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Collaborations: Rethinking Architectural Design

[transcript]

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Issue Editors
Elettra Carnelli, Federico Marcolini,
Fabio Marino, Rafael Sousa Santos

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How Do We Work Together? Enhancing the Role of Collaborations in Architectural Design

Elettra Carnelli, Federico Marcolini, Fabio Marino, Rafael Sousa Santos

Collaboration appears to have always been at the heart of architecture: in the complex process of design, architects must involve and be involved with different actors, professionals, and sets of knowledge that contribute to the final project, both in the design and realization phases. Such processes need the support of heterogeneous inputs that often go beyond the sole architectural discipline. Although architecture has its own unique body of knowledge, it needs to engage with other fields to create new insights and syntheses through design, which is, by nature, inherently transdisciplinary and interdisciplinary, based on dependency and contingency.

Indeed, people, circumstances, and unforeseen events influence the architects' plans, while external conditions, such as the economy, legislation, politics, technology, and society strongly shape and affect the built environment (Till 2009). As a result, architectural questions are not exclusively confined to the discipline and cannot be addressed solely from an architectural perspective. They require participation and collaboration between professionals, stakeholders, and researchers with diverse backgrounds. This is evident when considering urgent topics such as climate crisis, globalization, or issues of social equality.

Recently, with the increasing complexity associated with architectural project management, the interplay between architecture and other disciplines has shifted, prompting a rethinking of the architect's role within the design process. In response, architectural offices have undergone structural changes, re-imagined roles and adapted work methods to mirror the evolving demands of contemporary society. In some cases, this shift prompted practicing architects to test and propose alternative working and

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economic models to better fulfill their social responsibilities, as evidenced by the recent issue of *ARCH+ Unternehmen Architektur* (Kuhnert/ Ngo 2023).

Given the cross-disciplinary nature of problems associated with architectural design, architects need to broaden their training to encompass inherently collaborative and relational skills. This is why it is mentioned in the *Charter for Architectural Education* (UNESCO–UIA 2017) as a pedagogical principle that architects should be trained as generalists – and we can add that they should also be capable of working with specialists, users, and stakeholders, among others.

Despite the increasing interest in exploring the collaborative nature of architecture and spatial disciplines, we see that collaborations in design are not yet widely explored in all areas of architectural design. While the factors and individuals contributing to a specific spatial solution are diverse, they are often overlooked or excluded from architectural discourse, an omission that seems to be reflected in how we comprehend and portray architectural practice. This is indicated by how design continues to be taught in many architecture schools, with many studios maintaining a personal or individual approach to design, and multidisciplinary teams not being as common.

Indeed, a persistent gap between the collaborative essence of architectural design and its representation in discourse and educational contexts can be observed. Acknowledging this disparity should extend beyond recognizing the limits of the discipline; instead, it can serve as a catalyst for constant critical reflection and adaptation. It is precisely from this perspective that we aim to address the topic of collaboration in architectural design within this publication.

For the fifth issue of *Dimensions. Journal of Architectural Knowledge*, we selected contributions that explored the impact of collaboration on architectural design processes and considered the conditions and implications of their integration into practice and discourse. The issue aims to initiate an exchange between theory and practice, contributing to the discussion on collaboration and interdisciplinarity, as well as its application within design practice. For this reason, the issue includes contributions and visual essays as reports from teaching activities, realized or planned architectural projects, theoretical reflections on the topic, and the critical depiction of case studies, all of which adhere to the definition of new roles and modes of practice and address the significance of collaboration in architectural design.

The issue is structured into five thematic categories, namely: »Approaches«, »Tools«, »Teaching«, »Interactions« and »Narratives«. Each category includes two contributions alongside an interview in the closing section. The first section, »Approaches« uses concrete examples of more or less explicit collaborative methods and practices that involve users, planners, and specialists, and that enhance the comprehension of a specific context and make constructive contributions to both the context and its community. These approaches aim to suggest potential ways to translate theory into action. For instance, Ayesha Müller-Wolfertshofer and Benedikt Boucsein's contribution involves identifying and documenting various layers of collaborative functions and individuals within a section of the informal settlement Dharavi (Kumbharwada) in Mumbai. Through meticulous on-site explorations, the authors aim to demonstrate how hybridity, rooted in a specific place, can be employed and interpreted for a sustainable transformation of urban areas. The visual essay by Maria Francesca Lui focuses on the synergistic integration of technological innovation and traditional techniques within the design practice of *Harquitectes*. This approach explicitly and proactively promotes collaboration with a diverse range of experts and specialists, identifies design principles and energy management concepts, and adapts them to contemporary needs. The dialogue between Federico Marcolini and Nuno Graça Moura delves into Nuno's experience as a collaborator in Eduardo Souto de Moura's architectural office and his co-author on some recent projects. It highlights the bridge between studio design and on-site execution, all rooted in the distinctive environment of Porto, and illustrates an ongoing dialogue between Souto and his collaborators as a rich exchange of ideas, that melds formal and informal interactions within the workspace.

In the »Tools« section, the exploration of the practical aspects of architectural collaboration continues, investigating how the discipline's own instruments, such as digital and analogue models, can be used to establish deeper synergies. The contribution by Jana Hartmann and Dennis Häusler examines the potential of the 1:1 scale model, with a focus on its possible applications and uses. The authors highlight the consequent capacity of 1:1 models to foster deeper interactions with future users and designers within the context of the participatory design process. The relationship between physical and virtual dimensions, mediated by the »digital architect« in the production of knowledge linked to cultural heritage, is addressed in the article by Güzden Varinlioglu. Their work initiates a reflection on how interactive experiences influence an individual's perception and their comprehension of space and

heritage. The section concludes with an interview with Claudia Mainardi and Giacomo Ardesio from the collective *Fosbury Architecture*, in which they present the instruments and strategies of the group's collaborative design approach, together with its practical implications.

Enhancing the relevance of collaborations in architecture inevitably requires an emphasis on education. Within the »Teaching« section, the two contributions highlight collaborative teaching experiences in different institutions and contexts. Asma Mehan and Jessica Stuckemeyer reflect on how fostering collaboration within the design studio, particularly in the specific case of adaptive reuse, can lead to the development of a design approach that is culturally focused, contextually grounded, and democratic. Benedikt Boucsein, Isabel Glogar, Marco Kellhammer, Stefanie Ruf and Mareike Schmidt, from the professorship of urban design at the Technical University of Munich, provide a comprehensive overview of their ongoing teaching formats involving collaboration and address the urgent climate crisis within urban design education. The role of collaboration in architectural design education is then explored in a conversation with Sofie Pelsmakers. The communication acknowledges the complexity and broad scope of the significant challenges that architecture must address, including the climate crisis, the possibilities of multidisciplinary design and how it can be developed both in schools and architectural research.

Embedded within collaborations are the intricate interactions among the numerous actors involved in the design process. The »Interactions« section explores these relationships and their consequential impact on the final output, whether it be a villa in Sardinia, as in the case of Michela Bonomo's contribution, or a computer program, as described by Pablo Miranda Carranza. Michela Bonomo's reflection on the genesis of *La Cupola* by Dante Bini addresses the pivotal relationship between the architect and the client, Michelangelo Antonioni. This dynamic led to a surprising hybridization of architectural language within and beyond the example of the building. On the other hand, Pablo Carranza's close reading of the code of the Palladio software investigates how design principles, presented as so intrinsically human, can be translated into the mechanized operations of a computer program. The section ends with an interview with Salvatore Licitra, founder of the *Gio Ponti Archives*. Gio Ponti's grandson broadens the discourse on the Milanese architect's interdisciplinary creativity, expressed through impressive collaborations with artists and artisans, and reflects on two enduring

duos, the associate and wingman engineer, Antonio Fornaroli, and Ponti's daughter Lisa, deputy director of *Domus*.

Finally, the section »Narratives« presents a selection of concise contributions that scrutinize collaboration and explore its effectiveness and impact through exploratory and speculative approaches. Oliviero Vitali and Rocco Vitali's narrative takes us on a design and physical journey, deepening the intricate relationship between the architect, the craftsman, and the client; João Quintela and Tim Simon-Meyer from *Atelier JQTS* explores the possible dialogue between the human body and the built environment and emphasizes its role in the realm of design. Hannah Rochelt reflects on the significance of references and their interpretation in her project proposal for Munich's Südliches Bahnhofsviertel. Debasish Borah's visual essay questions the power dynamics and implications of collaborations between government and social institutions by using the perspective of residents of Salmora village in Assam, India as the focal point of the contribution.

We want to express our heartfelt gratitude to all the authors for their valuable contributions to the publication, to the external reviewers for their willingness to provide thoughtful and invaluable feedback, and to Dimensions' leading editors for their precious support throughout the entire process.

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APPROACHES

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Charting Hybridity in Dharavi for New Potentials of Collaboration

Ayesha Mueller-Wolfertshofer, Benedikt Boucsein

Abstract: Dharavi is an informal settlement in Mumbai reputed for its commercial enterprise. This article documents the spatial configuration of a typical pottery production unit in Kumbharwada, Dharavi, demonstrating the complexity and juxtaposition of prevalent uses. The manufacturing process has been recorded through extensive fieldwork and interviews with the potters on site. The paper proposes that such data, although laborious to collect, should be used to integrate user requirements into slum-redevelopment initiatives to preserve hybridity and ensure the continuation of vital urban functions and livelihoods. It illustrates the possible role of architects in such processes of collaboration for understanding, recreating, and further developing the informal spatial organization of socio-economic functions.

Keywords: Informal Settlement; Slum Redevelopment; Dharavi; Kumbharwada; Pottery.

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Introduction and Theoretical Framework

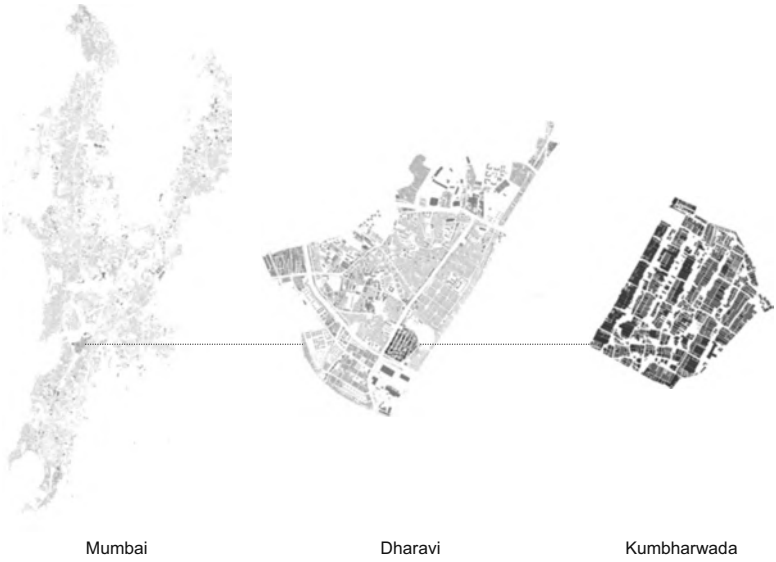
> »Dharavi is an interesting and exceptional place. Here, people live most of their daily lives within the borders of Dharavi and yet are connected to the rest of the city by the two railroads. This way of life – local, with your entire daily needs within walking distance and yet with the possibility to interact with the city around you – is an ideal situation« (Engqvist/Lantz 2008: 59).

This quote from Engqvist and Lantz attests to Dharavi's hybrid nature. The term hybridity has, until now, mainly been used in the Western context of planning and real-estate development (Fernández Per et al. 2014; Mueller 2017; Le Fort 2019). Vernacular architecture, however, is also hybrid in nature and exists across the globe (cf. Oliver 1997). Informal settlements in Mumbai are one such example. From a planning perspective, it is important to understand existing correlations of socio-economic activities, as the spatial fabric has evolved over the decades to cater to the specific needs of those who built it. Dharavi, also known as Asia's densest slum, internationally renowned for its small businesses and production units, is used as a case study for an approach towards slum redevelopment that integrates these aspects.

On November 29, 2022, the *Adani Group* won the bid to redevelop Dharavi, bringing the area back into the international debate on planning and governance. The proposed redevelopment project is to be completed within the next 17 years, with the timeline for rehabilitation set at at seven years (Adimulam 2022). Commercial establishments and the inhabitants of about 58,000 »eligible« structures are to be resettled within the settlement while an equal number of inhabitants are to be relocated to other parts of the city (Indorewala 2022; Lewis 2022). The results of negotiations with inhabitants conducted over the years for the Dharavi Redevelopment Project have been erased and an entirely new master plan will be created which no longer facilitates inhabitant participation (Indorewala 2022). The architect's role will be that of a top-down planner, imposing a scheme on an existing structure without communicating with current residents. This role is problematic since Dharavi offers not only shelter but also employment to thousands of its inhabitants. Various economic activities exist, from recycling and plastic industries to food and leather production. Artisans like potters, carpenters, and tailors also live and work here, exporting their products domestically and abroad (Engqvist/Lantz 2008; Patel/Paul 2010). These deep-rooted economic systems, or micro-ecologies, have to be integrated into redevelopment plans

to ensure the continuation of vital economic patterns, conforming to contemporary knowledge about how cities should best be configured (cf. Meerow/Newell/Stults 2016; Moreno et al. 2021; Pozoukidou/Chatziyiannaki 2021). And, according to Indorewala (2022), as well as Patel (1996), such a scheme could be possible: If Dharavi's redevelopment was carried out without the intention of making profit from extra apartments built for sale, all the inhabitants could be resettled on the site without deeming half of them ineligible. Integrating inhabitants into the planning process could also help safeguard their economic systems and incorporate these into the master plan. The authors add that since the settlement is primarily on government land, it is mainly the costs of planning and construction that inhabitants would need assistance with, an amount that the government could provide.

In this context, the article attempts to identify and document collaborations between functions prevalent in one section of Dharavi: Kumbharwada, also known as the potters' colony. It builds on the work of Patel and Paul (2010); Dovey and Tomlinson (2012); Indorewala and Wagh (2014); Rosa et al. (2014); Nijman (2015); as well as Bray and Shyam (2018b), who documented existing structures and processes in Mumbai's informal settlements on the urban scale to enable the integration of bottom-up initiatives into their redevelopment. This article deepens the existing work by extensively studying a single production unit cum household in Kumbharwada to understand the spatial requirements of current collaborative processes. This is done by analyzing existing constructions through the perspective of hybrid buildings to account for their multi-functional nature. In doing so, the article seeks not only to contribute to a better understanding of the specific case study but also attempts to show how hybridity, rooted in a specific place, should be understood as a first step toward a sustainable transformation of cities; as hybrid buildings use resources more effectively than those separated by functionalist planning (cf. Fernández Per et al. 2014; Le Fort 2019). Apart from this, the article also attempts to understand how the role of the architect as collaborator could be strengthened to deal more effectively with the environmental and social crises of the 21st century.



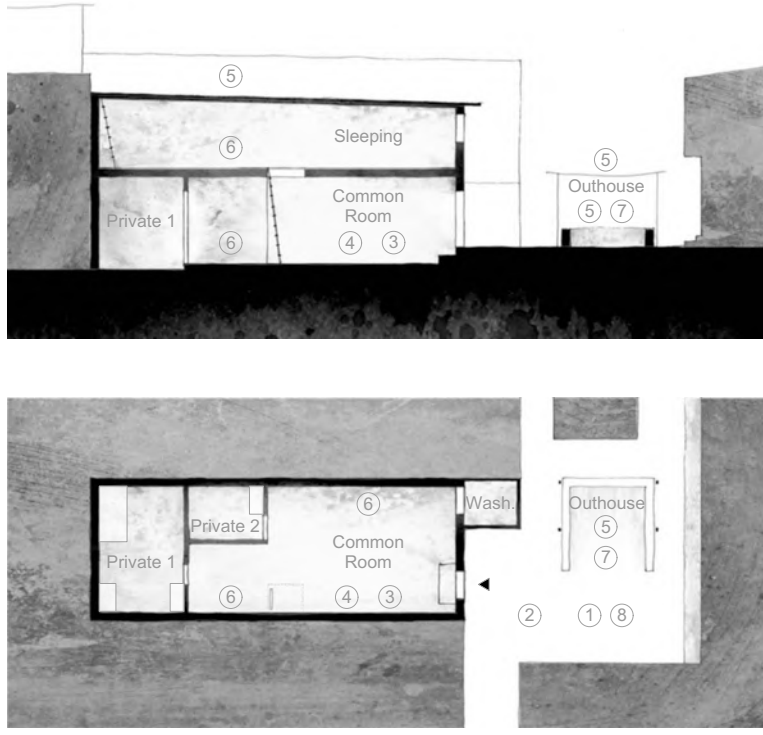
1.
Ayesha Mueller-Wolfertshofer: Kumbharwada in Dharavi, Mumbai, 2023.

Case Study and Methodology

The pottery processes in Dharavi are as old as Dharavi itself (Engqvist/Lantz 2008: 166; Patel/Paul 2010: 22). The community of Kumbhwarwada was formed in the 1800s as the potters, or Kumbhars, were shifted out of the city center due to the pollution created by their kilns (Ohlsson 2013; Bray/Shyam 2018a). Together with the leather manufacturers, they were the first businesses to settle in Dharavi, then a marshy area on the outskirts of the city (Sharma 2000; Engqvist/Lantz 2008). Over the years, the settlement grew and was engulfed by the city as it expanded to the north. Today, Dharavi consists of over one million people living in about 2 square kilometers of prime real estate in the heart of the city of the city (Patel et al. 2009). Kumbharwada covers about 2 per cent of this area and accommodates about 5000 potters that live and work here (Saglio-Yatzimirsky 2015: 95) (fig. 1). These families are fourth-generation inhabitants of Dharavi and constitute one of the settlement's three most extensive manufacturing sectors, accounting for about 18% of all production units (Saglio-Yatzimirsky 2015: 157). Their processes are deep-rooted and their artifacts internationally reputed (Burman/Datta 1971).

The article reflects on the pottery process and proposes a methodology that could be the basis for similar studies and subsequent projects in Dharavi and beyond – leading, through the integration of knowledge gained from user collaboration to a continuation of vital functions while improving aspects that are currently detrimental to the inhabitant's health as well as their economic activities. It comprises the following sections: »Collaboration in the Family and its Spatial Constellation«; »Collaboration in the Neighborhood«; and »Hybrid Principles for Redevelopment and the Need for the Architect as Collaborator«.

With a qualitative framework, this research has documented the multi-faceted use of spaces for economic purposes in one household in Kumbharwada. To collect the data, the family's confidence first had to be gained, the most difficult part of the process. With severe political and financial pressure to redevelop Dharavi, inhabitants distrust strangers, especially planners, who approach them. Without collaboration, however, explicit and implicit user requirements cannot be understood. A large amount of time was therefore spent getting acquainted with the family whose home was to be examined before interviews were conducted. This is the first step in an alternate role of the architect, who, to become a collaborator, first has to become an acquaintance. Even so, not all interviews could be documented.



1 Loading / Unloading
2 Mixing Clay
3 Storing Mouldable Clay
4 Throwing Clay - Potters' Wheel
5 Drying Clay
6 Storing Shaped Clay
7 Firing Shaped Clay in Kiln
8 Packaging finished Artifacts

2.
Ayesha Mueller-Wolfertshofer: Constellation of uses in the pottery unit, 2023.

The fieldwork took place in two phases. The first was from February to March 2022 and consisted of gaining an overview of the area, understanding socio-economic processes, and interacting with inhabitants. The second phase of research occurred during the monsoons in September 2022 in order to study the changes in the production process during this period. Communication was in the national language, Hindi, since most inhabitants do not speak English or any other foreign languages. The exact location of the unit will not be disclosed in order to retain the family's anonymity.

Collaboration in the Family and its Spatial Constellation

The unit studied is the home of a family of five: the grandmother (80 y.o.) with her her two sons (40–50 y.o.), daughter-in-law (40 y.o.), and grandchild (15–20 y.o.). A worker who mixes clay for the family (50 y.o.) also lives with them and pays rent. While the granchild goes to school, the sons tend to the family's financial needs. The daughter-in-law assists her husband and his brother in their economic processes, as well as the grandmother in the domestic chores. The close proximity between domestic and economic activities is an important feature that enables the family members to carry out different tasks-like watching over children or caring for the sick-flexibly, while collectively ensuring financial stability.

