chronological order [Zelić and Plosnić Škarić 2017]. The book is available as an OA resource on the project’s website.³

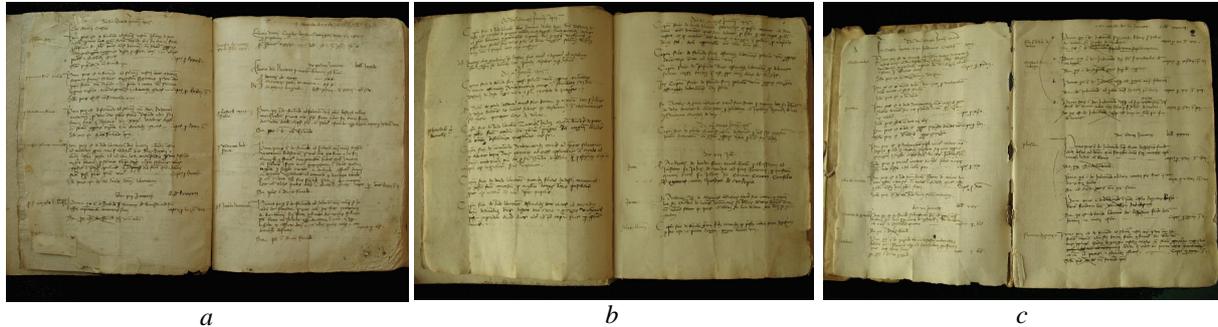
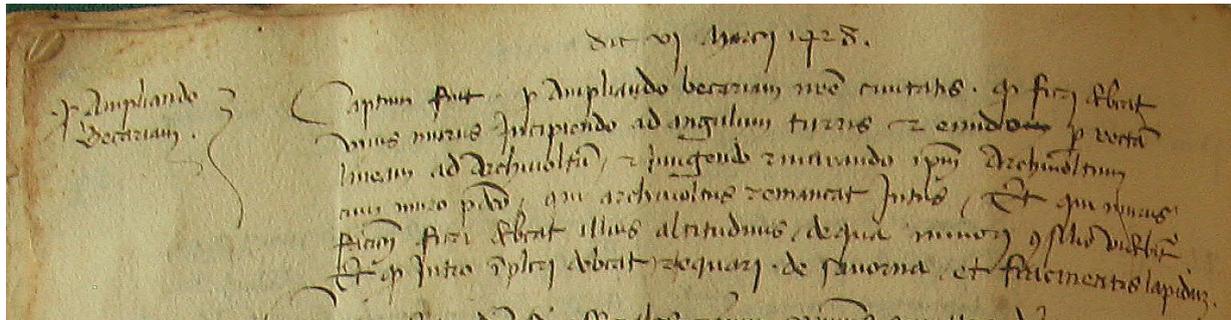


Fig. 1. Pages from the volumes recording the Dubrovnik city councils’ deliberations: a) *Acta Consilii Maioris*, Vol. 1, ff. 1v–2r; b) *Acta Consilii Minoris*, Vol. 1, ff. 4v–5r; c) *Acta Consilii Rogatorum*, Vol. 1, ff. 1v–2r (photo by Danko Zelić)



1428-03-06 Pro ampliando beccariam

Captum fuit pro ampliando beccariam nostre civitatis quod fieri debeat unus murus incipiendo ad angulum turris et eundo per rectam lineam ad archivoltum et iungendo et murando ipsum archivoltum cum muro predicto qui archivoltus remaneat intus et qui murus faciendo fieri debeat illius altitudinis de qua minori consilio videbitur et quod intro impleri debeat et equari de savorna et fracmentis lapidum. (CMin 4, f. 146v)

Fig. 2. The deliberation from 1428 recording the decision to expand the Beccaria; *Acta Consilii Minoris*, Vol. 4, f. 146v, detail, and the transcription (photo by Danko Zelić)

THE MAP-SEARCHABLE DATABASE

However, an additional effort was made within the project: a map-searchable database was created. The aim of this database has been to facilitate in-depth research of the urban history of Dubrovnik. It was meant to be used both during the project as well as after it. When this archival investigation began, the researchers expected to find many new data, but the quantity of nearly 3,000 new deliberations exceeded expectations. Therefore, during the project, only some of these newly discovered documents could be thoroughly studied, comparing the data from the deliberations with the existing urban tissue and previously collected architectural, photographic, and archival documentation. However, this database is also intended to prompt further research. Therefore, it can be defined as a database developed by researchers for researchers.