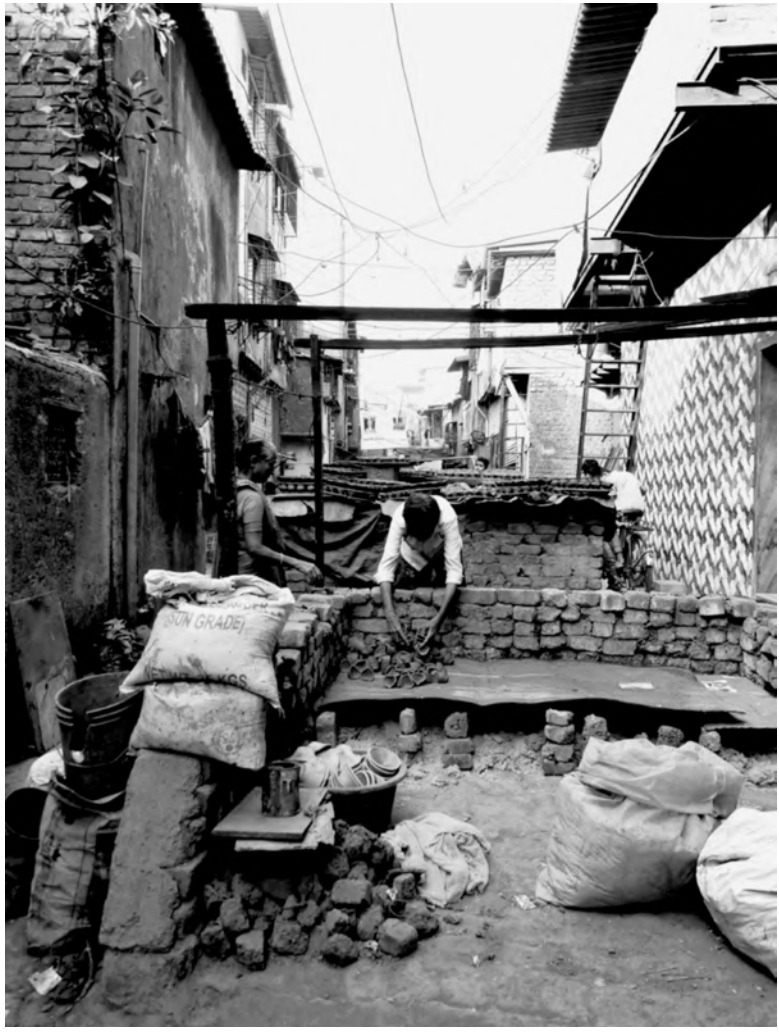
The unit, with a similar layout to others in the neighborhood, is long and rectangular. It covers about 60 square meters and only has openings on one side (fig. 2). It has two private rooms on the ground floor. The larger room is mainly used by the grandmother to cook and sleep in, as she is no longer able to access the upper floor. The smaller room is a private area for the daughter-in-law and is mainly used for cooking. Both rooms open into a large common area for production. A ladder connects this common room with the upper floor, where the rest of the family and the worker sleep. The ground floor has been extended with a small washroom containing a toilet on the outer facade. There is an open outhouse of about nine square meters opposite their entrance, which is converted into a kiln when required. Work with wet clay is restricted to the production room and areas outside the home to reduce the spread of soil and moisture in the areas for domestic activities. The private rooms are used for storing clay artifacts when necessary. The unit is predominantly constructed of brickwork and incorporates recycled materials for doors, windows, roofs, interior partitions, and other elements.

3.
Ayesha Mueller-Wolfertshofer: Mixing of clay, 2023.

The work process, as explained by the family and observed in the field, is as follows: Clay soil is brought to the settlement by trucks from Gujarat, the state from which the family originates. The soil is transported in sacks and delivered to the family's doorstep by laborers. The family buys one tonne at a time, which is usually processed within four days. Once the sacks are delivered, the powder is spread on the ground outside the entrance and mixed with water to create the clay with which they work. This is done by the worker who lives with the family (fig. 3). The clay is then cut into workable pieces and thrown onto the potters' wheel in the common room. Within seconds a handmade Dia, an Indian oil lamp, or a small earthen pot is shaped and placed to dry. The family explained that, when placed in the open, either in the shed outside the home or on the roof of the unit, the shaped clay dries in a day because of its exposure to sunlight and wind. If left indoors, it needs three days until it is ready to be burned. The family's daily routine thus consists of throwing clay, forming work-pieces, leaving them out to dry during the day, and finally bringing them into the dwelling at night, until enough of the pieces are accumulated to be burned.

The process of firing the clay artifacts takes over a day and occurs about once a week, in summer and winter. For this, the outhouse is converted into a kiln (fig. 4). The first step is preparing the layers of waste cotton and insulation material. The family did not specify what these consist of; it was only mentioned that the kiln can burn for long periods and reach temperatures of about 1200 Celsius degrees. A metal sheet is placed over this material and the molded clay forms are stacked on it. Metal sheets and roof tiles then protect the forms on the top before another layer of fabrics and insulation material is used to cover the entire mass. Once completed, the furnace is lit, and the clay is burnt for a few hours. According to the family, the clay must be burned for four hours at a temperature of 1200 Celsius degrees. The smoke created by this process spreads into all of the households in the immediate surroundings (fig. 5). The burned clay is left to cool overnight and collected the following day.

The shaped clay forms, once burned, are transported to shops and workshops throughout the city. The family states that their business is not registered, so they do not have a permit for retail sales. Therefore, they only work for orders they receive from known clients and sell their artifacts to them at wholesale rates. The Dias, for example, are transported to workshops where they are painted using bright colors before they are sold as oil lamps in shops. Small earthen containers are filled with milk sweets like rabdi or lassi



4.
Ayesha Mueller-Wolfertshofer: Creation of the kiln,2023.

before they are likewise sold in shops. Other objects like pots, are re-sold by merchants as they are. As the artifacts are packed and delivered to the customers by hired workers, the family prepares for the next pottery batch, thus entering a new cycle of production.

This process changes during the monsoon period, which usually lasts from June to September and is characterized by massive rainfall. During the site visit at this time, the family stated that work was much slower. This was confirmed by observation in the field: although the shaped clay had been placed under fans in their private rooms for over a week, it still hadn't dried. Almost all of the steps in the production process are conducted within the home during the monsoons, leading to very cramped conditions. The clay is prepared and cut for throwing in the common room. The potters' wheel is surrounded by shaped clay left to dry. Molded clay is also placed in all the private rooms, under fans, in an attempt to accelerate its drying. The only processes undertaken outside are firing the clay, and water collection (fig. 6). The furnace is constructed the same way as in summer or winter, with metal sheets placed over it for protection from the rain. Barrels are also placed outside to collect water for mixing the clay, as well as for domestic purposes. The extremely high humidity delays the whole manufacturing process, which accounts for the family's reduced income during this season, along with their cramped living conditions.

Humidity levels are not however, the only cause of economic loss during the monsoons. Mumbai often faces severe problems due to flooding and the people worst affected belong to the informal sector (Hallegatte et al. 2010; Patankar/Patwardhan 2016). They are forced to vacate their homes when water levels rise too high, which causes the destruction of, and damage to, their homes and places of work, sometimes resulting in a loss of life (Indorewala/Wagh 2018; Shantha 2018; Goyal 2021). In one of the interviews, the family stated that they are not insured. Any loss they experience, the family has to bear on their own, there is no assistance from the authorities. This places the family in a highly precarious position.

Collaboration in the Neighborhood

There is a strong sense of community among all the potters living and working in Kumbharwada. They share the same ancestry, from Gujarat, and religion, Hinduism. The structures have evolved for over a century, catering to their socio-economic requirements, and have resulted in the built environment

5.
Ayesha Mueller-Wolfertshofer: Smoke created during firing clay artifacts,2023.

6.
Ayesha Mueller-Wolfertshofer: A metal roof over the kiln and water collection in the monsoons, 2023.

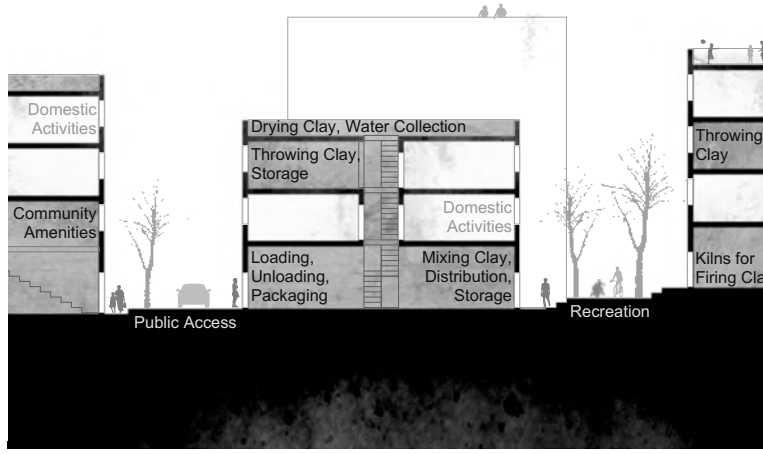
seen today. Although the spaces are private, external areas are used communally for shared festivals and ceremonies, an example of which is the creation of an idol of Lord Ganesh by the neighborhood and their procession to the sea during Ganesh Chaturthi.

Since inhabitants largely follow the same manufacturing techniques, their processes are carried out in sync with other households; with collaboration taking on several forms: Kilns are shared for burning clay, as households next to each other are often at different stages of the production process. These staggered processes enable the family's lodger, who mixes the clay, for example, to be employed by other production units in the area. There is also a Muslim family who coordinate the import of clay to Kumbharwada. Sacks of clay are stacked into trucks in Gujarat, about 17–18 tonnes per truck, then transported to the area, unloaded, and distributed to the potters according to the orders given. Staggered processes enable a cost-effective and continuous workflow of import and distribution by a relatively small number of people with fixed occupations. Similar tendencies can also be seen in the packaging and transportation processes of finished artifacts. In addition to the synchronization of production cycles, the potters, at times, also work for each other. For example, one of the brothers in the family studied also shapes clay in a larger manufacturing unit nearby for additional income. A micro-ecology is thus formed, with co-relations and dependence on one another at various steps of the manufacturing processes, where the synergy of collaboration profits the entire neighborhood.

Collaboration also means that if there are problems, all the other actors are directly affected. When pottery processes dramatically slow down during the monsoons or in the case of natural calamities like floods, the connected businesses of transportation or mixing clay also suffer significant losses. Safeguarding and enhancing pottery processes would therefore strengthen the entire micro-ecology.

Hybrid Principles for Redevelopment and the Need for the Architect as Collaborator

The built environment in Kumbharwada is hybrid, making maximum use of the space available with residential and commercial processes intertwined. Spaces are used flexibly depending on the stage of production or season of the year. Only a redevelopment initiative that understands, as well as integrates, existing processes could improve the conditions for inhabitants by



7.
Ayesha Mueller-Wolfertshofer: Schematic section of hybrid redevelopment, 2023.

keeping socio-economic relations and livelihoods intact. This section reflects on the data gathered during the research and hypothesizes possibilities for redevelopment.

One idea is a vertical separation of the now primarily horizontal connection between functions. If residences were planned above the ground floor, inhabitants would not only be protected from heavy flooding during the monsoons but would also live at a greater distance from noise, pollution, and insects belonging to the immediate surroundings, aspects favored by inhabitants as discovered by Sanyal and Mukhija (2001: 2052). An essential aspect of retaining hybridity is, however, maintaining close proximity between areas for production and domestic activities and enabling the flexibility of uses as in the present circumstances (fig. 7). Another aspect is the activation of roof areas. Currently, these areas are being used for drying clay, albeit without safety considerations. Replacing ladders with stairways and installing railings are measures that would improve the inhabitants' safety and make it easier for people with restricted mobility to access the upper floors of buildings. If appropriately planned, roof areas could also collect water for clay production and domestic use during the monsoons, enhancing current processes and conserving resources. If implemented on a large scale, rainwater harvesting can help reduce flooding during heavy rainfall. Another idea is the improvement of sanitary conditions in living areas by confining clay work to production zones. Although work with wet clay is restricted to the production room and areas outside the unit examined in this article, soil and moisture still spread into domestic areas. Separating these areas could improve hygiene for inhabitants.

Ideas for improvement were also found at the neighborhood level. Since kilns are already shared in current processes, units could be combined, used collectively, and fitted with cost-effective filtration systems to drastically reduce air pollution in the immediate surroundings. Having fixed kilns of superior quality would also reduce the work involved in re-building the small kilns each week, for each family, as observed in the current processes. Areas for unloading and distributing sacks of clay could also be optimized along with zones for mixing clay and distribution. Another option to be considered is the collective use of dehumidifiers to maintain production cycles during the monsoons. Integrating areas for public amenities and recreation is yet another vital aspect that redevelopment projects must facilitate (cf. Patel/Sheth/Panchal 2007; Indorewala 2018). Flexible spaces for community use can be designed within hybrid buildings to integrate amenities for

requirements like education or healthcare. When zones outside buildings are no longer required for production they can also be collectively used for cultural and recreational activities. If these areas are transformed into green areas, they could provide additional climatic advantages of water absorption during the monsoons and heat regulation in the summer.

To plan the redevelopment of Dharavi, more qualitative as well as quantitative research is required. One major aspect to be addressed is that of financing the project. For this, data about the exact number of inhabitants and their financial status is needed, to understand which citizens require financial assistance and which can contribute to the cost of redevelopment. In one of the interviews with the family, for example, it was mentioned by the grandmother that the family would like to renovate and extend their house. Some units in Kumbharwada have already been extended by the inhabitants, into three- or four-story buildings, to accommodate their growing families. This demonstrates that certain families are able to cover the costs of simple construction. These families would only need assistance in planning and implementing technology in their hybrid buildings – like the air filtration systems in kilns, water-harvesting methods, or the integration of green spaces. Similarly, further data is also required on sources of pollution in the area, inherent inequalities and precarious living and labor conditions, for a more wholistic approach towards redevelopment in general.

This research is the beginning of an alternative approach toward, not just the redevelopment of Dharavi, but the development of sustainable cities worldwide. Crucial to the success of such a method is a fundamentally different role of the architect than the one envisaged by developers and authorities. When architects become collaborators, based on a thorough and continuous dialogue with inhabitants, making their implicit practices explicit and formulating them in plans, the essential principles of vernacular architecture can be retained and directed toward a new developmental phase. Such a different role of the architect could help to identify and incorporate other beneficial properties of this architecture. Aspects of circular economies (cf. Dabaieh/Maguid/El-Mahdy 2021) are for example, embedded into their micro-ecologies, like the potters' use of waste cotton for firing the kiln, rainwater collection during the monsoons or the inclusion of recycled materials in the construction of their buildings. Such processes can only be observed, understood, documented, and integrated into planning strategies if attention is paid and a new role of the architect accepted.

Conclusion

Within the various districts of Dharavi, deep-rooted economic systems – or micro-ecologies – have grown over the decades, with collaboration at different stages of the manufacturing process. An example is the potters' unit studied in this article. The preservation of these micro-ecologies is essential, not just for inhabitants to retain their economic autonomy but also to strengthen the settlement, and thus the city in general. As in most of the world's urban areas, the data to understand such relationships is scarce; laborious fieldwork, such as exercised for this article, is necessary to discover, understand, and document them. While this study clearly indicates that the hybridity of buildings is fundamental to how the life of the family and the neighborhood is organized and should be retained, it also provides ideas for redevelopment. It is an attempt to show the depth of the results that can be achieved through the method of collaboration. While this method is not new, the case study proves its effectiveness.

In taking the inhabitant's perspective and trying to understand their livelihood and reasoning, the architect becomes their accomplice. The architect's role thus becomes a vital one: Not just for spatial mapping but through collaborative techniques that make informal, hybrid processes tangible for planning initiatives. It is the only way in which implicit user requirements, whether social, cultural, or economic; can be understood, recorded, and incorporated into development initiatives. In the future, our urban surroundings will have to be intelligently transformed from their present condition; the according techniques and mindset will be decisive architectural tools.

Acknowledgments

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Towards Sustainability and Transdisciplinarity. Harquitectes's Collaborative Practice

Maria Francesca Lui

Abstract: *Harquitectes* is a Catalan architecture studio founded in 2000, renowned for its blend of technological innovation and traditional techniques, as well as its focus on environmental, ethical, and social issues. The studio's approach is rooted in research and continuous dialogue among its four partners: David Lorente Ibáñez; Josep Ricart Ulldemolins; Xavier Ros Majó and Roger Tudó Galí, as well as collaboration with external professionals. This collaboration allows them to rediscover and reinterpret experiences from the traditional Catalan architectural heritage, identifying principles of design and energy management and adapting them to meet the needs of contemporary society, specific contexts, and client requirements. Working with external mechanical engineers enables them to develop innovative solutions to ensure passive indoor comfort in buildings. Termed »climatic parameterization« by the studio, this approach relies on the use of algorithms and simulations to assess and optimize design choices from the early stages. This complicity between different disciplines not only blurs professional boundaries but also transforms architecture into a space for sharing and learning where the integration of expertise offers a new model for bioclimatic design.

Keywords: Climate; Critic Regionalism; Passive Systems; Innovation; Complicity; Comfort.

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Architecture, as an ancient discipline, has gone through various evolutionary phases, influenced by the conception of the human being and its relationship with the world. One of the crucial moments in the history of »international« architecture, as identified by Terunobu Fujimori, was the transition from constructing simple buildings with available materials to standardization, which occurred after the Industrial Revolution (Pierconti 2019).[1] This paradigm shift led architects to overlook climatic aspects within their designs, now replaced by technological air conditioning systems, and deprived them of the fundamental task of defining spaces capable of controlling variables such as temperature, humidity, and natural ventilation. Since the 1970s, following the energy crisis, more and more architects have reconsidered the relationship between design, climate, and resources, seeking to reconcile technological progress with traditional knowledge. Among them, Kenneth Frampton, in his essay »Towards a Critical Regionalism: Six Points for an Architecture of Resistance« argues that architecture should assume a position of *avant-garde*, distancing itself from the myth of Enlightenment progress and reactionary impulses to return to the past (Frampton 1983).[2] Likewise, Bernard Rudofksy highlighted the conditions of modernity by criticizing the uniformity of mechanized and internationalist modernism (fig. 1).

Today, more than fifty years after these initial considerations, contemporary society is faced with urgent challenges due to the construction sector being responsible for a significant number of emissions and the intensive use of natural resources. In this transformative context, the Spanish studio *Harquitectes* emerges, representing both an interesting contemporary development in »Critical Regionalism«[3] theorized by Frampton and a manifesta-

1 Fujimori is interested in this internationalism which he identifies as occurring in two periods in history: »The first time during the Stone Age […] using natural materials like soil, stone, wood, grass; the second time […] exploiting industrial materials like iron, glass and cement […] I believe that my interest in architecture lies in how to recall the former in the present time« (Pierconti 2019: 75).

2 According to Frampton, only through this *arrière-garde* perspective can architecture develop a resilient and identity-driven culture, making appropriate use of universal technique.

3 Kenneth Frampton adopted the term »Critical Regionalism«, coined by Alessandro Tzonis and Liane Lefaivre, in reference to Greek architects Dimitris and Suzana Antonakakis. In Frampton's interpretation, it is an approach to architecture that seeks to enhance the cultural and historical identity of a place through the design of buildings that respect the local characteristics of the context in which they emerge. The term »critical« in the movement's name stems from Frampton's belief that architecture should be able to critique and resist the homogenizing forces of modernity, instead embracing regional and local differences in the design process.

tion of architecture in which different stakeholders collaborate to achieve internal comfort and reduce energy consumption. All of this begins with the definition of space and matter (fig. 2).

Founded in 2000 in Sabadell, Catalonia, by David Lorente Ibáñez, Josep Ricart Ulldemolins, Xavier Ros Majó, and Roger Tudó Galí, *Harquitectes* Studio stands out for its synergistic integration of technological innovation and traditional techniques, as well as its thoughtful consideration of environmental, ethical, and social themes. A particularly interesting aspect of *Harquitectes*' operational philosophy is its openness to collaboration with various professional figures, both within and outside the field of architecture. Since its early stages of development, the studio has demonstrated this collaborative inclination. Initially, collaboration with experts within the academic environment allowed the four architects to acquire a deep understanding of the reasons and principles underlying the traditional techniques of vernacular architecture, as well as the perceptual and tactile qualities of the built environment (fig. 3). Subsequently, this knowledge, gained from the lessons of vernacular architecture, merges with the adoption of innovative devices, resulting from collaboration with external mechanical engineers. This process of synergy allows *Harquitectes* to broaden the perspectives and competencies of their design approach while still holding firm to the principles and convictions that characterized the earlier and more intuitive phase of their work.

Undoubtedly, the curiosity of the four partners of *Harquitectes* about vernacular architecture constitutes a fundamental and consistent element of the studio's evolutionary process. Through an in-depth study of the structural, geometric, and material characteristics of vernacular constructions, the architects have gained profound insights into the pre-industrial mechanisms of climatic control present in such buildings. This cognitive progress has been further facilitated by valuable interactions with experts within the academic sphere like Coque Claret and Joan Sabaté.[4] Thanks to

4 Coque Claret Martí and Joan Sabaté are two professors at ETSAV in Sant Cugat del Vallès, where Roger Tudò (*Harquitectes*) teaches. Specifically, Coque Claret focuses on architecture and sustainability, while Joan Sabaté specializes in construction. The engagement with these influential figures in the Catalan landscape has enriched *Harquitectes*, bringing them closer to a certain understanding of vernacular architecture, its behavior, and its potential. In the book *Harquitectes*. Textos y conversaciones, Roger Tudò states »We developed an awareness of what it meant to build when I started teaching construction at the School of Architecture La Salle with a group of very interesting young professors, led by other more senior and powerful ones: Coque Claret and Joan Sabaté« (Harquitectes 2022: 76–77).

these exchanges and their propensity for research, the studio has developed a greater awareness of traditional passive energy control systems and fundamental concepts of thermodynamics. *Harquitectes*' interest in Catalan vernacular architecture has allowed them to gain a deeper understanding of the potential of traditional materials. The use of Catalan brick has proven to be a crucial element in achieving multiple design objectives. According to the studio, brick offers the ideal conditions for defining spaces, thanks to its thermal inertia that regulates temperature through its mass. Additionally, its porosity facilitates humidity control, while its raw nature contributes to narrating the memory of the constructed space (fig. 4).

From this perspective, one of *Harquitectes*' most notable projects is Casa 1014, located at the heart of the historic center of Granollers. This building, nestled between two boundary walls, features two internal courtyards which consist of vertical spaces approximately nine meters high and are entirely constructed with exposed brickwork. These voids play an essential role in regulating internal temperature and controlling natural illumination, while also serving as a threshold of transition between the bustling street chaos and the intimacy of the domestic environment. Of particular interest is the innovative use of Catalan brick in the construction of the lintels. Instead of adopting conventional solutions, such as employing different materials or using arches, the studio has developed a clever approach by overlapping shorter bricks anchored with steel rods. This »contemporary vernacular« approach, skillfully reinterpreting traditional techniques to suit modern needs, is a distinctive feature of *Harquitectes*' methodology. Their attention to climatic solutions and adherence to ethical imperatives has led them to recognize the significance of designing spaces capable of ensuring comfort through the precise control of geometry and materials, thereby reducing energy demand and resource consumption (fig. 5). While, on the one hand, this understanding provides an intriguing response to the challenges posed by the climate crisis and resource scarcity, on the other, it allows *Harquitectes* to address themes related to bodily perception and the relationship between humans and nature (fig. 6).

In a subsequent phase, coinciding with projects such as the student residence at the *Escuela de Arquitectura del Vallès* (ETSAV) (2010–11) or the *Institut de Ciència i Tecnologia Ambientals* (ICTA-UAB) (2013–14), the Catalan studio *Harquitectes* decided to combine the knowledge acquired from vernacular architecture with the utilization of innovative devices through collaboration with external mechanical engineers. The four partners realized that

tradition and common sense were insufficient to objectively justify their design choices. Consequently, when facing more complex projects, they opted to rely on consultants capable of simulating thermodynamic variables. As they state:

> »We have never been interested in an efficiency based on machines; instead, we have always believed in sustainable comfort whose success and longevity rely on the ›natural‹ behavior of construction. However, we understood that relying solely on tradition or common sense would not be enough to objectively justify it. Hence the appearance of new external collaborators who helped us outline a thermodynamic approach and employ parametric simulations to precisely verify our strategies« (De Ferrari 2022: 45).

The adopted design methodology enabled them to rigorously optimize the internal comfort of the building. Through collaboration with external experts, the studio introduced an additional level of complexity and control over the involved variables, utilizing algorithms and simulations to test the newly introduced strategies and assess the most promising choices during the design phase, as they define it, »climatic parameterization«. This openness to external expertise allowed *Harquitectes* to transcend the disciplinary boundaries of architecture and integrate competences from other fields, such as engineering, to address environmental, social, and economic issues in a more effective and sustainable manner.

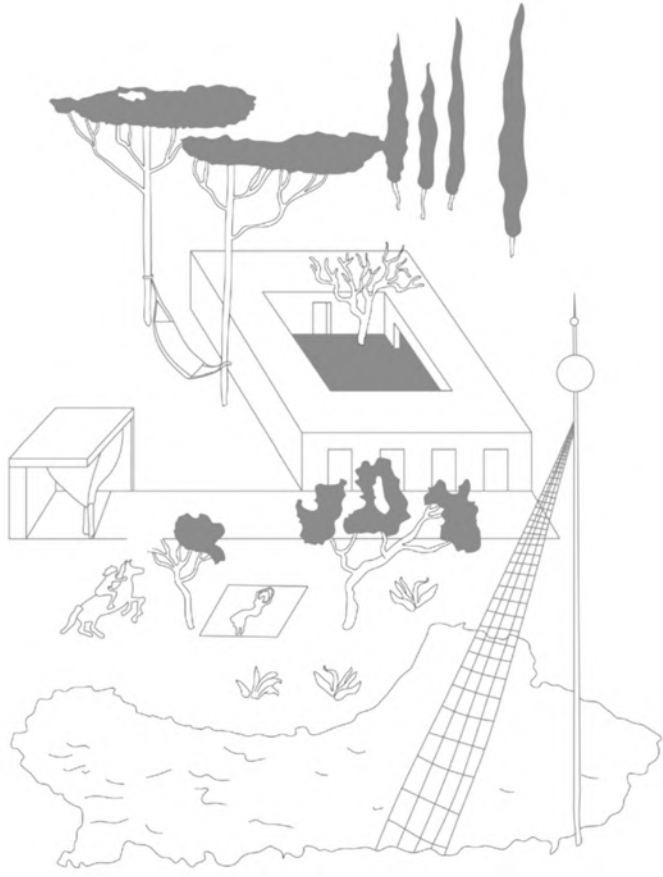
In contrast to other architectural studies that use parameterization to manage complex structures, *Harquitectes* adopts simulations to increasingly simplify the envisioned solutions and make them feasible while adhering to regulatory constraints. A paradigmatic example of this collaborative approach is represented by the Cívico Cristalerías Planell, a historic former glass factory located in the Les Corts district, which was transformed into an adult education center. In this case, continuous interaction with a mechanical engineer experienced in CFD software allowed the replacement of mechanical systems with innovative passive systems. The building features four solar chimneys on the roof and two internal courtyards, generating a »metabolic« behavior that varies according to different periods of the year. During winter, when heat dispersion needs to be controlled, clean air enters the building through the lateral courtyards and is heated thanks to the greenhouse effect. In contrast, during the summer, when heat dissipation is

necessary, shaded courtyards allow fresh air to enter naturally through the four solar chimneys (fig. 7).
Harquitectes demonstrates how the use of climatic parameterization can lead to more effective design solutions and during a lecture at the University of Navarra, Josep Ricar Ulldemolins (2022) emphasized:

> »All these projects would be impossible without collaboration with engineers. However, we must seek engineers who are accomplices in solving the comfort problem starting from the discipline of architecture. We need simulations, calculations, justifications, and sometimes even machines. But above all, we need engineers who are willing to set aside machine efficiency and focus on demand management«.

In an era marked by urgent challenges such as the climate emergency and the search for sustainable solutions, the work of *Harquitectes* serves as a reference model on multiple fronts. On one hand, their ability to reinterpret traditional techniques and adapt them to contemporary needs represents a convincing and replicable approach in similar contexts, where vernacular architecture can be studied and reinvented to provide concrete and creative solutions. On the other hand, *Harquitectes*' openness to collaboration with external experts represents a virtuous model to enrich the design process and allows for the convergence of diverse competences to adequately address the complex challenges of our time. This synergy between the past and the present, combined with an open and multi-disciplinary vision, offers the opportunity to construct a meaningful future for contemporary architecture.

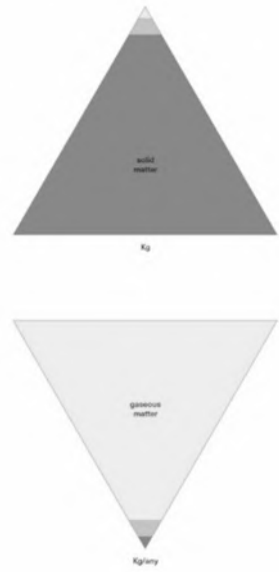
In 1938, Bernard Rudofsky published an article in *Domus* in which he described the project for a house on the island of Procida (Rudofsky 1938). This house would serve as an interface between humans and nature, a component capable of managing external factors to create a comfortable experience indoors and redefine the way we live in domestic spaces.



1.
Maria Francesca Lui: Schematization of Bernard Rudofsky's drawing for a house in Procida, 2023.

This graph (fig. 2) is the result of a reflection conducted by *Harquitectes* on the relationship between solid, liquid, and gaseous matter (in kilograms), using a standard house as a model. The introduction of time as a factor revealed that over the course of 50 years, the quantity of circulating fluid matter predominates over solid matter, constituting over 90 percent of the building's weight. Based on these considerations, they began to take a greater interest in controlling the qualities of gaseous matter, starting from the definition of solid matter.

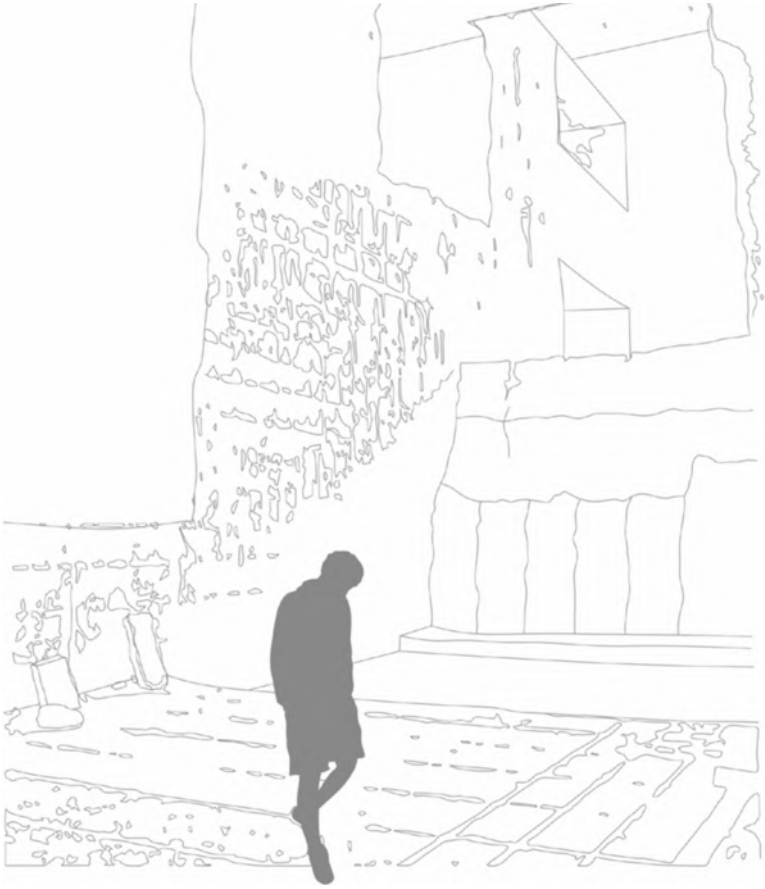
> »We discovered the contribution of materials to the atmosphere somewhat randomly, but we soon realized their value. […] Between you and the physical support, there is transparent material, but the solid matter allows the transparent to acquire presence, to be more corporeal for reasons of light and its relationship with the final enclosing support. It's not just about working with solid matter but exploring the combination between the environmental conditions of transparent matter and the surrounding matter« (Díaz Moreno/García Grinda 2020: 25).



2.
Harquitectes: *Graph on solid, liquid, and gaseous matter, 2020.*

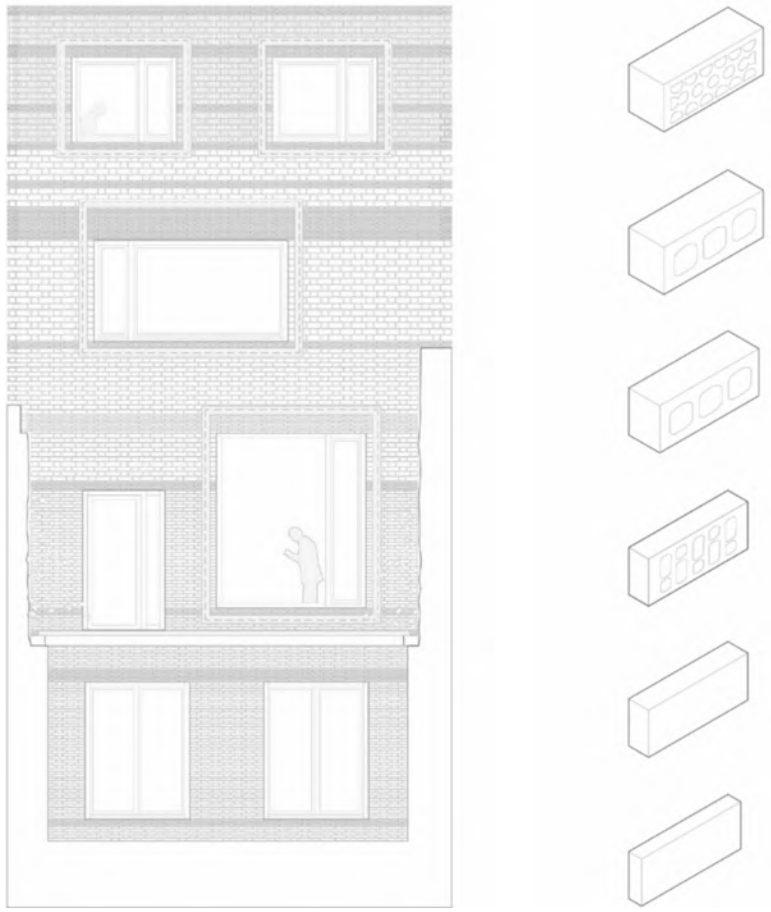
During my 2022 interview with Josep Ricart from *Harquitectes*, when discussing the value of architecture without architects, he stated:

> »Since we opened the studio, every year we organize one or two trips. Initially, we always visited buildings designed by famous architects. Then, there was a trip to Mallorca where we entered an active stone quarry in Mares. It felt like being inside Chillida's Tindaya project. It was during this trip that we began to understand the value of experience« (Cacciatore/Lui 2023: 8).



3.
Maria Francesca Lui: Drawing of the stone quarry of Mares, taken from a photograph of Harquitectes' journey, 2023.

The use of Catalan brick allows *Harquitectes* to achieve multiple design objectives. For example, the intricate masonry composition of Casa 1014 reflects the typical stratifications found in historic buildings and consists of six different types of bricks, selected,and laid based upon their density. The heaviest bricks were used in the lower part of the building, while the perforated ones were used in the upper section. This gradation of density meets structural requirements and enables the walls to interact with light and transform into ornament.



4.
Harquitectes: *Internal section of the entrance patio of Casa 1014, 2023.*

The verticality, almost monumental, of the entrance courtyard of Casa 1014 engages in a dialogue with natural phenomena such as gravity, light, and the stratification of air, while the perception of the external environment allows for a connection to seasonal comfort. At the same time, the use of brick resolves multiple aspects through a single element: from composition and structure to thermal inertia and the management of air humidity.

5.
Maria Francesca Lui: Drawing of the entrance courtyard of Casa 1014, 2023.

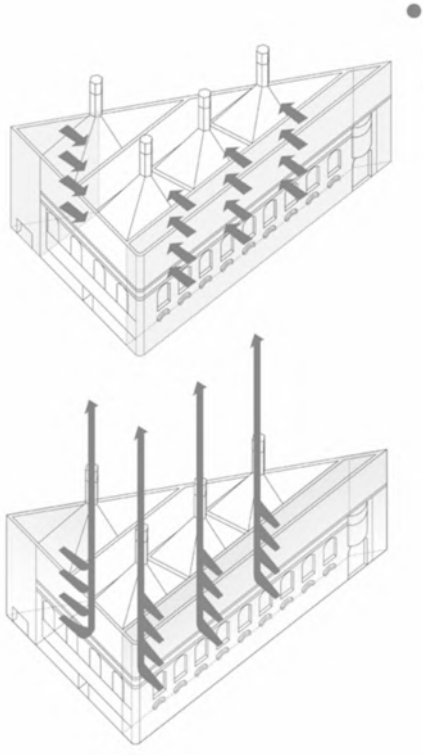
In the same 2022 interview, Josep Ricart state:

> »There is a painting by Ramon Casas, a Catalan painter, that interests us greatly. The title is Interior al Aire Libre (Interior in the Open Air). The title itself is an architectural manifesto that defines many of the values of our architecture. […] This painting shows an architecture that connects people with the invisible: the climate, physical phenomena, cross-ventilation, and inertia. It is an extraordinary painting that effectively explains the concept of reciprocal architecture, which constitutes an emotional and comfortable experience through the collaboration between architectural space and the natural context.« (Cacciatore/Lui 2023: 5)

6.
Maria Francesca Lui: Schematization of Ramon Casas's Painting Interior al Aire Libre (Interior in the Open Air), *2023*.

The Cristalleries Planell Civic Center represents a perfect example of collaboration and complicity in architecture. The management of air, through the introduction of solar chimneys on the roof, allows the building to self-regulate without the use of mechanical systems, while also reconnecting humans with the physical phenomena within the built environment In an interview for the magazine El Croquis, the four partners state:

> »There are people interested in thermodynamics who wanted to find a new language within it. We find it interesting – and the chimneys of Cristalleries Planell could accidentally fall into this category – but what truly interests us is bodily perception« (Díaz Moreno/García Grinda 2020: 27).



7.
Harquitectes*: Descriptive diagram of the airflow inside the Civic Center. The top diagram represents the summer behavior, while the bottom one represents the winter behavior, 2023.*

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Collaborative Endeavors in Souto De Moura's Legacy. A Conversation with Nuno Graça Mora

Federico Marcolini

In the recent past, the Portuguese context was characterized by the predominant role of architecture in the construction of a modern country. A product of the blending of several generations and the sharing of ideals aimed at change, the Portuguese experience seems to find the origin of this change in Porto. Although distant in time and on the fringes of European geography, it is fitting to look at that lively transformation experience through the testimony of the architect Nuno Gràça Moura. From the 1990s, he collaborated with Eduardo Souto de Moura's studio, experiencing a modus operandi based on dialogue and the free exchange of ideas. It was a professional experience based on collaboration, which saw, in the relationship between Fernando Távora, Álvaro Siza Vieira, and Eduardo Souto de Moura, the tangible legacy of those free reforms that began in Porto thanks to Carlos Ramos in the 1950s. It is worth delving into understanding how architecture can act as a catalyst for other disciplines without ever sidelining its primary role. It is an essential look at a time dense with changes where Nuno Gràça Moura intervenes, drawing on his own experience as a possible interpretation. It is an intimate gaze laden with memories, where the architect's work is at the heart of a dialogue between multiple actors and where collaboration seems to be understood more as an informal relationship, where one is attentive to the other. An attitude of listening to realities and times that change rapidly, where architecture stands as a repository of various expertise and collaborations between the office and the construction site.