³ https://ducac.ipu.hr/project/wp-content/uploads/Dubrovnik_Civitas_et_Acta_Consiliorum.pdf



Fig. 3. The map-searchable database of the transcriptions of the Dubrovnik city councils' deliberations from the first half of the 15th century; a) the first step – the entry page with the map representing the city layout at the beginning of the 15th century (the map was made by Marko Amroš under the supervision of Danko Zelić), b) the second step – a magnified segment (here: c5) and the miniature city map for orientation, c) the third step – the transcriptions of the deliberations (here: Deliberations regarding the Beccaria) (web programming by Natko Katičić, created by Natko Katičić and Ana Plosnić Škarić)

The introduction to the database is a map, made at the Institute's Architectural Department under the supervision of D. Zelić.⁴ The map depicts the layout of the city of Dubrovnik at the beginning of the 15th century (Fig. 3a). Although the relationship between built and open spaces in most parts of the city has not changed much since the 13th century [Prelog 1971], there are still some significant differences between the city's layout as it was in the 15th century and as it is today. Furthermore, regarding built structures, the differences are even greater. This is not only due to the rebuilding and embellishing of these structures, but it is also a consequence of the disastrous earthquake that struck the city in 1667. The layout of the south-central part of the city was utterly changed; demolished houses were never built again, leaving open public spaces in their place, or providing the space for erecting the Jesuits' convent and church. The Romanesque cathedral and the church of Saint Blaise, the city's patron saint, were also dismantled so that modern, Baroque churches could be erected in their place. Significant changes were made to the complex of government buildings by the city port, including the Rector's Palace, the City Hall, and the Big Arsenal. Medieval city fortifications also had to be constantly improved and modernized, and the process lasted for centuries. However, all the other buildings in the city underwent subsequent changes as well. Therefore, this map of Dubrovnik, representing the city's layout at the beginning of the 15th century, is the only proper introduction to the database of the deliberations from the first half of the 15th century, and a constant reminder that these deliberations do not relate to the urban form of Dubrovnik as it is today. The deliberations are meant to improve our knowledge of Dubrovnik's urban form in the Late Middle Ages and the changes this form has undergone since.