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Federico Marcolini | We would like you to introduce yourself as an architect and collaborator.

Nuno Gràça Moura | I studied architecture here in Porto at Faculdade de Arquitectura da Universidade do Porto. In the last year, we were required to complete a six-month internship, so I applied to Souto de Moura's office because I was fascinated by his work and I was fortunate to get the position. I began my internship in 1994 and extended my stay, only taking a break for a year and a half to finish my architectural studies before returning to the office. I remained with his office until around 2001–2002. During those later years, many projects were developed in collaboration with Álvaro Siza Vieira, which was a rewarding experience. I eventually left the office since I had begun working as an independent architect. Since then, I've co-authored publications with Souto de Moura on numerous occasions. Currently, we are engaged in two projects. My collaborative experience with him feels like it never truly ended. Over time, we became close friends.

FM | When it comes to collaboration, I'd appreciate insights based on your experience. In this issue, our primary interest revolves around pinpointing what's essential in collaborating to define an architectural project.

NGM | Among architects, collaboration remains consistent over time. While nuances evolve, the fundamental challenges remain essentially unchanged. In Portugal, we traditionally have a small architecture firm, towards the atelier concept. This was my experience when I began working with Souto de Moura. Even as he gained recognition outside of Portugal, there were only twelve of us in the office. Compare that to today when a budding architect in Switzerland designing a few houses may have the same number of collaborators as Souto de Moura did back then. In his office, collaborations were profound. While there was a dynamic between the architect and collaborators and some scope to contribute ideas, it often felt like a solo activity for the architect that was enriched by collaborators' insights. I recall my first day there: Souto de Moura showed me sketches for two houses in southern Portugal. They essentially captured the final essence of the project. Our role was to support the architect's primary vision while contributing our own perspectives. This sometimes meant adding layers of complexity, challenging, and evolving the design. I had

the same experience when I was working with Siza Vieira. Architectural practices in Portugal are presently evolving. Younger firms are less about the identities of individual architects and more about collective enterprise. I'm unsure about the dynamics of working within such larger collaborative groups, especially when all participants supposedly hold equal sway. You need a lead vision, even in collaborative or co-authorship setups. Today's collaboration in architecture doesn't seem drastically different from the past, save for a shift toward group-driven rather than hierarchical models.

FM | Collaboration today seems to demand input from a range of disciplines beyond architecture. In your perspective, which disciplines, besides architecture, are crucial today?

NGM | During times when architecture faced challenges, in the 1960s and 1970s, architects often turned to disciplines like sociology. Currently, architects often lean heavily on artistic references, striving to equate architecture with art. I argue that architecture shares as much with painting or sculpture as it does with engineering or even cooking. The underpinning philosophy is crucial. When architects attempt to emulate sculptural forms, the results can be disastrous, creating ambiguous structures that fall between architecture and sculpture. While architecture has always integrated different disciplines, especially those related to construction, there's a tendency to over-rely on peripheral disciplines during times of architectural uncertainty.

FM | How about the collaborative approach that encompasses diverse contributions? Have there been roles in contemporary architectural firms that didn't exist before?

NGM | Architecture's major shift began when engineering and architecture split. Historically, construction and architectural design were almost synonymous. Now, with the rise of bureaucratic regulations, architects require specialized consultants even before they can begin the creative process. While architects should remain open to the world, drawing on various influences, there's a temptation today to involve disciplines distantly related to architecture's core. Contemporary architectural practices often demand collaboration with landscape architects or engineers right from the project's early phases. However, it's crucial to differentiate

1.
Nuno Graça Moura with Eduardo Souto de Moura, Porto, 2019.

between getting cultural insights from diverse disciplines and collaborating directly with them.

FM | So, there's a distinction between influence and direct involvement?

NGM | Precisely. Directly embedding artistic elements into architectural spaces often results in neither commendable architecture nor commendable art. While sculptures are meant to provoke questions, architecture aims to provide solutions. Drawing inspiration from various disciplines is vital for an architect's creative evolution, yet their direct involvement in the architectural process can be problematic. For instance, I remember a well-known architecture practice in Switzerland that often appeared to discuss their collaboration with artists, but I find their most captivating works devoid of overt artistic influences. It's about the dialogue, not just the inclusion.

FM | In May 2022, Souto de Moura delivered a captivating lecture as part of the Mantova Architettura festival. He began by showing a video where he conversed with a skilled stonemason about the possibilities and limitations of working with stone. This suggested a horizontal approach to design and construction that stretches from the drafting table to the construction site.

NGM | Masonry is part of construction and therefore, part of architecture. Souto de Moura has always had a way of making architecture deeply tied to the technology available to him. Early in his career, architectural technology wasn't as advanced. The most common solutions harkened back to traditional systems like masonry. He often collaborated with local craftsmen and used traditional Portuguese construction solutions. When I worked in his office, a project never ended there, it continued on the construction site. Many final design decisions were discussed in collaboration with the team in the office, stonemasons, and other technicians. In Portugal, it's still feasible to evolve the project on-site, treating it as a 1:1 model. I recall a project where Souto de Moura was designing a university building and initially proposed brise-soleil made of wood. Given the lack of tradition and expertise in wooden facades in Portugal, he eventually used a steel structure and marble. I remember him discussing this with Jacques Herzog at Harvard. Herzog was astonished at the cost-effectiveness of this approach. Souto de Moura explained that stone was cheaper

than wood in Portugal due to the lack of expertise. These local peculiarities have often shaped his projects uniquely.

FM | How is the relationship with the other »players«?

NGM | When Souto de Moura is on site with his team, everyone involved can influence the design process. Often, mistakes lead to better solutions and he, in a truly humble manner, listens and asks for adjustments when better solutions are proposed. This dynamic epitomizes the essence of architecture. It's not a melding of disciplines but a collaboration where diverse fields converge without overlapping. Sometimes, Souto de Moura collaborates with artists. For instance, he worked with a renowned artist from Lisbon, Pedro Cabrita Reis, in the design of public buildings. While Souto de Moura does involve artists in the design process, they don't reshape the building's main idea. Take Souto de Moura's crematorium project in Uitzicht, Belgium. The main architectural concept was solely within the realm of architecture with no input from the artist. Likewise, an architect shouldn't dictate an artist's creation. I mean, there is always discussion and it improves the design, but not the main ideas.

FM | In the *Electa* volume on Souto de Moura, we found Távora's remarks about the building that housed his, Souto de Moura's, and Siza Vieira's studios particularly poignant. He considered it a »home« and emphasized the camaraderie, family ties, and teaching relationships. We'd like to get your perspective on how such a collaborative and non-competitive environment influenced Souto de Moura's development.[1]

NGM | Távora's passage is deeply touching. It underscores the concept of »home« as more than just a physical structure – it's also a mental and emotional space, especially since »casa« means both »home« and »house« in Portuguese. This collaborative spirit can be traced back to the 1920s and 1930s. The architect Carlos Ramos played a pivotal role in modernizing

1 »This house was necessary because it existed before it was a building, because of our friendship, family, and teaching relationships. I wanted a place that could be a small cathedral of architecture frequented by students and architects. These relationships have been an extraordinary force in my life. Even though I now feel more tired and weak, we maintain our friendships, we meet in the hallways, we visit each other, we converse, we exchange opinions I believe it's a rare condition among architects« (Esposito/Leoni 2003: 15, author's translation).

architecture in Porto, with Távora being part of this transformative journey. This shift led to a rich educational environment brimming with modern ideas. Such a setup fostered a distinct architectural milieu, which we fondly remember as the »Oporto school«. It's more of an »atmosphere« than a style – a milieu of collaboration, the exchange of ideas, and individual heterogeneity. The architects, spanning three generations, operated under one roof, yet each brought distinct architectural influences, from Frank Lloyd Wright and Le Corbusier to Mies van der Rohe and Louis Barragán. Their shared workspace in Porto became a melting pot of ideas and styles, exemplifying the ethos of the »Oporto School«.

FM | Some time ago, we discussed the atmosphere in Souto de Moura's studio. We spoke about a former collaborator, and you emphasized the collaborator's valuable contributions to both the project and the culture within the office. It seemed the studio balanced professional and private life, with no rigid roles or tasks?

NGM | In the early days of Souto de Moura's career, only three people worked in the office and the workload was lighter. They were peers, sharing time both in and out of the studio. Conversations extended beyond architecture and lasted for days. I suspect Souto de Moura's interests in Bach and Miles Davis originated from these conversations with collaborators who infused the office with their passions. Távora's office had a similar vibe. This culture of dialogue, collaboration, and camaraderie is emblematic of the Porto environment, likely due to the city's size.

FM | Giovanni Leoni's essay in the exhibition catalog you co-curated with Francesco Dal Co suggests Souto de Moura views architecture as an ever-evolving discipline, drawing from the past while anticipating the future.[2] Would you agree?

NGM | I question if revolutions truly exist in architecture, or if they're fleeting. For Portuguese architects like Souto de Moura, Siza Vieira, and Távora, tradition plays a crucial role. But tradition isn't just about

2 Souto de Moura is quoted saying that »architecture is a profession against nature, in which the design constitutes a non-existent practice, a sum of various operations to build, to materialize an idea that we ask ourselves or that is asked of us, a process that constantly updates with new information, not an isolated act« (Dal Co/Graça Moura 2020: 15).

2.
Nuno Graça Moura with Eduardo Souto de Moura, Porto, 2019.

3.
Eduardo Souto de Moura and his collaborators in their office, Porto, 2019.

aesthetics. Quoting Siza Vieira, it's »a reason to bring innovation«. Being »conservative« means preserving and evolving ideas, rather than maintaining the status quo. As a renowned Portuguese writer once told me, »I'm conservative, not in the sense of refrigerating items to prevent change, but in the manner of retaining and expanding upon ideas and concepts« This perspective involves integrating the past while pioneering something new, a viewpoint not always aligned with modern architecture. Central European traditions differ from ours. Our prolonged engagement with tradition, in a conservative milieu, perhaps drove architects to seek fresh influences beyond national borders. Merging these influences with our traditions resulted in particular architectural languages. This tri-generational experience, shared by these three architects, is unparalleled. While we may not witness a fourth iteration, their legacy will inspire future generations.

FM | What's the takeaway from this collaborative journey?

NGM | My fondest memories with Souto de Moura are outside the office – on construction sites, during overseas trips. He's passionate and knowledgeable, discussing varied topics with the same enthusiasm he reserves for architecture. Today, many believe that once you establish your practice, you must design something groundbreaking. But innovation isn't instantaneous. When Souto de Moura left Siza Vieira's firm, his initial designs bore a strong resemblance to Siza Vieira's. That influence remains palpable today.

FM | How would you define collaboration?

NGM | Collaboration involves continually engaging with experiences and individuals. A collaborator shouldn't just echo your thoughts, they should challenge and enrich them. Their added value might be intangible, but it's invaluable. Talent alone doesn't guarantee longevity in an office. In fact, Siza Vieira once advised Souto to leave and establish his practice, believing he'd be more productive independently.

FM | Lastly, can you share a memory epitomizing Souto de Moura's idea of collaboration?

NGM | Towards the end of my tenure at Souto de Moura's firm, we collaborated with Siza Vieira on the Portuguese pavilion for the 2000 Hannover Expo. Following a productive session, Siza Vieira and Souto de Moura shared a sketch. When discussing door details, Souto de Moura directed me to Siza Vieira for answers. Ironically, Siza Vieira pointed me back to Souto de Moura. Both were trying to emulate the other's design approach, which highlights their mutual respect and adaptability. This episode underscores their humility and the importance of continuous inquiry in design, emphasizing the need for an open mind and rigorous examination of every project element.

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TOOLS

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Spatial 1:1 Models. A Tool for Collaborative and Participatory Processes in Housing Projects

Jana Hartmann, Dennis Häusler

Abstract: Architectural production relies, among other methods and tools, on models, mock-ups and prototypes. This article proposes using spatial 1:1 models to communicate and design socio-spatial aspects in housing projects, thus, discussing the specificity of spatial 1:1 models and how they differ from material mock-ups or architectural prototypes. To demonstrate the relevance of spatial 1:1 models, a case study is presented. To illustrate the specific characteristics and possibilities of representation and interaction in the context of today's cooperative housing, the case study addresses threshold spaces and their social implications. Within dense cooperative housing projects these spatial configurations and the way they are communicated to future residents is critical for socially sustainable projects. The spatial 1:1 model investigates the acceptability and appropriability of threshold spaces and is intended to be an open platform for participation and collaboration. The article addresses the added value of a spatial 1:1 model for the design and communication process between lay people, architects, and various other stakeholders and its ability to improve socio-spatial qualities in the built projects.

Keywords: 1:1 Model; Mock-Up; Participatory Design Process; Cooperative Housing; Threshold Spaces.

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Introduction

Today's cooperative housing projects in a Central European context face socio-economic challenges that result in a shift in architectural typologies and adaptation in spatial configurations. The increase in construction and utility costs and the urge to build affordable housing results in more compact and dense projects. (European Commission 2019) It is not uncommon for detached, linear buildings to be replaced by larger volumes with narrower exterior spaces that result in densified neighborhoods and compressed spaces between neighbors.

Alternative life models and family structures cause smaller households and thus, smaller average apartment sizes (Bouzarovski et al. 2006). Together, these aspects lead to adapted circulation typologies and new forms of transitional spaces between the public and the private. This points to a crucial aspect of a successful housing project: the social acceptance and therefore the social sustainability of large housing developments. There are numerous failed social housing projects in architectural history; especially if architecture is pushed to rapidly adapt to socio-economic forces or experiment with new forms of living. Alison and Peter Smithson's ambitious and well-intended »streets in the sky« at Robin Hood Gardens, for example, pushed social density too far and did not secure acceptance by the residents which resulted in vandalism, mismanagement and ultimately the demolition of the project 45 years after its construction (Liakoura/Lozano 2020). To help avoid misplanning from a social perspective, a multitude of strategies can be applied. A participatory design process, thorough communication and interaction with future residents, is one of them.

As part of such a strategy, this article introduces the spatial 1:1 model which addresses the socially crucial threshold spaces in dense housing projects. Spaces can be tested and communicated before construction to reduce the discrepancy between projection and the built reality of a project. First, the specific benefits of spatial 1:1 models and their differentiation from architectural models and mock-ups are elaborated. The focus in the 1:1 scale is shifted from constructive material mock-ups toward social and spatial models for participation and collaboration. Second, the article examines a case study which was built during the summer of 2023 in the context of a cooperative housing project in Stuttgart. By recreating multiple extracts of the larger housing project and reconfiguring them in a spatial 1:1 model, future residents, architects, and other stakeholders could experience the

spaces, interact with them and test different settings of everyday life thereby overcoming some of the challenging abstractions of scaled models, plans or visualizations. The case study allows us to evaluate the general use of such models and their potential effect on architectural production, potentially leading to more socially sustainable housing projects and less social misplanning in the future.

Models, Mock-Ups & Prototypes

The terms model, mock-up, and prototype have different meanings and applications throughout different professional fields ranging from computer science, mathematics, philosophy, and psychology to linguistics and beyond. In this article, their meaning and use in the realm of architecture will be explored. Whereas the prototype is only sparsely used in today's architectural discussion, the model and mock-up are common terminologies, although boundaries remain fluent.

Accoding to the Oxford Dictionary, the prototype is often seen as a first or preliminary version of a device or vehicle from which other forms are developed. This implies the specific use of the term in architecture. A prototype as described above is the first version of a mass-produced product. In the realm of architecture, this occurs either with architectural elements such as doors, windows or other functional objects, prefabricated elements or with whole structures that are reproduced in large numbers. Some architectural movements in the past tended to focus more on the prototype as an architectural method. One was the Bauhaus when architects aspired to mass-produced products and architectural elements. Today, the term prototype is used in relation to single elements or products as well as in research, for example in the fields of robotic fabrication or experimental structural design.

Following the explanations of philosopher Herbert Stachowiak in his 1973 book *Allgemeine Modelltheorie*, the concept of a model can be defined on the basis of three main characteristics:

> »1. Mapping: Models are always models of something, i.e. mappings from, representations of natural or artificial originals, that can be models themselves. 2. Reduction: Models in general capture not all attributes of the original represented by them, but rather only those seeming relevant to their model creators and/or model users. 3. Pragmatism: Models are not uniquely assigned to their originals per se. They fulfil their replacement function a.) for

> particular-cognitive and/or acting, model-using subjects, b.) within particular time intervals and c.) restricted to particular mental or actual operations« (Stachowiak 1973: 131).

This applies for abstract models in other fields but especially to the physical and digital models in architectural practice. In contrast to the abstract concept of a model the architectural model, both physical and virtual, is usually utilized to represent a structure yet to be realized.

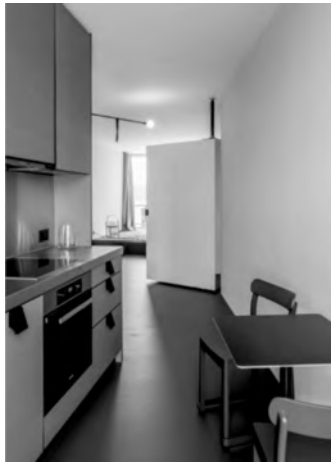
The architectural model often serves as a descriptive means of communication between laymen and experts to clarify spatial or constructive questions – thus becoming a collaborative and participatory tool. It appears to be particularly effective for this purpose as it allows for a rapid and holistic understanding of an architectural project and requires less imagination than drawn plans and sections (Gerkan 1994). In most cases, the model is related to a specific building project and is part of, and a tool in, the design process. Consequently, it is to be understood as an intermediate stage toward the eventual piece of work rather than as a body of work in its own right.

In most cases the architectural model is a scaled model, representing measurements and spaces with coherent relations but in an overall smaller scale. This requires a certain imagination to translate the perceived scaled model into a potential life-size project. Imagination and translation can be a challenge and might be overcome by introducing a model at a scale of 1:1. That said, what makes a 1:1 structure still to be a model? It is the properties mentioned previously. The 1:1 model is still an intermediate step toward a project. It emphasizes specific aspects of the project and depicts certain extracts that do not represent the whole. One type of 1:1 model is the mock-up. The mock-up is generally known to test materials and construction methods on a scale of 1:1 before construction starts. Besides typical constructive facade mock-ups, the search for more sustainable building materials and construction methods led to an increased use of the technical 1:1 mock-up. For example, the clay mock-ups for the project »Sitterwerk St. Gallen« by Roger Boltshauser (2017) developed in the context of the *École Polytechnique Fédérale de Lausanne* (EPFL Lausanne) (Boltshauser 2020). Such mock-ups lead to professional collaborations before the main project's construction begins and may also function to form trust and establish relationships between contractors and stakeholders. A collection of such examples and their value for architectural planning were the focus of the exhibition »Mock Up« at the *Swiss Architecture Museum* (SAM) in 2021. In the exhibition text,

curator Kofler describes the mock-up as a »true-to-material demonstration model that reproduces a section of a building at the original scale« (Kofler 2021: 2). Looking at the presentation in the exhibitions at SAM or the photo series »Archetypes of Contemporary Architectures« by David Ross or »The Mock Series« by Tobias Wootton, the mock-up itself, although originating as a experimental object in a larger design process, becomes the center of interest on its own. These further interpretations of the mock-ups, although interesting, are less relevant to the primary use of mock-ups or 1:1 models as discussed in this article. Although the 1:1 model has been used in architecture for quite some time and has proven itself as a valuable method, it is relatively unexplored today (Menz 2021).