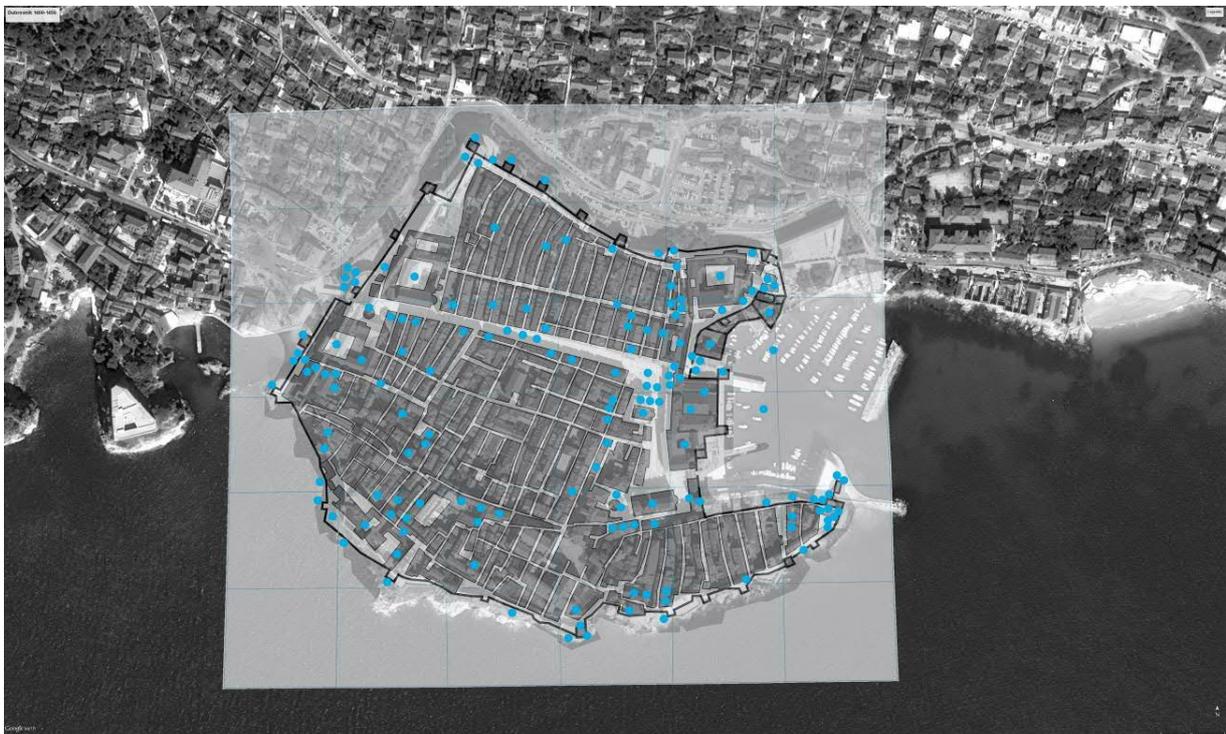


Fig. 4. Survey of 160 dots added to the map-searchable database: the map representing Dubrovnik's layout at the beginning of the 15th century (map by Marko Amroš under the supervision of Danko Zelić) as a georectified transparent layer over a Google Earth aerial view (by Ana Plosnić Škarić)

This map of Dubrovnik in the 15th century is further used by A. Plosnić Škarić and N. Katičić for creating and web-programming the database [Plosnić Škarić and Ferrighi 2017]. The map is subdivided into segments, and each segment is provided with the content, listing buildings and spaces recorded in the deliberations. During the second step, each segment opens in a separate webpage (Fig. 3b). Here the segment is magnified and there are dots added to it, pointing to an exact building or space recorded in the deliberations. Each dot leads to a new webpage – that is the

⁴ <https://ducac.ipu.hr/project/mapping/>

third step – where all the transcriptions of the deliberations regarding that building or space can be found (Fig. 3c). The symbol that was used for mapping is always a blue dot, indicating the presence of data on a deeper layer.

Orientation and navigation were the next issues to be solved. The moment when a user reaches a separate page relating to a particular segment, it is crucial that he/she understands the location of that segment. Therefore, every such page contains a miniature map of the whole city in the upper right corner (Fig. 3b). The chosen segment appears on the map colored in blue.

Once the user reaches a page with a magnified segment he/she can easily switch to the next segment, without having to return to the entrance page. There are two ways in which this can be done. The first is clicking on the borders of the segment, which are programmed as links leading to the adjacent segments. The other is clicking on a segment on the small map of the whole city. Each segment on that map has a link leading to the page where the chosen segment is magnified.

The dots that are added to the segments were implemented using the Image Map Hotspot plugin. When touched by the cursor they show the content. They are also programmed as links leading to the pages containing the transcriptions of the deliberations. These links are activated with a simple click. The major map that serves as the entry point to the database is also provided with hot-spots. Here they reveal the content of a segment.

In total 160 dots have been added to the map-searchable database, clearly demonstrating the control that the Dubrovnik government had over the city during the first half of the 15th century [Plosnić Škarić and Ferrighi 2017] (Fig. 4).

CASE STUDY: THE *BECCARIA* – A SLAUGHTERHOUSE AND BUTCHERS' SHOP

To demonstrate the possibilities for further in-depth research, the following is a case study of the *Beccaria* that was made during the project. After analyzing all the collected deliberations, A. Plosnić Škarić proceeded, together with A. Ferrighi and A. Marinković, to conduct field research. It comprised the examination of the existing building's form and its relationship with the archival data. Further research included a comparative analysis of data that were collected from other sources: architectural drawings, the Cadastral Map from the 1830s, the first city plan from the end of the 16th century [Principe 1991; 2017], the 17th-century *veduta* of the city depicting buildings with a fair amount of precision [Zelić 2016b], and scholarly studies [Beritić 1955; 1956]. With this methodology, some new insights regarding the changes in the urban tissue were achieved.

Dubrovnik's late medieval *Beccaria* consisted of a slaughterhouse and butchers' shop (Figs. 5 and 6). In all Dalmatian medieval cities, slaughterhouses and butchers' shops were situated outside of the city walls and by the sea, to provide the highest possible level of cleanness. In Dubrovnik, the *Beccaria* was in the port, next to the eastern city wall, south of the Tower of Saint Luke and the salt storage, and north of the Tower of Saint Dominic. However, the *Beccaria* was protected by another wall that formed part of the city's fortifications. In the city wall, there was the *Porta Beccarie*, a gate that had to be locked during the night. The cattle were transferred from the north-eastern entrance to the city, the *Porta Plociarum*, along a public street, to the *Porta Beccarie* and the slaughterhouse. It was the shortest route, ensuring the least possible pollution of the public streets.

The list of transcribed deliberations relating to the *Beccaria* that can be found in the map-searchable database consists of 67 deliberations from the first half of the 15th century.⁵ Many of them record the maintenance of these buildings – roof repairs [Zelić and Plosnić Škarić 2017; DUCAC 1423/2] and roof construction [DUCAC 1439/25], pavement repairs [DUCAC 1423/2], ordering new doors for the *Porta Beccarie* [DUCAC 1449/24], and unspecified repairs of walls [DUCAC 1409/25, 1426/65, 1429/20, 1432/21, 1423/14, 1441/53, 1442/22, 1445/55, 1447/68, 1448/11, 1448/25]. They also reveal that there was an enclosed partition in which the animals were kept: a 1436 deliberation required lifting the fence and straightening the fence gate so that the animals could not be stolen [DUCAC 1436/62]. Both the gate and the fence had to be repaired in 1447 [DUCAC 1447/49].

⁵ <https://ducac.ipu.hr/project/mapping/c5-segment/c5-beccaria/>



Fig. 5. The Beccaria on the plan of Dubrovnik, at the ground floor level and in detail
 (© Institute of Art History, Zagreb, Croatia, 1972)