In this context, the 1:1 scale, widely used in material mock-ups investigating construction techniques, will be reinterpreted here and used to communicate and explore spatial aspects of a project in an open and participatory process. Unlike the technical mock-up, the spatial 1:1 model can be understood by lay people and therefore enhance their participation and the integration of their opinions. Examples of the use of spatial 1:1 models can be found but are not well documented or publicly reflected on:

The »DesignBuild« project »Musterwohnung St. Quirin« was created in Munich in 2021 by the housing cooperative *Kooperative Großstadt eG* and the *Chair of Design and Construction* (by Prof. Florian Nagler) at the *TU Munich* to question contemporary forms of housing and their spatial structure in the floor plan (Nagler 2021) (fig. 1). The model was designed and constructed by students of the Chair at St.-Quirin-Platz in Munich and used as an open platform for a discussion with experts and city residents. Although a very interesting approach, the project was not directly linked to a specific housing project testing spatial aspects yet to be built. Instead, the project focused on a general discourse. Similar to the »Musterwohnung St. Quirin« is the concept behind Professor Ralf Pasel's summer academy »Werkstatt Multihalle« in Mannheim in the summer of 2019. The project was intended to test modular living spaces. To this end, students of the *TU Berlin* built prototype room modules in the *Multihalle Mannheim*, using a simple wooden construction method, over a period of two weeks and then set them up temporarily. Residents of the adjacent district were encouraged to participate through user workshops and were actively involved in the process. This project was mainly rooted in broader research about living spaces and was highly experimental. In both projects, the design and materiality were greatly simplified



1.
Chair of Architecture and Construction Florian Nagler, TU Munich: *Musterwohnung St. Quirin, 2021. Photographer: Matthias Kestel.*

2.
Chair for Architecture and Design Elli Mosayebi, ETH Zurich: *»Vacancy–no vacancy« 1:1 Housing Model, 2022. Photographer: Michael Stirnemann.*

3.
Summacumfemmer: *Mock-up of »Winter Garden« Facade for the San Riemo Housing Cooperative Building in Munich, 2022.*

and the spaces abstracted. The use of wood allowed for simple construction, with a screw and plug system that untrained students could assemble.

In contrast, the 1:1 housing model project »vacancy – no vacancy« (2019–2021) run by the *Chair of Architecture and Design* (Prof. Elli Mosayebi) at *ETH Zurich* was dedicated to question new concepts of living in the context of a real housing project before its construction. The 1:1 model was used to research the behavior of occupants in the interior spaces of the apartment- prior to the construction of idential apartments in the residential building Stampfenbachstrasse built by *EMI Architects* in Zurich (2018–2022). For this purpose, the behavior of the temporary residents (a few days or weeks at a time) in the 1:1 model was measured in regards to the use of performative interior fittings, such as a moving interior door. The project served as both a research apparatus and for the refinement of a concrete building project. Terminologically, the model was described by the authors as a »Mock-Up with prototypical elements« which again show the soft borders between the terms mock-up, model and prototype in the architectural context. Qualitative interviews and quantitative measurements with sensors on the interior furniture were used for evaluation (Mosayebi 2022) (fig. 2).

In the context of the cooperative housing project »San Riemo« (2017–2020), in Munich, the architecture office *Summacumfemmer* also created a 1:1 model, which they called »disobedient Mock-Up« or »Constructive Trojans«. The life-size model was argued to be a tool to manage the different opinions of contractors and site managers, norms and regulations during the design process when architects try to »transcend conventions«. Furthermore, Femmer and Summa state that

> »the architectural (near-) reality of the mock-up already enforces built facts, which are less contestable than prior drawn propositions. In this sense, mock-ups can make things more plausible, more convincing, but also more persuasive« (Summa/Femmer 2022).

They also argue that in their project, »San Riemo«, their proposals would have been less successfull if communicated through conventional means,

> »even scaled Models – would have fallen on death ears. […] And only the mock-up proved to speak a language that all of the participants could clearly hear, at the same time with a rhetoric that was convincing enough to gener-

> ate understanding and plausibility. The mock-up triggered a communicative proces« (Summa/Femmer 2022).

Thus it could be argued that for them, the mock-up played a central role in the realization of the prize-winning architectural project »San Riemo« although their »Constructive Trojans« are more of a mock-up than a spatial model they do have spatial and participatory qualities, therefore going beyond the pure constructive facade mock-up (fig. 3).

Although the differentiation between mock-up, 1:1 model, and prototype can be made linguistically, the examples show that the use of the terms and their intended meaning are not clearly separable. Nevertheless, the examples reveal a potential in research and practice on spatial 1:1 models and their use as collaborative and participatory tools, especially in the context of cooperative housing projects. The participatory aspect of spatial 1:1 models and the refinement of the project's spatial aspects bear potential for the outcome of the whole project.

Threshold Spaces

The »Schwellenraum« (threshold space) is linguistically composed of »Schwelle« (threshold) and »Raum« (space). It is therefore, a space but at the same time a transition between spaces. Only through the transition from one space to another does a person create the possibility of entering or leaving a space. Without a transition, there is no connection between the inner and outer spatiality. The creation of thresholds arises directly from the need to form space. (Boettger 2014: 10) In architecture, threshold spaces refer to the space between two spaces, between inside and outside, public and private, our body and what surrounds it. (Girot et al. 2021). Questions about the degree of visibility, accessibility, privacy, protection, blending and separating immediately arise in this context. In architecture, on one hand, these spaces can function as buffer zones in both climatic and socio-economic contexts. They are used, for example, as climatic layers to store heat or provide ventilation, or allow for common spaces while at the same time distancing private spaces. On the other hand, transitional spaces often serve purely functional purposes of circulation and access. The corridor, the foyer, or the vestibule often indicate the functional character of the threshold space, which sometimes has little to no quality as a place to stay due to economic and fire-protection motivations (Boettger 2014). In contrast to the functional

aspects, thresholds can also refer to the atmosphere of the spaces to which they allow access, thus providing a spatial and atmospheric transition.

In recent years, transitional spaces have once again gained importance in housing projects throughout Europe. The architects Lacaton and Vassal, for instance, have been dealing with the question of layering the facade for decades. In their »Cité du Grand Parc« project, a 2017 social housing project in Bordeaux, a new spatial layer in front of the existing building contributes to the summer extension of the apartments and thus to an increase in the quality of living for the residents. Similarly, the project »Cité manifeste« in Mulhouse (2005), opens the interior to the outside and turns it into a semi-private communal space. In particular, the shift toward smaller households and reduced flat sizes (in total square meters, not in square meters per person), as argued in the introduction, lead to the challenge of economically accessing many small apartment units. These circulations are increasingly designed as exterior circulation spaces like exterior corridors, access balconies, stairs or communal balconies. By doing so,the amount of insulated floor area can be reduced and consequently, utility costs are lowered. These factors led to a recent proliferation of access galleries in affordable housing. Apart from the economic advantages, prejudices against access galleries are still widespread among professionals and residents alike:

> »It should be said that access galleries the way we know them in conventional residential construction only meet with little approval among residents. They are perceived to be uninviting rather than inviting as recreational spaces. The walking areas are too narrow. The building fronts are closed above eye level to compensate for the narrow situation and the lack of distance to the apartments, which leads to windows that work as skylights. Social control is just as impossible in these cases as it is in closed interior hallways or on the stair landing in a hall/stairway structure. Seen exclusively as traffic carriers, access galleries are generally set along the climatically disadvantageous north side of a building. They, therefore, do not receive sunlight and are not adequate for the cultivation of plants. Hence it is understandable that residents prefer closed apartment access ways under these conditions« (Schneider 1995: 37).

For these reasons, architects try to design these often complex spaces in an inclusive manner: as common spaces which enable the development of a social milieu of a house community and increase the quality of living

4.
SSS Architecture & Research, Architecture, Studio Vlay Streeruwitz *and* EMT Architekten: *Urban plan of the cooperative housing project »Quartier am Rotweg«.*

5.
studio komaba: *Plans for the cooperative housing project »Quartier am Rotweg«. Transitional spaces between the private apartments and the common spaces, access balconies, etc.*

within the housing development. Sometimes, these generous shared spaces can compensate for smaller private spaces. At least that is the assumption and hope of many architects, developers, and housing cooperatives. The transition from inside to outside, private to collective becomes a key concern in these multi-functional threshold spaces. If constructed purely as described by Schneider, a lack of privacy and a high volume of transit can lead to anonymity and unwanted social friction. Therefore, a thorough and open design process for threshold spaces in housing projects seems to be crucially important for the social sustainability and overall success of a project. Consequently, the question of how to adequately represent and communicate such socio-spatial aspects like transitional spaces in a project become central. Boettger even states that these aspects are often neglected in planning due to aspects of economic efficiency and the lack of quantitative criteria (Boettger 2014). To counter the tendencies toward economic efficiency and functionality and focus more on social aspects, collaborative and participatory methods could be increased and greater attention paid to the design of threshold spaces. To do so, new methods should be developed for the participatory testing of the social aspects of housing projects and specifically of the threshold spaces. The spatial 1:1 model proposed here could be such a new method in a collaborative and participatory process to avoid social misplanning and strengthen increased socially aware architecture for the community.

Case Study: Spatial 1:1 Housing Model at Rotweg

On the urban periphery of Stuttgart, the housing project »Quartier am Rotweg« is to be realized by 2027. After the demolition of the site's existing post-war settlement, a lively, sustainable neighborhood with affordable housing and high-quality public spaces is to be built beginning in late 2023. Based on the winning project by *ISSS Architecture & Research*, nine dense residential buildings are planned. The central feature of each residential building is its external stair and corridor circulation combined with common spaces named »Vertical Commons«. These allow for efficient and low-cost access to a greater number of apartments. Reacting to the shift in household size and the intention to build affordable housing while densifying neighborhoods close to the core city. In conjunction with the planning of this cooperative housing project, a spatial 1:1 model was built during the summer of 2023. It was intended to test the socially important threshold spaces between communal

6.
studio komaba: *Extracts of the cooperative housing project and their inclusion into the spatial 1:1 plan.*

7.
studio komaba: *Photograph of the 1:1 model of one of the transitional spaces.*

and private living spaces and to investigate the use of a 1:1 model as a collaborative and participatory design tool. This accompanying project aimed to create a »lived culture of participation« through experimental working methods and participation activities. The organizing institutions were the housing cooperatives *Neues Heim* and *Zuffenhausen* in collaboration with the IBA'27 (International Building Exhibition). After an open call in 2022, *studio komaba* was selected to design and implement the 1:1 model in the summer of 2023 before the construction process for the larger housing development began in the fall of the same year. The spatial 1:1 model was used for appropriation, discussion, and participative processes that focus on testing threshold spaces and their social implications for the upcoming housing project. For this purpose, five transitions between the public and the private, the apartment and the circulation spaces were reconstructed. The model consisted of five different spatial situations as they are planned in the new larger housing project. Based on these situations, spatial and social aspects of the design could be openly discussed and also made tangible in life-size for non-professionals. Curated activities like workshops, discussions, or plays took place in the model. In one of the early workshops, potential future residents helped to furnish the spatial model and initiated a discussion about individual rooms, their allocated function, and their relation to the transitional spaces. Later in the process, various activities were organized by different actors under the guidance of the housing cooperatives.

Description of the Model

The 1:1 model combines five threshold spaces and spatial sequences as they are planned in the larger cooperative housing project. Threshold spaces, as well as parts of the private living spaces and common circulation spaces, were reconstructed. The model included two variations of »buffer zones« consisting of semi-heated winter gardens that separate the living spaces from the common circulation spaces with two layers of sliding doors. Furthermore, a situation was created whereby a bedroom was facing public access gallery. Here, the window size and proportion became crucial, as well as the distance between the access gallery and the interior room. In a fourth reconstruction, a living room was enlarged onto the common access gallery to create a semi-private outdoor seating area. Last but not least, the distance between two building parts and the courtyard they form was spatially reproduced by the model and could be experienced. This combination of different

8.
studio komaba: *Photographs of the 1:1 model showing different transitional spaces, materiality and performative elements.*

spatial situations forms a new whole, a model consisting of two parts that function as walk-through pavilions. The threshold spaces are tested not only horizontally, but also vertically, to simulate the three-dimensional situation in a multi-storey housing project.

As with all models, the question of abstraction, materiality, and extract became crucial for the spatial 1:1 housing model. The extracts are described above and derive from their contents. The appropriate materiality and degree of abstraction require specific strategies. As Gänshirt states in the context of architectural models, the interplay of building materials, design, and the statement of the model is certainly present, but not in a constraining relationship (Gänshirt 2012). Thus, not only forms or scales but also materials can be abstracted and represented by related (analogous) materials. This transformation in materiality is one of the central questions in planning a spatial 1:1 model because it is in contrast to the mock-ups not true in material or constructive methods. But rather, the spatial 1:1 model represents materials and spatial atmospheres in a coherent but translated manner.

Due to the model's size and temporality, it entails its own materials and construction methods which can differ from and need to be negotiated with the desired analogies with the larger project. Namely, the relationship between the model's construction materials, construction costs, and sustainability aspects become more important as the model's size increases. Despite these pragmatic motivations, the 1:1 construction method should still be able to support the overall claims of the model. After all, as Gerkan states: the construction method and the materiality of a model can often be used to reinforce the essence of the design or statement (Gerkan 1994). This is also true for spatial models in a 1:1 scale. The case study utilizes two material atmospheres: wood paneling and metal scaffolding. Both are suitable due to their ability to be deconstructed and the possibility of re-use. The planked wooden frame acts as an abstracted placeholder for plastered planar surfaces. Analogous to the grayboard at a scale of 1:100 or 1:50, wooden panels suggest a planar and opaque spatial boundary. The wooden paneling method was used in the 1:1 model for the interior »private« housing spaces–»the apartments«. Steel scaffolding, on the other hand, suggests a metallic, filigree construction method and was used in the model's communal outdoor spaces. The clear distinction between the different spaces and their materials accentuated the threshold between them and enhanced the perception of the transitions. The difference between the interior rooms and the exterior access balconies was therefore reinforced. For a more precise simulation of

9.
studio komaba: *Photographs of the 1:1 model showing different transitional spaces, materiality and performative elements.*

the transitions, additional performative elements such as vegetation, sliding doors, curtains, and furniture were incorporated. In order to simulate a more tangible, »inhabited« situation, which is crucial to the walk-through testing with lay people. It helped to simplify the understanding of the spaces and allowed easier access to, and interaction with, the model. Future residents, neighbors, or interested people were able to interact with the spaces, furniture, curtains, etc., and each other. In order to develop an understanding of how the threshold spaces may be used in the future. Performative components like furniture or curtains along with the changing vegetation made it possible to imagine and test different spatial configurations; not only for non-professionals but also for planners. The model increased the understanding of, and confidence in, the planning process.

Conclusion and Discussion

During the planning and construction process, as well as during the in-depth discussion about spatial 1:1 models as tools, the following aspects have become apparent. One is that the life-size model enables a deeper and broader examination of its specific topic; in this case, transitional threshold spaces in cooperative housing projects. The planning teams, site managers, contractors, and craftsmen have dealt intensively with the questions of threshold spaces in multi-story housing and how they can be formulated. Also, possible future residents, neighbors, and other stakeholders have been involved in the discussion and the understanding of the architectural challenges in building dense, cost-efficient housing has been increased. The relationship between flat size, circulation typology, costs, and ultimately, the form and dimension of the transitional spaces, has been communicated and lay people became more aware of crucial factors. Although difficult to quantify, it seems that through this participatory process and with the help of the 1:1 model, the acceptance and the willingness to adapt to even unconventional transitional spaces and the narrow borders between private and public spaces was increased. It remains to be seen whether and in which form this discussion will impact the design of the larger housing project to be built on-site. Naturally, it would be desirable if the 1:1 model was not only a representational tool for communication purposes but also an exploratory model that can feed new insights back into the ongoing building process. The 1:1 model will most definitely effect the »soft factors« of the design of the transitional spaces. By »soft factors« we mean the amount and type of vegetation, common and private furniture, per-

formative elements like sliding doors, curtains, or the choice of surfaces and materials. Even if these direct architectural implications may be limited, the spatial model can make a contribution beyond the housing project on-site. Evaluating the model's effects on the collaborative and participatory process – capturing the spatial experience of the visitors in the 1:1 model is a challenge and probably only possible with qualitative methods. Thus, the impact of the spatial 1:1 model will not be able to be measured precisely, even after the project is completed.

On a further note, the planning effort and costs of a 1:1 model cannot be neglected. The life-size spatial model is a costly approach which is not suitable for all housing projects or planning processes. Alternatives like immersive digital models or scaled models have their own disadvantages but may, in certain cases, be more effective. However, the effort and costs can certainly be justified for larger projects, especially if the 1:1 models are seen in a larger context. As Eidenbenz puts it, »economic profit is not suited for evaluating [constructive] mock-ups« and the same seems to be true for spatial 1:1 models. He states that the return of a constructive or material mock-up »is difficult, not measurable directly or becomes visible even only in later projects« And therefore

> »the decision of or against the use of mock-ups must not be linked to possible profit but must be made independently based on the desired quality, control and perceived responsibility to further develop the building culture« (Eidenbenz 2012: 210).

When comparing the spatial 1:1 model to the 1:1 material mock-up in particular, it can be stated that the design of project's socio-spatial aspects deserve just as much effort and financing as the constructive details do, since the social sustainability of housing projects has proven crucial for their longevity. So, the 1:1 model of the case study may on a larger time frame, contribute to the academic and architectural discourse for future projects, adding to the dialogue around cooperative housing projects.

In summary, the case study managed to improve the communication of socially relevant spaces in housing projects to a broader audience of stakeholders, contractors, and non-professionals, and therefore gives the topic of transitional spaces greater importance in the planning process. This can significantly improve the social aspects of a housing project and the community

of future residents, not only integrating them in participatory processes but also seeing them as future collaborators in the management and caretaking of, the designed spaces. On a more general note, spatial 1:1 models can support design decisions and the interdisciplinary discussion around them – and therefore contribute to an architectural discourse that focuses more on spatial qualities and social aspects.

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New Perspectives for Cultural Heritage. The Role of Digital Architects and Virtual Reality

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Abstract: This article explores the role of »digital architects« in the production of knowledge related to cultural heritage. It delves into the potential contribution of architects in developing a metaverse that represents past societies and creating a persistent and shared 3D virtual space within the evolving internet. The study aims to enhance our understanding of the relationship between physical and virtual spaces in the interpretation of cultural heritage and to investigate how interactive experiences impact individuals' perceptions and their comprehension of space and heritage. Two case studies are provided to comprehensively demonstrate the challenges and benefits of digital tools in designing architectural heritage projects. By exploring these tools and fostering collaboration between digital architects and digital tools, the projects aim to raise public awareness of architectural heritage and facilitate a deeper understanding of the past and its relevance to the present.

Keywords: Digital Architect; Virtual Reconstruction; Immersive Technologies; Digital Heritage.

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Introduction

Architectutal design is a complex process that requires the involvement of various actors, professionals, and knowledge sets to ensure the successful design and realization of a project. Recently, the design process has been substantially impacted by the new ideas and technologies brought about by the digital age. With the rise of digital tools, the role of the architect has evolved from simple design and analysis to include collaborations with different professionals through new technologies. This has resulted in a new term, the »digital architect« responsible for a wide range of tasks in the design and realization of a project in the digital realm (Negroponte 1995). Similarly, the role of the architectural historian is undergoing a major shift in the digital age. While architects are now exploring the possibilities of designing in a virtual environment, architectural historians use digital tools to preserve and study architectural heritage. Some notable works include those of Takehiko Nagakura at MIT's *Design Computation Lab*, who is working on the visualization of architectural heritage; Mark Jarzombek at MIT's *History and Theory Group*, who is working on storytelling in virtual reality applications; and Diane Favro, a professor emeritus at UCLA's *Department of Architecture*, who is working on several reconstruction projects and using digital humanities tools in Roman architecture in both digital and physical publications. The integration of computational and computerized tools in the fields of architectural history and cultural heritage management is creating a new research field, »digital heritage« (Kalay et al. 2008). This shift is driven by the need to find new and innovative ways to learn from the past in an ever-changing landscape. The use of digital tools in architectural history and cultural heritage has the potential to provide more accurate and detailed information, allowing a deeper understanding of our architectural heritage.

This article focuses on the evolution of the architect and their toolbox, more specifically, »digital architects«, in the knowledge production of cultural heritage. It aims to investigate architects' potential contribution to developing a metaverse of past societies for the next iteration of the internet, made up of persistent, shared three-dimensional virtual spaces. This involves providing a deeper understanding of the physical-virtual space relationship in the context of cultural heritage interpretation and exploring the impact of interactive experiences on personal perceptions and understandings of space and heritage.

To explore the challenges and benefits of digital tools in the design of architectural heritage projects and to provide a comprehensive analysis, we focus on overcoming the challenges encountered in two case studies. The first case study, named »Digital Teos«, utilizes architectural reconstructions of an ancient Greek city (Teos) to create interactive virtual reality and mobile game experiences, disseminating this virtual experience to the general public while simultaneously testing the archeologists' hypothesis. The second and more recent project, »SILK: Sustainable Information Lifecycle of Kervansaray« explores a network of caravanserais, buildings specific to Islamic architecture and roadside inns along the *Silk Roads*. This project provides both academics and the general public with various computational and computerized methods and tools for research, analysis, and interaction. The project explores the potential for the reconstruction of past networks via mapping their distribution on the topography and using various tools to represent individual buildings through photogrammetry, 360-degree videos and photographs, and parametric modeling for the reconstruction. These project setups are expected to lead to further questions for investigation, particularly concerning the collaboration between the »digital architect« and digital tools. At different urban and architectural scales, the two projects highlight methods and technologies involved in the reconstruction of elements of architectural heritage. Exploring these tools in the context of cross-disciplinary and cross-technology collaboration has the potential to uncover valuable insights and knowledge, contributing to a deeper understanding of the past and thus, the present.

The Evolution of the Architect and Their Toolbox

Architects originated as builders in early civilizations, overseeing design and construction. As a distinct profession emerged, architectural drawings, exemplified by Vitruvius (1914), communicated designs. In the Renaissance, architects broadened their role to include diverse disciplines like engineering, sculpture, and painting, evident in detailed drawings ensuring the design process. The architect's role has continued to evolve to the present day, with a growing emphasis on interdisciplinary collaboration and the integration of new technologies into design and manufacturing processes (Kolarevic, 2003). Similarly, architectural drafting has experienced a significant transformation with the introduction of advanced technologies. Traditional two-dimensional orthographic drawings have been surpassed by more generative

approaches, leveraging tools such as computer-aided design, (CAD), formation, generative, performance, and integrated compound models (Oxman 2008). Oxman introduced five categories of digital design models based on designer relationships, conceptual content, process, and object. CAD models resemble paper-based designs and employ geometric software. Formation models act as a bridge between digital and non-digital, offering control. These technologies have revolutionized architectural design by enabling the creation and real-time interaction with 3D representations of designs. Generative models use computation for computer-generated content. Performance and integrated compound models provide typological and deterministic approaches. Generative modeling techniques allow architects to establish relationships and dependencies within the design, facilitating the exploration of numerous alternatives and the generation of complex forms. This shift towards 3D representations and interactive environments has greatly enhanced the efficiency and accuracy of architectural drafting, leading to improved project outcomes.

Although often used interchangeably, »computational« and »computerized« are distinct concepts. Computation involves calculating new outputs via mathematics, driven by problem-solving and rule-based intelligence, leading to unforeseen outcomes. It utilizes algorithmic thinking. On the other hand, computerization processes information within a computer system, mainly for representation, translation, or storage on digital platforms. While computation has a broader scope and potential for unexpected outcomes, computerization primarily serves as a tool for representation and storage. CAD technology, initially envisaged as a tool for representation, allowing for the creation of complex and intricate geometries, has since evolved to encompass algorithmic computation (Terzidis 2006). It has since moved beyond its original function as a representation tool and currently plays a key role in the computational design process, enabling designers and architects to create designs informed by both digital and material considerations. The integration of CAD technology into the process has significantly impacted the design and production of objects, opening up new possibilities for creativity and sustainability.

The advancement of digital tools has revolutionized architects' approaches to design and visualization. The integration of virtual and augmented reality (VR/AR) technologies has brought architects many new possibilities for engaging with their designs. These two technologies provide different but complementary advantages. In a virtual reality environment, architects can

immerse themselves in a fully digital world, allowing them to interact with their designs and make real-time changes. AR, on the other hand, superimposes digital information onto the physical world, creating new ways to view and interact with designs. This integration has also created a new field of design known as metaverse architecture, which refers to the design and creation of digital environments existing within the virtual world. This integration allows architects to design spaces and environments in a world that exists beyond the physical realm and to explore new forms of interaction and design experience. Thus, the integration of digital tools with metaverse architecture has greatly expanded architects' potential to both engage with their designs and create new and innovative environments.

Digital Heritage and Humanities

The field of digital humanities encompasses a wide range of disciplines and provides a foundation for studying digital heritage, which plays a crucial role within this realm (Cameron/ Kenderdine 2007). A particular focus has been placed on museums and how digital technologies have transformed these traditional heritage institutions, while in turn being influenced by them. Cameron and Kenderdine (2007) delve into the theoretical evaluation of digital media applications by cultural heritage institutions, exploring practical aspects such as cultural heritage research, preservation, management, interpretation, and representation. Meanwhile, Kalay et al. (2007) contributes to the theoretical framework of digital heritage, expanding the definition of cultural heritage to emphasize its multi-dimensional nature, with its associated social, political, and economic aspects.

In a similar vein, Addison defines digital heritage as an emergent discipline that comprises three fundamental processes within the 3D realm (Addison 2000). These processes include documentation, involving activities ranging from site surveys to epigraphy; these include representation, encompassing tasks such as historical reconstruction and visualization, and dissemination, which incorporates immersive networked worlds and in-situ augmented reality experiences. Drawing upon Addison's definitions, this article examines significant heritage projects as examples of documentation, representation, and dissemination, acknowledging the fluid nature of these categories. By analyzing and exploring the theoretical foundations and practical applications within the field of digital heritage, researchers, professionals, academics, and students can establish a common ground

for interdisciplinary research. This interdisciplinary approach not only advances our understanding of digital media in cultural heritage institutions but also addresses the related multi-faceted challenges and opportunities in the context of a technologically driven world. A major benefit of interaction technologies is that they allow gallery, library, archive, and museum (GLAM) institutions to access new approaches to interpreting and presenting cultural heritage, potentially increasing awareness and understanding of its cultural significance (Kalay et al. 2008). These new tools and environments also increase opportunities for exploratory interactions and engaging storytelling for cultural heritage interpretation. This can lead to a shift away from the traditional, passive »look but do not touch« mentality, toward the creation of special interaction points and indicators in museums. Such a change has led to the emergence of studies on the implications of extended reality in the field of cultural heritage and is focused on the design of multi-layered interactive experiences with cultural artifacts. It is also important to note that these emerging interactive experiences have the potential to reshape our spatial experiences and understandings. However, it is not yet clear how these interactive experiences will impact our perception of space, understanding of reality, physicality, and virtuality, and personal understanding of heritage interpretations. The design of these new experiences should therefore involve an investigation of the effects of these new and subtle interaction mechanisms that are emerging in cultural heritage interpretation-focused mixed-reality settings.

The integration of AR and VR technologies into cultural heritage has opened new venues for interactive experiences and immersive storytelling. These technologies allow the creation of a metaverse architecture, enabling the overlay of digital information onto the physical world and thereby providing a more comprehensive understanding of the past. Thus, in archeology, the integration of digital technologies has led to a major reconsideration of the potential for computational and representational practices, leading to an enhanced analysis and interpretation of sites.

Case Studies

Two case studies, »Digital Teos« and »SILK«, are recent cultural heritage projects involving the use of various digital tools. The former focuses on the reconstruction of Greek and Roman architecture, and the latter, on Islamic architecture. »Digital Teos« takes its inspiration from the ancient city of Teos,

located on the western coast of modern-day Turkey in the Aegean region. The city's architecture reflects its rich cultural history and includes a theater, a cistern, a harbor, a council house, the temple of Dionysus, a gymnasium, and other public structures. The architecture is characterized by a mixture of Greek and Roman styles but the city lacks an orthogonal street system; also, the remains of buildings are scattered, and little is known about the layout of the streets. The »SILK« project focuses on the networks of caravanserai building types, which served as roadside inns along the *Silk Roads* during the early Islamic period, and are located in modern-day Turkey. Unlike the buildings in Teos, these caravanserais were independent structures; not integrated into a city plan. They exhibit castle-like exteriors, but their interiors served as dwellings. As they existed as separate entities within the vast *Silk Roads* network, a geodatabase was needed to trace the links between these caravanserais. These two projects employ similar technologies but due to the contrasting architectural contexts and urban setups they result in very different architectural heritage products.

Digital Teos

Teos was a historical Greek city located on the Ionian coast, positioned on a peninsula on the west coast of Turkey. The »Digital Teos« project has a primary objective of enriching the conservation of cultural heritage through the utilization of digital tools which facilitate the research, documentation, and digital modeling of the site's architectural aspects. By showcasing the potential of digital tools, this exemplary project demonstrates how cultural heritage can be comprehended and safeguarded for future generations (Varinlioglu et al. 2018).[1] The project primarily focused on exploring various digital tools, including digital modeling for the reconstruction of four distinct buildings, digitally fabricating the same buildings, developing a mobile game available for download on mobile phone app stores, as well as creating a standalone virtual reality game for two selected buildings. The project was presented to the public using multiple platforms, such as a static public display at the excavation site, an immersive reality experience through VR devices, and a mobile game application. The ultimate goal was

1 In collaboration with Ankara University's Archeology Department, İzmir University of Economics Departments of Architecture, Visual Communication Design, and Software Engineering. This project digitally preserves Teos, a historical city in Sığacık, İzmir, through 3D reconstructions from Teos archeological excavation data.

1a.
Digital Teos: *A sample scene from the standalone virtual reality game or interaction.*

1b.
Digital Teos: *A sample screen of the mobile platform game.*

1c.
Digital Teos: *3D fabricated model for the exhibition.*

1d.
Digital Teos: *Renders of the hypothetical reconstruction.*

to provide visitors with an immersive experience that enabled them to fully grasp the great significance of Teos' cultural heritage.

Using cutting-edge technologies, the project aims to bridge the gap between the past and the present and to engage the public by making history more interactive. Teos VR is a 3D computer graphic that allows users to navigate and shape their own experience (Varinlioglu 2020). By modeling architectural heritage, it allows archeologists to test the accuracy of their interpretations on the reconstruction of the buildings. Through these reanimated models, an awareness of cultural heritage can also be created, potentially preventing behavior that could cause damage to sites. The virtual reality application is designed for pedagogical purposes. It contributes to the production, preservation, and transfer of consistent knowledge in archeology, architectural history, restoration, and cultural heritage preservation education. It allows users to experience 3D reconstructions of the city as it once was and provides instructional information screens.

The framework of analyzing architectural items involved using modeling tools to create graphic representations of four historical structures (theater, temple, cistern, and port) in the ancient city. Based on the archeological excavation data, 2D graphic representations were created from the computer-generated 3D representations and converted into a mobile application for archeological and architectural history education. This mobile application featuring ancient Teos plays an active role in delivering accurate architectural and archeological information to the target audience and can be updated with graphics and information from different ancient cities, making it suitable as a setting for more general architecture and art history education. Utilizing digital tools to visualize and reproduce archeological finds has the potential to increase the exposure of cultural assets, benefiting science, culture, tourism, and the economy. The exhibition at the excavation site displays structures produced during the digital fabrication phase of »Digital Teos«. Model buildings were created to facilitate archeologists' 3D analyses of the architecture, and then 2D and 3D visualizations of these models were created using data on material, color, and light settings.

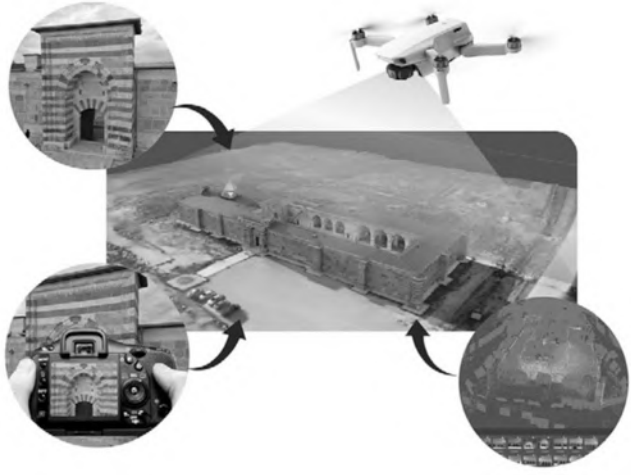
Overall, the project explored three methods of interaction with the public. The direct approach mainly focused on allowing users to interact with the ancient city, while the interaction between the archeologist and the digital architect remained limited.

SILK

The »Sustainable Information Lifecycle of Kervansaray« (SILK) pertains to the investigation of the ancient road networks in Anatolia, with a specific emphasis on the architectural relics of buildings known as caravanserais.[2] Caravanserais, a distinctive type of building within Islamic architecture, functioned as roadside inns situated at intervals of approximately 30–40 kilometers along the *Silk Roads*. The project's digitization encompasses the creation of a distribution map, 3D documentation, virtual reconstruction, and interaction design for individual structures, as well as tracing the networks among these architectural treasures. The endeavor faced several challenges, including the overabundance of sometimes conflicting information available on these buildings, the extensive geographical area to be covered, and the inconsistent data regarding locations due to the ever-changing conditions which involved preservation, restoration, and adaptive reuse. Notably, these caravanserais, as a specifically Islamic heritage, have traditionally fallen outside the typical methodology of archaeological preservation in Turkey. The adaptive reuse of these buildings brought new functions to them, thus rendering their current state subject to frequent changes, dependent on the private owners. The disturbances inflicted upon these architectural sites have given rise to numerous obstacles, necessitating the documentation not only of the buildings themselves but also their precise locations and the various stages they have undergone over time. The reconstruction process must encompass not only the current state of the caravanserais and their original form upon construction but also consider restoration efforts that often compromise the authenticity of this cultural heritage. It is also important to consider multiple stages and prospective assumptions or proposals regarding the structures' future reuse.

The project's initial stage entails digitizing the urban networks in Anatolia during the *Rum Seljuk* period. This involves the digital conversion of published inventories and maps. Although the primary objective was to compile location data, the absence of structured information, and the abundance of sometimes conflicting data on these buildings necessitated additional measures, including comparing various written resources, geolocating

2 SILK is a transnational cooperation partnership project led by Professor Guzden Varinlioglu (Visiting Scholar, MIT) and Professor Takehiko Nagakura (MIT) funded by the U.S. Department of State, MIT International Science and Technology Initiatives-MISTI Global Seed Funds supported by the US Fulbright and the UK Chevening fellowship programs.



2a.
SILK: *Distribution maps of these caravanserais.*

2b.
SILK: *Photogrammetric reconstruction of individual buildings.*

them using Google Maps and Earth, and conducting on-site investigations to verify their locations. Throughout this process, it was considered appropriate to adapt the data structure utilized in University College London's (UCL'S) *Silk Road Project* to the particular context (Williams 2015).

The second stage focused on the documentation of individual caravanserais, employing diverse technologies based on their preservation status and urban context. The photogrammetric modeling techniques involved generating 3D photorealistic models using systematic photography in the field. Additionally, 360-degree static and moving images were captured to produce immersive tools. While the 3D models were created to facilitate immersive VR interaction, the 360-degree images enabled the development of a VR video with its own narrative.

The third stage encompassed the geometric analysis of the caravanserais, enabling the parametric modeling of architectural elements. Parametric tools were employed with the plan and section drawings from the archival resources. This stage allowed a cost-effective method for reconstructing buildings, particularly in cases where the process was complicated by significant disturbance to the ruins, making it difficult for the general public to discern the structures' 3D characteristics. The reconstruction process empowers architects and digital architects to envision and depict the building's original appearance before its destruction.

The game study involved the design and implementation of an educational game utilizing 360-degree images and videos (Varinlioglu et al. 2022a). The game aimed to encourage users to engage in virtual site visits, interact with content, and solve puzzles. This approach followed the strategy of learning through play, in line with the objectives of the serious game category. This game project is comparable with the »Digital Teos« project, sharing the common objective of providing a learning environment for gamers, albeit employing different methods and technologies. While the Teos project was slightly different in that it utilized a mobile platform for 2D games and 3D immersive VR games, both projects sought to create an educational context for players.

The figure 2 depicts a distinct approach in the form of a board game project, in contrast to the creation of a learning environment (Varinlioglu et al. 2022b) (fig. 2d). The board game, based on an abstracted version of the topography, employed game mechanics that enabled players to move between different caravanserais. The game's objective was to observe and record the players' movements on the board, aiming to understand their

2c.
SILK: *Gamification.*

2d.
SILK: *Board game.*

decision-making and path-finding processes within this abstracted landscape. This unique approach transcends the boundaries of the serious game category; its aim extends beyond merely teaching gamers the history of the land, as its actual purpose is to use their behavior to build knowledge. This was achieved in the later stages of the project, by incorporating game-user research tools, including physiological and psychological inputs from users. By leveraging affective computing devices such as medical tools like an electroencephalogram (EEG) and Galvanic Skin Response (GSR), along with video recordings, the team was able to capture and analyze the gamers' reactions (Varinlioglu et al. 2023). Another aspect of the project was to explore the utilization of wearable sensors for architectural research within the context of game environments. The research team harnessed gamers' collective intelligence to test theories of architectural history through the employment of a serious board game simulating past trade routes. The game environment allowed the tracking of players' movements and behaviors, providing data for spatial analysis and user behavior. Wearable devices and video cameras captured players' positions, behaviors, and emotions during the decision-making process and provided data. The feelings that were visible in the recordings were compared with the gamers' stated feelings, leading to valuable insights (Varinlioglu et al. 2023).

The final stage of the project involves public engagement, primarily through the inclusion of VR immersion. The aim is to create an immersive and interactive environment using VR technology, enabling highly detailed and accurate exploration of heritage sites. This approach, similar to Teos VR, leverages the current technologies and the market appeal of virtual reality to provide the public with a high-quality, but limited, experience of the project's final product. The design will combine photorealistic reconstructions, historical photographs showcasing different stages of restoration, and archeological survey data such as plans and sections, integrated with photogrammetric models of the environment. This stage will focus on selected caravanserais along the *Silk Roads*. Recognizing the limitations of access in this form, an alternative version in the form of a webGL version is also planned. Distribution of this version will be facilitated through state-of-the-art social media platforms and other relevant channels.

3.
SILK: A proposal for VR experience.

Conclusion

These projects explore two Anatolian heritage sites from different eras and regions. The first project, »Digital Teos«, deals with a well-preserved and systematically documented archeological heritage. The primary challenge was to accurately represent individual buildings in the virtual environment, requiring collaboration with archeologists providing guidance and architects providing 3D modeling skills. While time-consuming, this approach was relatively straightforward. In contrast, the second project, »SILK«, presented a larger landscape and more extensive datasets. The distribution of caravanserais proved challenging due to ambiguous and inconsistent information, as well as the ever-changing conditions resulting from restoration processes and difficulties in public access. The technologies employed in each project varied accordingly. The first project prioritized accuracy above all, and the second, crowdsourcing and public inclusion, aimed to reach broader audiences and facilitate mutual learning between locals and researchers. In summary, these projects highlight the diverse challenges of exploring different heritage sites. »Digital Teos« focuses on precise representation, while »SILK« emphasizes public engagement and knowledge sharing.

The slow pace of the digitization process of heritage sites and historical resources led to an urgent need to establish comprehensive inventories that encompass a larger scope of archeological heritage and sites. However, through various initiatives, significant progress has been made in creating virtual reconstructions which are readily accessible online and contribute to the broader inventory of Anatolia's heritage. Additionally, VR, AR, and other technological tools have expanded our ability to explore and learn from ancient architecture. These advancements have not only enriched our understanding of the past but have also significantly renewed interest in archeological heritage preservation and exploration. Moving forward, it is essential to continue fostering collaborations between technology and heritage professionals to ensure the preservation, accessibility, and educational value of these invaluable resources for future generations.

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Collaborations Informing Collective Practice. A Conversation with Fosbury Architecture

Elettra Carnelli

While hierarchically structured offices remain the prevailing organizational model within architectural firms, in recent times more horizontally organized groups and collectives with alternative perspectives and design approaches are emerging. These collectives challenge the conventional notions of individual authorship and creativity and advocate for an egalitarian and collaborative way of practicing in response to specific situations. Even though the term has entered common usage, it is not easy to define what an architectural collective is and how it works; indeed, many aspects related to its function and motivation remain largely unexplored: What is the collective reacting to, and what strategies and tools do they employ? Which forms of collaboration – within or outside the disciplinary field of architecture – are integrated with the activities of a collective? And what role do those collaborations play in the evolution of the group?