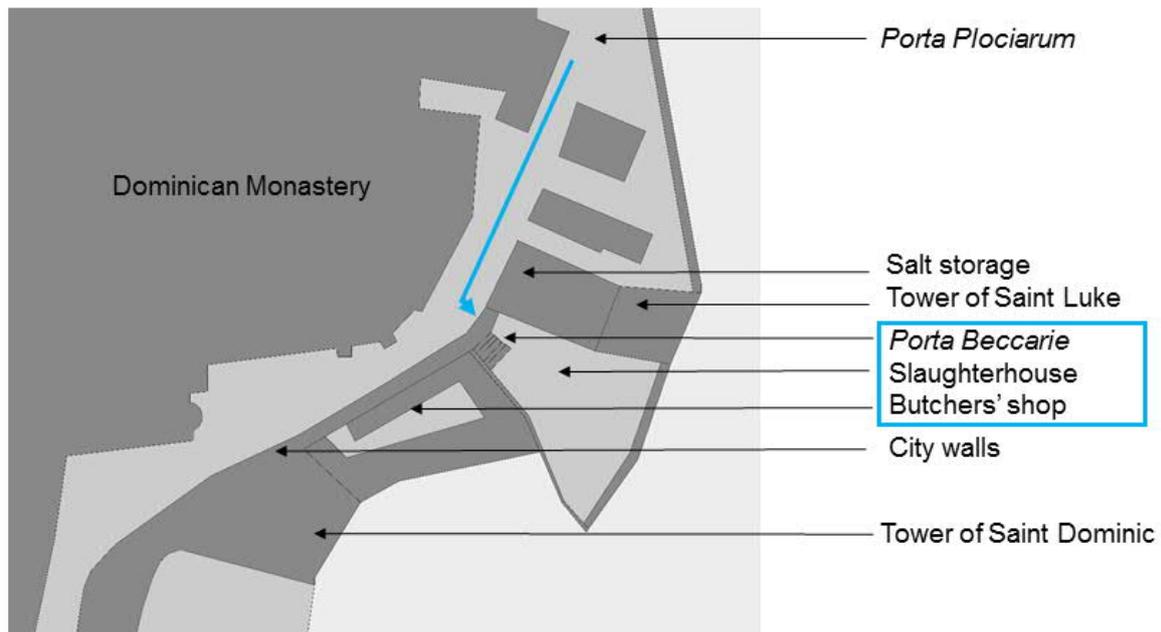


Fig. 6. The Beccaria – Slaughterhouse and Butchers' shop and surrounding buildings presented on the map made after the Cadastral Map from the 1830s (Ana Plosnić Škarić)

The officials appointed to manage all the building, maintenance and repairs, were *officiales laboreriorum*. They were appointed annually and were responsible for managing works on most municipal buildings. However, they were among more than twenty different officials who were appointed to manage different works concerning buildings and spaces in the city during the first half of the 15th century [Plosnić Škarić and Ferrighi 2017].

Officiales laboreriorum were also those who had to regularly examine the banks where the meat was cut. Depending on their condition, the banks were then repaired [DUCAC 1422/19, 1425/78, 1426/64, 1426/74, 1426/75, 1427/38, 1429/20, 1429/56, 1434/22, 1435/30, 1436/40, 1437/27, 1438/24, 1438/54, 1439/22, 1440/13, 1440/21, 1440/32,

1441/53, 1442/22, 1445/14, 1450/21], or replaced with new ones [DUCAC 1426/39, 1445/73, 1447/59]. Furthermore, the butchers were not allowed to move the banks and special commissioners were appointed to determine a site for each bank [DUCAC 1424/36, 1426/39]. The penalty for disobeying recorded in 1424 suggested a sentence of one month's imprisonment [DUCAC 1424/36]. However, the penalty didn't seem to be strong enough, and a deliberation from two years later imposed a punishment for the loss of a work permit [DUCAC 1426/39]. Ten years later, the prohibition on moving the banks was repeated [DUCAC 1436/122]. It was only a deliberation from 1445 that demanded the removal of a butcher's bank [DUCAC 1445/71], probably as a consequence of repeated disobedience.

Both the slaughterhouse and butchers' shop were municipal property. The license for using these buildings and the banks was given by the government. Among the deliberations there are only two licenses [DUCAC 1433/81, 1439/71], thus it is possible to assume that they record permissions based on special pleas, while the regular licenses were written down in some other book. Both licenses specified the exact position of the new bank inside the *Beccaria* – to the right of the entrance stairs – probably because the rest of the space was already occupied.

The reason why the butchers were permitted to slaughter animals only in the municipal *Beccaria* was not just to maintain the cleanliness of the city. They were also obliged to pay a fee for every animal slaughtered. A deliberation from 1447 specified the fee for pigs and castrated animals, most likely because the government raised these fees [DUCAC 1447/15]. Furthermore, the butchers were obliged to hand over the fat from the animals, and the fat was used for making candles, which was the duty of a municipal candle maker [e.g. DUCAC 1422/27]. The butchers were obliged to store the fat in cupboards that were made especially for this purpose. These cupboards were regularly repaired by the government [DUCAC 1436/41] and each was provided with its own key [DUCAC 1436/103]. A special *scriba* – a clerk – was employed to write down all the collected fees as well as the quantities of animal fat. A barrack was built in the slaughterhouse for him, with a cabinet for storing his account books. Both were regularly maintained [DUCAC 1436/44, 1436/50, 1440/21]. A deliberation from 1449 reveals that there was also a special regulation regarding the animal skins, and that butchers were not allowed to re/move them without permission [DUCAC 1449/25]. It was for all these reasons that it was necessary to report the slaughter of any animals outside of the city walls [DUCAC 1449/27].

The Dubrovnik government always paid special attention to ensuring that food sold by quantity was measured using a certified tool. This control was necessary to ensure fair trade between the citizens and the merchants. Therefore, in the *Beccaria*, only the weights and balances provided and attested by the government could be used. In 1438 new weights were delivered [DUCAC 1438/23]; a new cabin was erected for their storage [DUCAC 1438/24], and a new official was appointed as the only person allowed weighing the meat [DUCAC 1438/25].

Regarding the regulations of butchers' working hours and the conditions under which they used the *Beccaria*, a 1440 deliberation reveals that they were obliged to work on Saturdays and the penalty for disobeying was eight days' imprisonment [DUCAC 1440/47]. Since wood was a precious material in late medieval Dubrovnik, the citizens used to store all the good parts from disassembled objects, knowing that sooner or later an occasion would come to reuse it. A 1449 deliberation demands that butchers remove all such wood from the *Beccaria*, where they were obviously accustomed to storing it [DUCAC 1449/26]. In 1447 an official announcement was proclaimed throughout the city, which prohibited the owners of a pig from letting it wander through the *Beccaria* and on public streets [DUCAC 1447/65].

All these deliberations reveal the vibrant everyday life of this part of late medieval Dubrovnik, whose government had to put constant effort into upholding the functionality of the whole urban tissue. Although the deliberations presented here are from the first half of the 15th century, one can expect to find similar ones before and after that period. Maintenance of and improvements to buildings are a necessity, regardless of the historical period, and usage regulations require frequent repetitions and modifications in order to maintain the necessary discipline.



Fig. 7. The Beccaria, a) view from the city port, b) the staircase and the arch, view from the former slaughterhouse (photos by Ana Plosnić Škarčić)

Among these 68 deliberations there were two, both from 1428 that attracted particular attention. They both reveal data about changes in the built tissue. The first records the decision to expand the *Beccaria* [DUCAC 1428/22] (Fig. 2). It was expanded towards the east and the city port. The new wall had to be built starting from the south-eastern angle of the Tower of Saint Luke and then proceed towards the arch. The arch had to be walled in, after a new part of the slaughterhouse was built. The levels of the old and the new parts had to be equalized. The new part therefore had to be filled with stone fragments and sand. The second deliberation describes the new arch and the staircase that had to be made [DUCAC 1428/86]. The arch opening had to resemble the opening in the old arch so that the seawater could enter. The staircase had to lead from the slaughterhouse down to the sea level, and it had to be spacious enough. This arch and the staircase, recorded in the second deliberation from 1428, still exist (Fig. 7). They enabled the cleaning of the slaughterhouse. The arch is approximately one meter high and reinforced with an iron lattice door. It was obviously meant only for the disposal of waste, and not for transit, as this would have been a weakness in the city's fortification system.