These interrogations are explored in the conversation with Claudia Mainardi and Giacomo Ardesio, who are both members of *Fosbury Architecture*, founded in 2013 together with Alessandro Bonizzoni, Nicola Campri, and Veronica Caprino. In addition to the development of urban strategies, the reuse of existing buildings, and the design of temporary installations, the collective has participated in, and curated, numerous national and international exhibitions, most recently as curator of the Italian Pavilion at the 18th »International Architecture Exhibition« at the *Venice Biennale*. Fosbury defines itself as a spatial practice, interpreting architecture as a mediating tool between collective and individual needs, expectations and resources, sustainability and pragmatism, environment and human beings. Moreover, as a research group, Fosbury aims to push the boundaries of the architectural discipline, redefining its role and rethinking its production processes in light of contemporary challenges. In this interview, Mainardi and Ardesio reflect upon the origins and evolution of the group, detailing the challenges its members have encountered, and the insights that they have gained throughout their journey. Furthermore, they shed light on how collaborations with other collectives and actors have contributed to their growth and the explorations undertaken by their practice.

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Elettra Carnelli | Let's start from the beginning: How did you come up with the idea of founding a collective, instead of working on your own or within a more conventionally structured architectural practice?

Claudia Mainardi | It all began when we were still students, it was 2013. Some of us had just graduated from university, while others were nearing the end of their studies. Those were quite challenging years because it was just after the 2008 crisis. It was really difficult at that time, not only to find employment, but also to get into the job market. In the beginning, *Fosbury* emerged as a gathering of friends doing competitions together. It served as a platform where we could voice concerns and ideas that we perceived as urgent but could not readily express within our daily professional lives. Over time, as our group became more consolidated, *Fosbury* evolved into a sort of mental space where we could position ourselves and express ourselves freely. This allowed us to break free from certain business and production logics, also because at that time we were not so interested in making the group profitable.

EC | Why did you call yourself a collective?

CM | We initially defined our group as a collective, and we still refer to it as such, because over the years it has functioned as a sort of collector: while working on projects together, each of us was pursuing individual careers.

Giacomo Ardesio | It is also a collective because it stemmed from the involvement of many individuals, initially eight, now we are down to five: aside from Claudia and myself, there are Alessandro Bonizzoni, Nicola Campri, and Veronica Caprino. The formation of this collective was not based on a predefined group image as our individual backgrounds and diverse skills prevented a single unified profile from emerging. In truth, condensing our individualities under a collective entity was quite liberating, especially when compared with the prevailing notion of the architect-hero that was prominent during our university years. While this concept is much criticized now, it was a widespread notion at the time. We chose to follow our own inclinations, opting to avoid conforming to the

archetype of the starchitect. Instead, we aimed to be part of an impersonal entity, like *Wu Ming*, who we also involved in the publication *Incompiuto*.[1]

EC | It is interesting to notice that the image of the architect as a single hero, rising above all difficulties, does not represent the actual dynamics of the profession. This notion often hinders the cultivation of collaboration, as interactions with specialists or users is perceived as intrusive.

CM | Yes, such an attitude can also lead to frustration.

GA | Besides, the pressure to develop a recognizable signature can sometimes feel like a self-imposed restriction, which is often influenced by education, expectations, and peers.

EC | Adopting a name that corresponds to a collective identity provides a certain distance from the individual personalities within the group. How did you come up with the idea of naming yourself *Fosbury*?

CM | The name was originally suggested by one of the members for whom Dick Fosbury was an idol. The name refers to the message we read in this character, an athlete who in his only sports performance in the 1968 Olympics revolutionized the high jump discipline with a new technique: instead of jumping with his chest facing the bar, he jumped with his back, achieving an incredible result after which there was no turning back. We were fascinated by this idea of metaphorically overcoming obstacles not solely through extraordinary physical performances but by seeking alternative, even very simple, ways to shift the perspective and overcome challenges.

EC | How did the collective work at the beginning and how did your organization change over the years?

CM | Our evolution unfolded in several stages. Initially, we were all based in Milan and the group served as a space on its own, separated from our everyday work. Then another phase began when Giacomo and I moved to

1 *Wu Ming* is a collective of Italian writers formed in 2000 from a section of the *Luther Blisset Project* in Bologna. The group's literary endeavors are centered on radical fiction approaches, ranging from novels to comics, from audiobooks to screenplays.

1.
Realization of a model at the entrance of Fosbury's *first studio in via Pinturicchio, Milan, 2014.*

2.
Weekly meeting (together with south-American colleagues) in Fosbury's *first studio in via Pinturicchio, Milan, 2014.*

the Netherlands after graduation, while Nicola went to Hamburg and the rest of the group remained in Milan. So for a long time, there was a core in Milan and another one abroad, with communication primarily taking place via Skype. Our projects were mainly concentrated in Milan but our research and competition activities spanned various locations, like our proposal for the 2015 *Europan* competition in Leeuwarden, in the Netherlands. This competition marked a turning point for us, as it prompted us to organize ourselves a bit more. During this period, our work was project-based and executed remotely, with our organization adapting to the needs and availability of individual members. Each project typically began with extensive brainstorming sessions, although these have become less frequent over the years as we developed a better understanding of our strengths and skills. In 2020, we all returned to Milan with the intention of dedicating more time and energy to the group but the onset of the Covid-19 pandemic forced us to revert to remote work which we were already accustomed to. During the pandemic, we co-founded the *Dopolavoro* association, along with others. This initiative stemmed from the necessity of having a large space for work and events. Through a bid from the municipality of Milan, we received the initial funding to rent a former workshop in Corvetto, in the south of Milan. There, we set up our workspaces together with three other collectives, a researcher, and two journalists.

EC | Now the collective consists of the five of you, all at the same level. Do you have employees?

GA | Since the competition to curate the Italian Pavillon at the *Biennale Architettura* 2023, we have been collaborating with a selected group of practitioners, with whom we have previously done other projects.

EC | Has the move to a physical space led to changes in the dynamics of your collective?

CM | What influenced our group dynamic was the appointment as curators for the Italian Pavillon, which coincided with our relocation to the new space. As we worked for the *Biennale*, each of us had to put a halt to their collateral activities because up to that point, *Fosbury* had always been something we did in addition to our day jobs.


RROARK!

3a.
Dopo?*'s collective. Photographer: Mattia Greghi.*

3b.
Dopo?*'s co-working space. Photographer: Mattia Greghi.*

4.
Fosbury Architecture: *Free press fanzine* RROARK*!, 2014–2015.*

GA | This is a common reality for many young and small architectural practices. Throughout the years we tried to preserve *Fosbury* as a space for pursuing projects that genuinely interested us, because otherwise we would have been forced to make a series of compromises to make ends meet. Looking back, it seems that this was the right choice, as it enabled us to establish a consistent and distinctive profile in the realm of research and installation, translating applied research into tangible installation.

EC | I can imagine that it must have been quite an adjustment to physically reunite after setting aside your individual commitments.

CM | At the same time, this situation has given us the opportunity to think about how to organize ourselves in the future. We are considering whether we should go back to the size we were before, maintaining individual careers alongside collective projects or explore alternative structures. This could involve a stronger connection to academia, especially given that some of us are pursuing PhDs or working in universities. Now, we want to see what might happen as we invest more in *Fosbury* without making too many compromises.

EC | Returning to your curatorship for this year's *Biennale*: How did you come up with the idea of *Spaziale*, connecting several groups across various locations in Italy, and how did you select them?

GA | In selecting the specific profiles, we made a curatorial choice: We looked for different profiles based both in Italy and abroad, operating both in the North and South of the country, with different interests and areas of expertise. Through this process, we identified a total of nine groups. The rationale behind inviting these groups and collectives stemmed from our belief that, particularly within an Italian context, the model of collective and cooperative work we advocate for is acknowledged but has not yet garnered full legitimacy. With our *Biennale* proposal, our aim was twofold: First, to shed light on this reality, of which we are a part, and second, to incite debate. Our overarching goal was to legitimize these kinds of practices and shared ways of working by showcasing how these groups effectively operated within the collaborative framework we proposed. In fact, our primary curatorial input was to build this framework, wherein each

group collaborated with an advisor who, in turn, worked alongside local actors and supporters.

EC | Do you think that your approach to design has changed after this experience?

GA | Yes, we are currently in the process of determining our future direction, drawing on the insights we have gained this year through collaborating with all the people we have encountered. These experiences have provided us with a better understanding of how others work and manage the challenges linked to running an architectural practice. We have always been interested in exploring these issues, for example, with the fanzine *RROARK!* we investigated the contemporary condition of young workers in the field of architecture to stimulate the debate around this matter. Similarly, in the context of the Bienniale, we asked Charlotte Malterre-Barthes to write an essay that addressed the weaknesses of, and challenges faced, by the groups that we had involved, including ourselves.[2] Her contribution posed critical questions, such as whether the collective pays maternity leave and whether the activity of the group alone can economically sustain all the individuals involved. Our intention was to bring these issues to the forefront of the discussion because we believe that it is essential to engage in these conversations openly.

CM | The organization of architectural practices is an increasingly pressing issue, as seen in one of the last issues of *ARCH+ Unternehmen Architektur*, which talked precisely about the need to change the architectural office and its organizational structures because the value systems have changed as well. It seems that there is a growing need to creatively explore new models and formats that enable architectural practices not only to sustain themselves but also to thrive through their work, a goal that still often feels like a mirage in today's context.

EC | What have you gained from discussing these issues with the groups you have been involved with?

2 Maltherre-Barthes, Charlotte (2023): »Kill your Darlings: Why the Office Must Be Fixed to Fix Architecture«, in: Fosbury Architecture (eds), *Spaziale: Ognuno appartiene a tutti gli altri = Everyone belongs to everyone else*, Milano: Humboldt Books, 328–233.

GA | We gained an overview into this unique universe to which we belong by asking how these groups organized themselves: Whether they operate as traditional firms, cultural associations, or individuals gathered under a common name. We also asked how they sustain themselves, through teaching, open calls, or primarily through their architectural work? This contact with other groups has allowed us to reflect on how we can organize ourselves, although we have not yet arrived at a definitive formula for us. The key takeaway is that the ultimate objective does not always have to be the establishment of a conventional company; there are various routes through this complex landscape.

EC | I guess it is part of a process: Individual members evolve, and as a result, the collective entity must adapt and evolve with them to accommodate these changes and continue to thrive.

GA | Absolutely. In fact, that is what we are envisioning, a structure that is flexible enough to allow individuals to take time for themselves and their own projects. Balancing the complexities of each person's life, both professionally and personally, can indeed be challenging, even from a legal perspective.

EC | In fact, the word »collective« does not resolve legal or organizational issues. It is perhaps in its vagueness that the beauty of the word lies, as it allows for appropriation and interpretations.

GA | A particularly intriguing aspect we observed is how each of the practices we involved defines itself: as a collective, atelier, group, or agency. The terminology is evolving, reflecting fundamental shifts in how individuals conceive their work. These are questions that we posed not only to ourselves but also to those we invited, and they resonate with many young architects today: Other paths are beginning to emerge besides that of the starchitect, which was presented as the only viable path in the past.

EC | Did you have shared references for designing, or visions for your evolution, when you first started at *Fosbury*? How have they evolved over time?

CM | In our early projects, each of us would bring in a multitude of references of all kinds. What was particularly fascinating was the sheer

5.
Alterazioni Video and Fosbury Architecture: *Pages from the publication »Incompiuto: The Birth of a Style«, 2018.*

diversity of these references, reflecting the wide-ranging interests and passions of each member.

GA | However, we never had fixed references, instead, we used different ones during the brainstorming phase. In our early days there was a discernible interest in both the *Tendenza* and the *Radicals*. This inclination was influenced by our academic and work environment because it was a period of revival for both currents when we were in university so, we were inspired by *baukuh* and their line drawings and *San Rocco* or Andrea Branzi, who collaborated with the professor we graduated with.

CM | In hindsight, I believe we have a shared but not explicit idea of aesthetics, that is certainly influenced by our context. However, the references we looked at concerned not only design: Each of us would introduce individual ideas and suggestions which served as the starting point for our discussions. While we are used to it now, in the early days we were quite captivated by one another's distinct interests. Consequently, our discussions were enriched by the introduction of references, often unexpected or lesser-known ones, which in turn, contributed to our collective growth as a group.

GA | This exchange was and still is very useful. The inclusion of non-architectural images allowed us to express a sense of irony that has always been present within our group. Perhaps irony served as a means to free ourselves from the need to provide overly precise definitions and to distance ourselves from the weight of the architect-hero image mentioned earlier. Working across different registers became a valuable tool for us and it eventually became an integral part of our method. This is perhaps also why we do not have a single, fixed recipe: It is a fundamental aspect of being a collective, where the collective identity evolves in tandem with the individuals, the project, and the context.

EC | Do interactions with references or individuals outside of architecture influence the final product, for example demonstrating that architects can engage in activities beyond building?

GA | We have consistently advocated this perspective, and not because we do not like doing architecture but because we believe that architectural

work encompasses more than just physical construction. This was exactly our aim with the *Bienniale*: To convey that architecture includes a broader spectrum of interventions. This view also challenges the current educational system and emphasizes the need to expand it. In essence, I think the world is gradually realizing that the role of architects is changing.

EC | In conclusion, how has collaborating with other groups and individuals impacted your experience as a collective so far?

CM | Collaborating has profoundly changed our approach, leading to a significant evolution in our collective identity. After an initial alignment, the end result undergoes changes by necessity, as exemplified by our collaboration with *Alterazioni Video* for the publication *Incompiuto: The Birth of a Style*. Here, we merged different perspectives and skills, with *Alterazioni Video* providing their artistic expertise and we contributed as architects with an obsession for cataloging. While we have frequently engaged in collaborations with other collectives or firms in the form of group exhibitions where each participant interprets a common theme, we often find ourselves most stimulated when working with people not directly linked to our own field. This includes production agencies, artists, or graphic designers, since such collaborations enrich both the discussion and the final outcome of our projects.

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Collaborative Pedagogical Practices in the Era of Radical Urban Transitions

Asma Mehan, Jessica Stuckemeyer

Abstract: Architectural research forms the basis of design in seeking a solution that considers the site's sociopolitical and spatial-cultural factors and the built environment surrounding it. In addressing industrial heritage, industrial revolutions, energy transitions, and technological innovation uniquely shape the city. The transformation and new discourse between similar heritage and different sites allows for a combination of ideas with transnational and interdisciplinary depth bolstering individual designs through a developed perspective on industrial architecture. This studio addresses the socio-political and spatial-cultural challenges of post-industrial cities. This article uses a critical, comparative, and analytical problem-based design research approach to examine collaborative pedagogical practices that can build a new image and identity through adaptive reuse strategies in the post-industrial urbanscape.

Keywords: Collaboration; Adaptive Reuse, Industrial Heritage; Architectural Studio Pedagogy.

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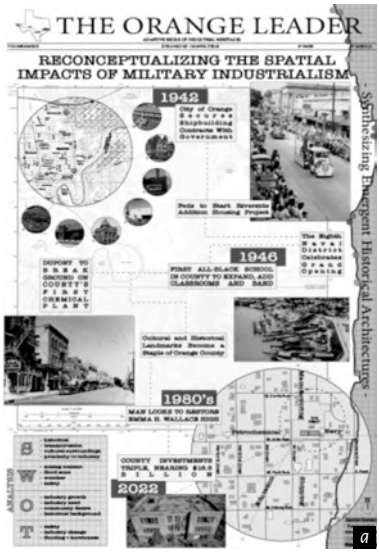


1.

Peer learning and correlation between heritage groups.

Fig. a: Emma H. Wallace High, Orange, Texas, Casey, 2022.

Fig. b: Piquette Ford Plant, Detroit, Michigan, Palady, 2022.

Fig. c: Linseed Oil Factory, Toronto, Canada, Gomez, 2022.

(Re)conceptualizing the Industrial Heritage: Peer-learning and Correlation

Over the previous centuries, powerful corporate and governmental actors have created a broad range of post-industrial imaginaries that have changed over time and are in line with local cultures. During deindustrialization and decarbonization, the term »industrial heritage« has recently emerged as a new subject in heritage studies (Hudson 1994; Hospers 2002; Berens 2010; Hospers 2002; Hudson 1994). To integrate the methodologies for the protection and adaptive reuse strategies, the »industrial heritage« itself needs to be divided into various categories (Bazazzadeh et al. 2022; Boodaghi et al. 2022). In its *World Heritage List*, UNESCO has begun including the increasing number of local industrial legacies like railways, mines, factories, assembly plants, agricultural production, and manufacturing production. In the process of their adaptive reuse however, the question of heritage meanings and values arises (Casey/Mehan 2023; Mehan/Abdul Razak 2022a; Mehan/Abdul Razak 2022c).

These collaborative design outcomes and selected projects are based on the fourth-year research-led studio »Adaptive Reuse of Industrial Heritage« taught at *Huckabee College of Architecture, TexasTech University* in the fall semester of 2022. Using a comparative approach and a transnational perspective, projects in this studio identify and study urban-rural buildings, infrastructures, sites, and contexts that can be categorized as industrial heritage (Mehan/Casey 2023; Mehan 2019). Projects may consider the United Nations' sustainable development goals (SDGs) as an overarching framework but may still go beyond them to engage with local communities and meet context-specific demands (Kincaid 2002; Mehan/Mostafavi 2022; Mehan 2023a). The legacy of various industries, such as oil, textile, and automotive, continues to reshape industry, society, culture, and politics (Hauser et al. 2023; Bonino/De Pieri 2015). With a significant focus on four industries, including automotive (auto and railway), technology, natural resources (oil and water), and textile, the projects' sites are distributed across various locations in North America, Latin America, Canada, Australia, and Asia (Mehan/Abdul Razak 2022c; Mehan 2023b). The group of two to three students was clustered thematically in the same industrial heritage group. Students were encouraged to take inspiration from their peers and the studio, working with each other to form a compressive analysis and design. Each selected case study and studio project targeted either an abandoned or malfunctioning

industrial heritage building or factory site and proposed an adaptive reuse framework and design strategies to revitalize post-industrial urbanscapes (Mehan/Mostafavi 2023) (fig. 1).

Morphological and Formal Design

Within the studio, students were prompted to begin developing morphological aspects and formal design through a list of considerations to be applied to the selected site. These include its physical aspects and the effects on a wider community and urban context (Khasraghi/Mehan 2023). This exploration focused on the existing building/infrastructure, extensions and parasitic additions, semi-open areas, and open urban platforms that culminated in a responsive zoning design and a collaborative exploration through the students (McPeek/Morthland 2010; Salama 2015). As each project progressed and the scope for design expanded, students became familiar with the various projects and the collective understanding of adaptive reuse and morphological considerations broadened.

Regarding adaptive reuse, the existing infrastructure acts as a set of guidelines for the purpose and functionality of the design, with additional restrictions forming from heritage-site considerations. The students were tasked with exploring the potential of their adaptive reuse idea through color – block diagrams, mind maps, and isometrics, and addressed limitations while exploring the precedents' structure, available space, and program. From this viewpoint, the concept of parasitic additions may be explored. Parasitic architecture is often synonymous with extension, and widespread definitions reflect this. The definitions broadly say »a new room or building attached to an existing larger structure,« but there is a difference between the two. This is limiting because the term »parasitic architecture« is thrown around to describe unusual expansions or to describe something that solely benefits the host building (Given 2021). By its very nature, this architecture increases diversity within the built environment, leading either to the host's extinction as the parasite drains resources or stimulating the host and increasing its growth rate. Parasitic architecture should be thought of as more complex, something that works in tandem with the existing building and community and has the potential to affect the entire city (Baroš/Katunský 2020). Students were challenged to consider this and incorporate parasitic addition into their design while maintaining the class-wide focus of eliminating excess information that is not beneficial to the project (Mehan/

Mostafavi 2023). After the basis for the morphological elements and program was finalized, the idea of semi-open areas and open urban platforms were explored to connect the structure of the surrounding site and community and increase circularity (Mehan et al. 2023).