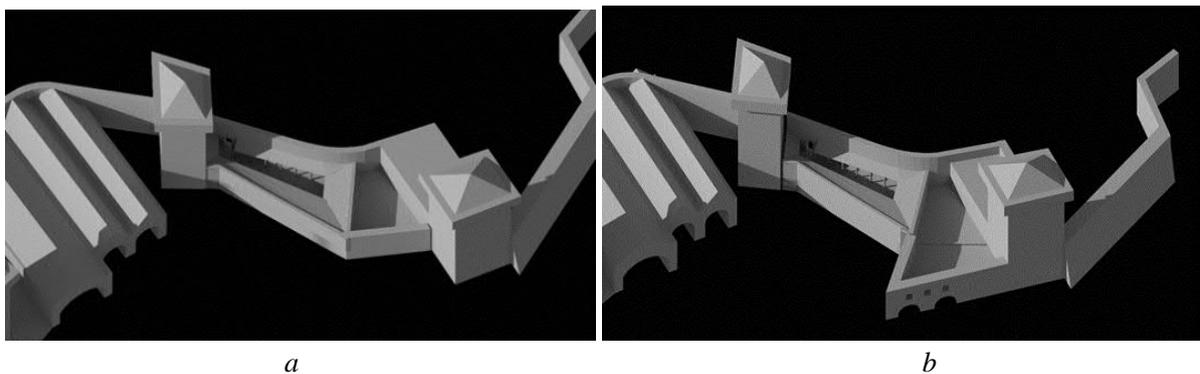


Fig. 8. Schematic 3D models of The Beccaria a) before 1428, b) after 1428 (models by Danijela Šapina, supervision and rendering by Ana Plosnić Škarčić)

To ease the understanding of the changes in the urban form according to these city councils' deliberations, two 3D models were made (Fig. 8). These models were made schematically and they represent the form of the *Beccaria* before 1428, and after it was expanded. The architectural drawings of the ground floor level, made at the Institute, were used as the initial layout. The roof above the butchers' stores was modelled after the Cadastral Map from the 1830s. Other details, like the battlements and the staircases, were not included in the model, although they still exist. They can be depicted well in photos. No attempt was made to depict the structures that are recorded only in written

sources, like the animal fence, barrack, cupboards and banks. This would presume to invent the sites and forms of these parts. The semi-circular reinforcement in front of the Tower of Saint Luke, which still exists, was not modelled since it was erected after the mid-15th century. The aim of these models was not to present in detail how the *Beccaria* might have looked during the first half of the 15th century, but rather to depict only the most important decision from the 1428 deliberation and its relationship with the built tissue – that is the significant change to the urban form that was caused by the expansion of the *Beccaria*. Consequently, these models are schematic, showing only the development of the built volumes.

However, all these deliberations have demonstrated the high demographic and economic growth of Dubrovnik, which resulted in the expansion of the urban tissue – the *Beccaria* – as well as by multiplying regulations on its maintenance, usage and the number of officials appointed for their implementation.

CONCLUSION

Understanding a city in a certain historical period is a complex task that requires efforts from various disciplines. This paper has presented a database of transcribed deliberations from the city councils which were previously available mostly as handwritten originals in the Dubrovnik archive. These deliberations were chosen according to the research interests of art historians. However, they are not limited to those interests that are traditionally of greatest importance to art historians, namely the changes of the urban shape and form. Rather, they cover more extensive issues: maintenance, use and management of the processes. As such, they deliver data that explain why certain building campaigns were created, by whom and in which way they were prompted, by whom they were implemented as well as how these buildings and spaces were used. These deliberations could therefore be studied by disciplines other than art history, leading to a deeper understanding of a city in a certain historical period.

Within the art history discipline, the interpretation of these new data benefits from the knowledge collected during the long-term research campaigns that were conducted at the Institute of Art History. Firstly, they enable visualization using 3D models. These 3D models were made according to certain principles and for a defined purpose. The purpose of the models of the *Beccaria* was to enable an understanding of the changes in the urban form in relation to the 1428 city council deliberation. The principle under these models was made to depict only the most important changes, leaving all the details aside. Using the same principle, a schematic 3D model was made during the project, representing the city in the first half of the 15th century.⁶ Its main purpose is to raise awareness of the differences between the urban form of Dubrovnik as it was then and as it is now. The second benefit from the knowledge collected at the Institute of Art History resulted in the mapping of the transcriptions of the deliberations using a map that depicts the layout of the city at the beginning of the 15th century as an introduction. It is important to note that many of the buildings recorded in these deliberations do not exist in the form they had then or have vanished completely. The map was further used in web programming and in this way a map-searchable database was created, revealing abundant data about urban life in Dubrovnik during the first half of the 15th century.

The creators of this map-searchable database believe that this database, as well as the 3D model schematically depicting the city of Dubrovnik in the first half of the 15th century, will prompt and facilitate further in-depth research of its urban history.

⁶ <https://youtu.be/yNb57aggeKo>; <https://ducac.ipu.hr/project/exhibition/>

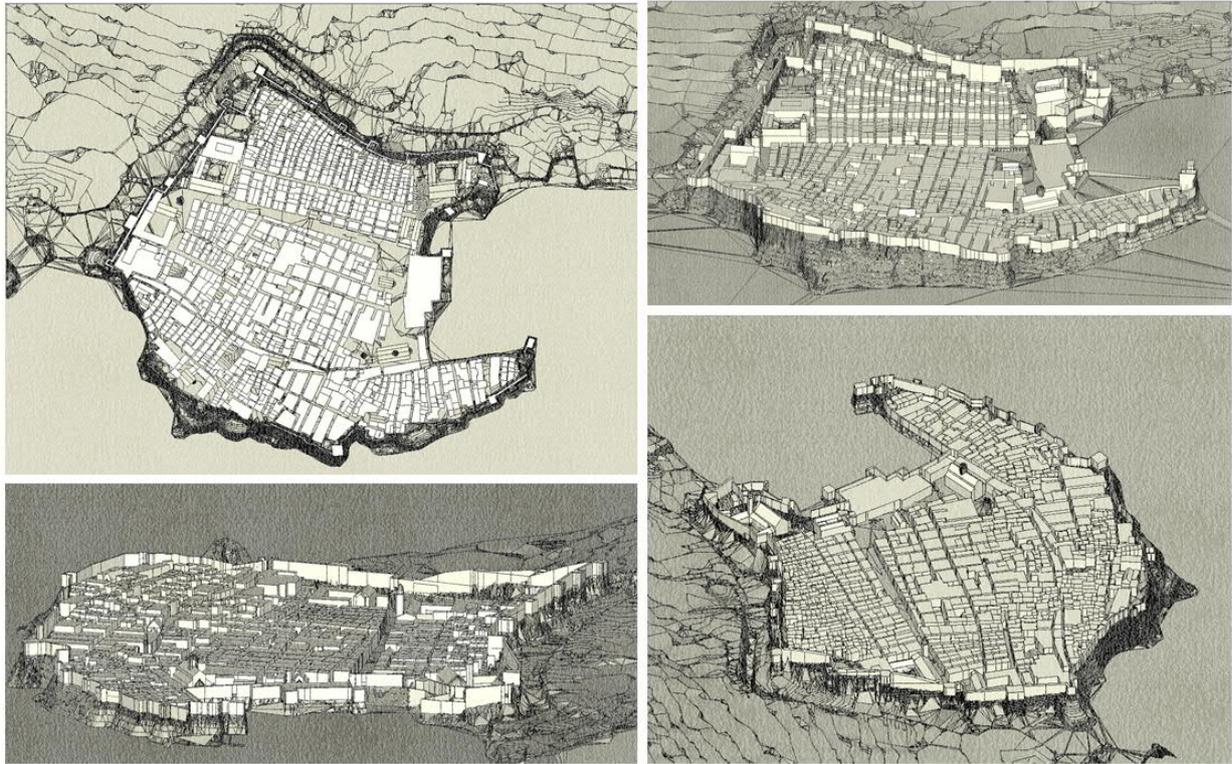


Fig. 9. Scenes from the video presenting a schematic 3D model of 15th century Dubrovnik (model by Danijela Šapina, supervision by Ana Plosnić Škarč; see also footnote)

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