Articulation and Materiality

The exploration focused on redefining adaptive reuse and inspired a new way of thinking. Adaptive reuse requires considering the existing built environment and how it can dictate a specific style, texture, morphology, and typology (Misirlisoy/Gunce 2016; Repellino et al. 2016). In contrast, contemporary requirements and a broader consideration of community needs may call for innovative methods and radical solutions (Mehan 2023c; Hatuka/Ben-Joseph 2017). In exploring adaptive reuse, form and material systems balance the contrast between the old and new and seek integrated solutions that address general concerns (Bazazzadeh et al. 2021).

Collaborative methods throughout the studio continued to develop through articulation and materiality, problem-solving and information sharing, and crucially, through the dissemination of previous studies and a set of collective points that every project had to critically respond to (Qureshi 2020). After several rounds of group discussion, we concluded that notions of form and materiality can be rethought and redefined in adaptive reuse projects. On the one hand, the very physicality of the built environment can dedicate a specific style, texture, morphology, and typology. On the other hand, contemporary requirements and challenges can demand innovative solutions in terms of form and material systems. Therefore, the contrast or harmony between the old and the new is a key factor to consider in an adaptive reuse proposal.

This being said, the following points and sets of questions have been collectively selected to be addressed in our project concerning the design of form and material systems:

- How do the additions to, and subtractions from, the existing buildings and infrastructures result in an integrated design solution?
- How will the ratio, contrast, and correlation between mass and void be redefined within the existing context?
- How does the project define the threshold between old and new?
- What is the function of the form in recreating a sense of place?

- What are the fundamental characteristics of the geometric systems developed and applied to blur the boundaries between the past, present, and future?
- How can the form of open space or the form of the void between old and new be defined and highlighted?
- How may the existing and new structural systems co-exist with each other?
- What are the functions of ornaments, relics of the industrial past, architectural tectonics, and patterns in defining the characteristics of old and new?
- How does the project define the form of added interior layers, and how is the continuity or discontinuity in the interior layer envisioned?
- How can we think of exteriority in interior spaces, and how do we extend the interior to the exterior and vice versa?

As students addressed their project-specific requirements, similar and different conditions were explored, thus creating unique solutions. Each person prioritized their project needs, while the collective atmosphere shifts into group thinking through collaborative discussions. A set of questions meant to inspire critical thinking and provide a bridge across student studies was distributed to facilitate this discourse. The students were also encouraged to find examples, previous projects, or sources of inspiration from sketches, drawings, images, and details that can address the selected points. The question supplied prompts covered parasitic additions and subtractions to the building, the transitions between old and new thresholds (Mehan 2019) and indicates how structural systems coexist between the original design and additions (Bazazzadeh et al. 2022).

Technological and System-Wide Studies

Adaptive reuse proposals begin on a theoretical, big-picture basis, exploring the site, and surrounding communities and programmatic needs. Still, when considering heritage buildings and sites that may have lain abandoned for years, the practical considerations amass quickly. At this point the studio had formed theoretical designs and deliberated over the practicality of their adaptive reuse as it relates to the city, people, and usage but delegated technological studies to a point in which specific systems and efficiency considerations could be cohesively designed (Varis Husar et al. 2023). After

exploring articulation and materials, the students were asked to focus on sustainability measures, regional concerns, and natural forces, the site's ecology and design efficacy. On a project-by-project basis, students explored the technical details of skylights, roof and wall systems, water management, and material longevity and possibilities for reuse.

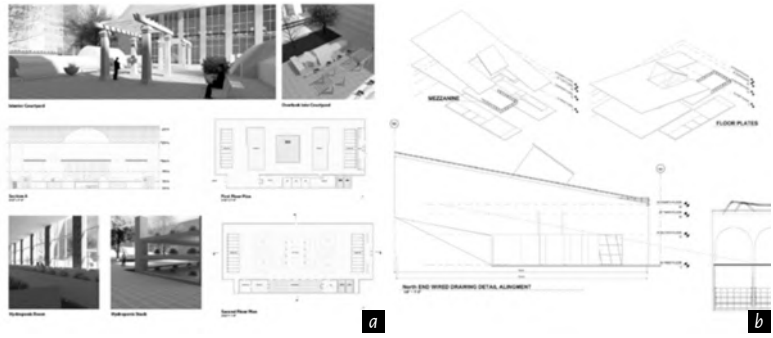
Redefinition of Studio Collaboration Through Adaptive Reuse Impact Groups

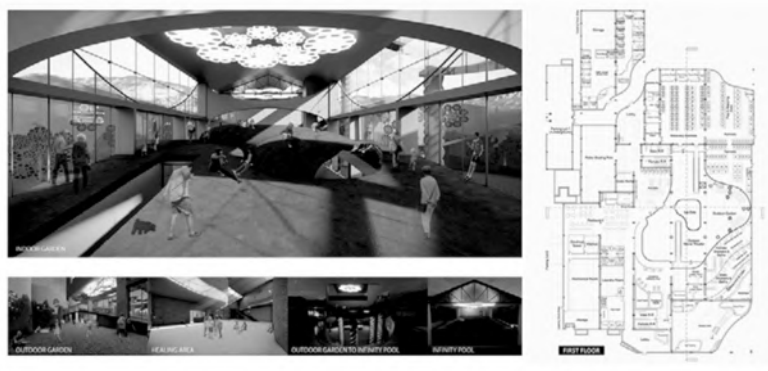
At the beginning of this studio's exploration, heritage groupings such as technological heritage, textile heritage, and transportation heritage were explored to create discussion among students with a similar industrial history and focus on the research as it applied to each project's unique requirements. Students continued their focus on industrial heritage and as the class developed an awareness of industrial needs and specific considerations across the heritage clusters, the separation through groups was lessened. At the stage where each project was well defined and had developed a particular identity, the second round of groupings was established to explore the impact of each student's adaptive reuse motivation and its eventual impact. The adaptive reuse impact groups were intended to create a new round of collaboration and function as an overarching introduction to a group of students during the final presentations. These groups were primarily based on, and categorized by, the design's intention and outcome through adaptive reuse and how that design affects the surrounding people.

The Genesis of Industrial Heritage in Post-Industrial Urbanscapes: Collaborative Design Research Practices

The class-wide exploration and innovation culminated in six distinct groups based on the »Adaptive Reuse Design« (ARD) strategies and approaches, with each project filling a niche within its overall impact. The first group dealt with outreach to the respective communities, addressing a direct problem and attending to people's needs, with designs such as a hydroponic greenhouse to combat food insecurity in Philadelphia, a mental and physical health clinic in Busan, and a plan for the rehabilitation of a gated dam and the surrounding built environment in El Paso (fig. 2).

Like the group mentioned above, three projects were clustered together as community-based, focusing on implementing support systems and





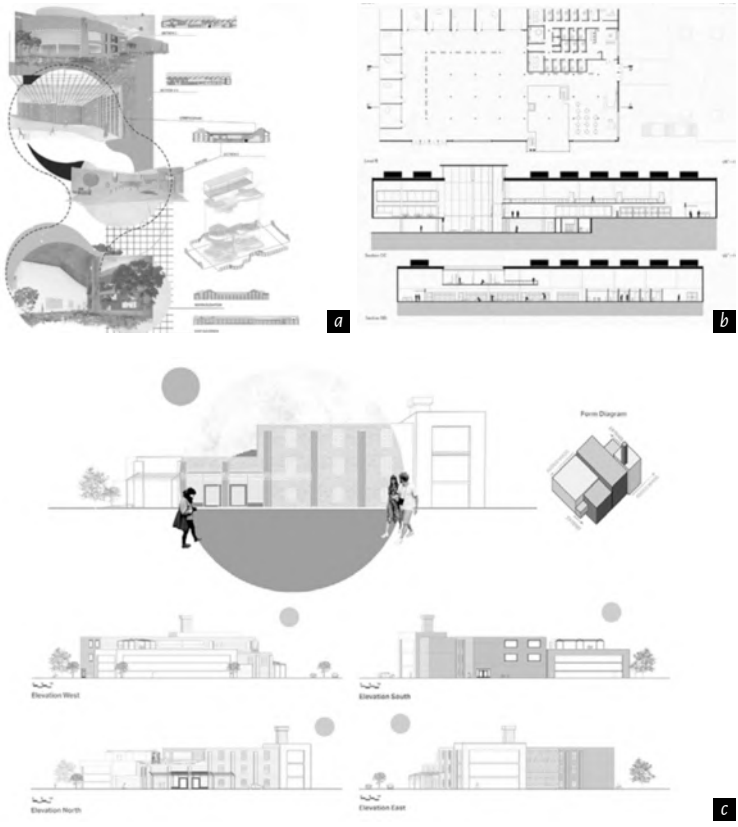
2.

Outreach ARD Group.

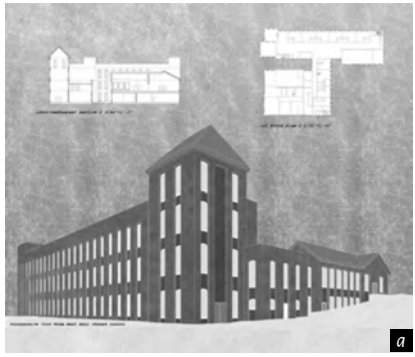
Fig. a: Richmond Power Plant – Philadelphia, Pennsylvania, Stuckemeyer, 2022.

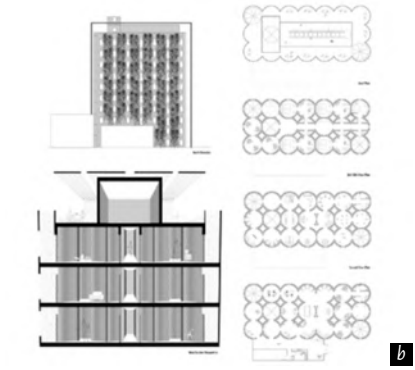
Fig. b: Suyeong Factory – Busan, South Korea, Chung ,2022.

Fig. c: New Smelltertown – El Paso, Texas, Arturo-Villegas, 2022.

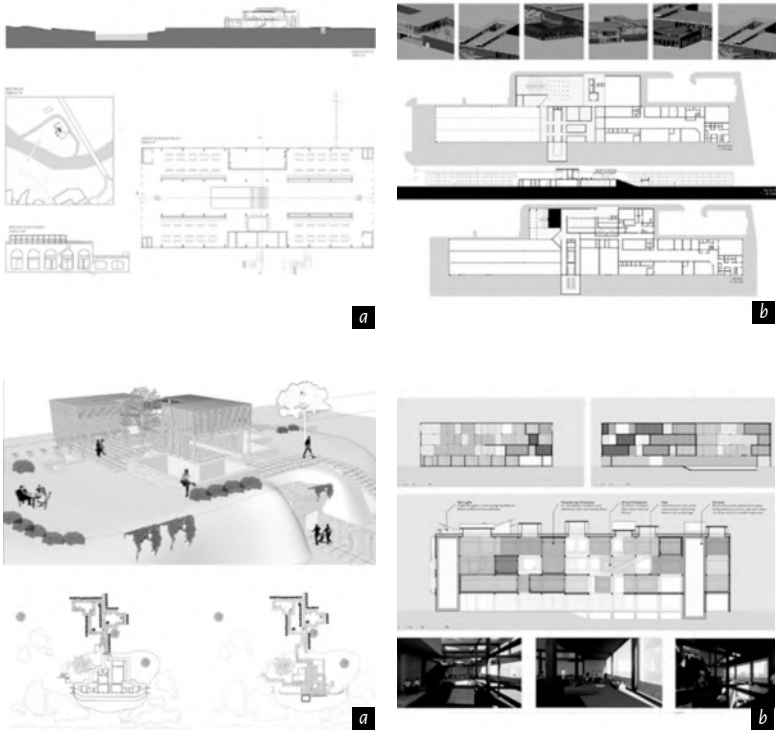


3.
Community ARD Group.
Fig. a: Ex Maestranza – San Bernardo, Medina, 2022..
Fig. b: Ford Motor Company, Geelong, Australia, Johnson, 2022.
Fig.c: Linseed Oil Factory, Toronto, Canada, Gomez, 2022.



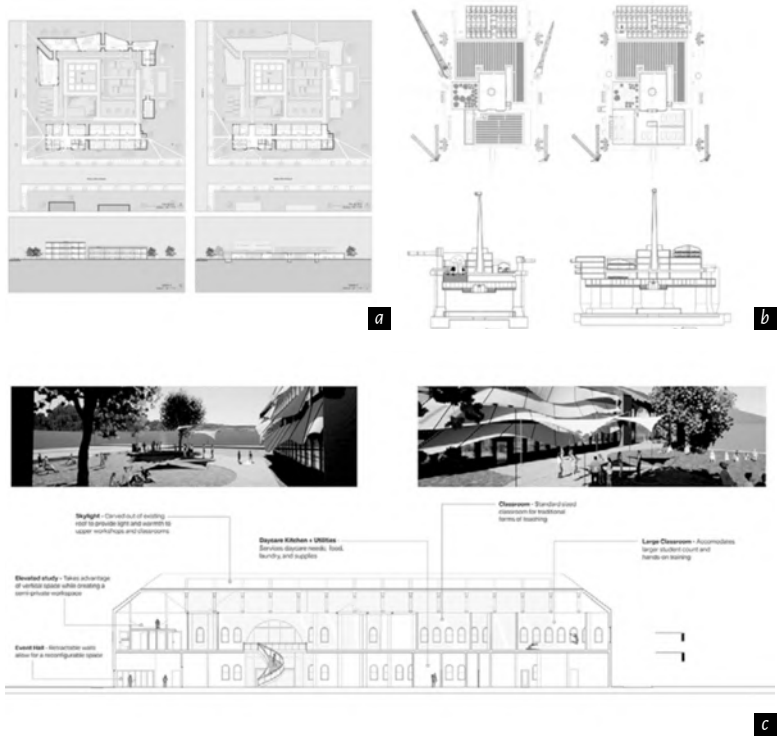


4.
Shelter ARD Group.
Fig. a: Lapham Woolen Mill – Millbury, Massachusetts, Wall, 2022.
Fig. b: F.P. Nielson and Sons Grain Elevator – Mesa, Arizona, Mccune 2022.



5.
Recreation ARD Group.
Fig. a: TXU North Power Plant – Fort Worth, Texas, Lopez, 2022.
Fig. b: McKinney Cotton Mill–McKinney, Texas, Hanson, 2022.

6.
Knowledge ARD Group.
Fig. a: Fort Tilden, Queens – New York, Avila, 2022.
Fig. b: Ford Piquette Factory – Detroit, Michigan, Palady, 2022.



7.
Education ARD Group.
Fig. a: Emma H. Wallace High – Orange, Texas, Casey, 2022.
Fig. b: Kiddie Kloss Factory – Lansford, Pennsylvania, DeGrande, 2022.
Fig. c: MacKay Marine Station – Cromarty Firth, Scotland, Rice, 2022.

attracting local people to inhabit the space to improve the area. This group included a historic train station renovated as a celebratory space to uphold cultural values, a multi-purpose building to facilitate community events and large-scale house gatherings, and a community gymnasium and lounge (fig. 3).

The following groups contained projects with programmatic similarities, such as sheltering the local community by providing safe and affordable housing in Lansford and Mesa (fig. 4). In addition, the recreation group focused on helping the community by providing reliable and attractive areas to enjoy leisure time. The designs created a restaurant and bar in Fort Worth and an entertainment complex in McKinney, Texas (fig. 5).

The two final groups were concerned with knowledge, addressing the community through information sharing and rethinking known topics, and education, providing research and prompting the community to absorb new information. The knowledge group included a military history museum and a museum dedicated to different movements and learning styles (fig. 6).

In contrast, the education group established a specialized trade school for local industries, an adaptive educational center with childcare that can be modified to fit various programs as needed, and a self-sufficient mobile research base on an oil rig (fig. 7). In the final presentation, these adaptive reuse groups functioned as a comprehensive introduction to each group's designs and the culmination of their work across the semester.

Conclusions: Implications for Collaborative Studio Pedagogy

From the standpoint of our research-led collaborative studio, it's clear that architectural and urban studies encompass a broad spectrum, overlapping with fields such as history, cultural studies, anthropology, sociology, and urban planning (Mehan 2023c). The underlying intent of fostering such collaborations was to instill in students the understanding that architectural processes are iterative and rely on many disciplines, actors, and urban factors. This approach further emphasized the significance of gaining insights from others through rigorous self-reflection within a collaborative setting.

Contrary to a simplistic replication approach – transferring ideas from other urban projects or historical precedents into a selected context – this strategy advocated for adaptive reuse. This required an extensive, intricate process to comprehend the industrial heritage site's history, the prevailing

cultural, political, and urban situations, future community requirements, and a research/design process that is adaptable, responsive, and cooperative. Although this method is considerably more complex and time-consuming than conventional top-down, expert-driven architectural and urban design practices (as seen in sizeable international design firms), it results in a culturally focused, contextually grounded, and democratic approach that encourages collaboration.

This research-focused design studio encouraged students to tackle pertinent issues through collective exploration and interactive research, employing methods like illustrated exercises, group activities, guest lectures from various disciplines and locations, studio research seminars, and group critiques. The studio's design facilitated the students' transformation of architecture and urbanism through cooperative critical thinking, research-based design processes, and innovative practices. The studio's collaborative spirit allowed students to leverage conventional domains like architecture, urban design, and planning while forging new transdisciplinary relationships that stem from specific issues like adaptive reuse strategies and post-industrial urban landscapes.

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A Collaborative Approach for Urban Design Education in Light of the Climate Emergency

Isabel Glogar, Benedikt Boucsein, Marco Kellhammer, Stefanie Ruf, Mareike Schmidt

Abstract: How can we collaborate to tackle the effects of the climate emergency on everyday human life in urban spaces and environments? How can we encourage open dialogue with students and various stakeholders involved in urban transformations? Given the already tangible effects of the climate catastrophe and the projected impact on future generations, we – an interdisciplinary team of researchers and practitioners at the professorship of urban design at the *Technical University of Munich*, Germany – believe that it is our responsibility in architecture schools to collectively focus on such questions. We presume that the discipline of urban design, part of most architectural curricula, plays a pivotal role here. However, the amount of research into formalizing collaborative processes that tackle the climate catastrophe in architecture and urban design education is scarce; therefore, in this article we aim to contribute to the discussion on how collaboration as a method could be further developed in urban design education and we critically examine two case studies to discern the various facets and different forms of collaboration in architectural curricula.

Keywords: Collaboration; Architectural Education; Urban Design Methods; Climate Catastrophe; Case Study Analysis; Urban Transformation; Everyday Human Life.

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Architectural Design and the Climate Emergency

All-encompassing and already tangible, the human-induced climate catastrophe (Latour 2018) has already had, and will continue to have, major impacts on human life and ecosystems, such as the loss of biodiversity and scarcity of resources impacting food and water supply, affecting human health and well-being, and leading to migration and displacement, as well as to consequences for economic systems (Crutzen 1996; IPCC 2015; IPCC 2022). The window of opportunity to reach the goal of not allowing the global temperature to increase by more than 1.5 Celsius degrees and mitigate the impact of the climate catastrophe, as aimed for by 196 nations in the Paris Agreement (United Nations 2015), is »rapidly narrowing« (cf. Rhodes 2019; Kohl/Stenhouse 2021; IPCC 2023: 26). Following these rather dire prospects, in 2022, movements like »Extinction Rebellion« or the organization »Last Generation« have long been advocating for solution-oriented, radical changes to ensure the livelihood of billions worldwide (Extinction Rebelliom 2022; Last Generation 2022). Increasingly, researchers have also been taking a stand. In 2019, over 11,000 scientists signed a declaration warning the public about the climate emergency (Ripple et al. 2019). In the fields of architecture and urban design, organizations like »Architects4Future« or »Abrissmoratorium« (»demolition moratorium«, an initiative of architects and scientists demanding the renovation and reconstruction of built structures instead of their demolition) are also demanding a stand be taken in the fight against the climate catastrophe (Architects4Future 2022, Abrissmoratorium 2022). Research collectives like »Mould.earth« point out that the consequences are already very apparent, partly due to a destructive idea of architecture, urban design and building as a representation of continuous growth (Mould.earth 2023).

Change will inevitably come with the ongoing climate catastrophe, forcing a shift in the disciplines of architecture and urban design from understanding building and planning as still very much centered around new construction, top-down planning procedures and resource-consuming institutional frameworks toward a discipline that works collaboratively on multi-faceted problems and views the immediate challenges from various angles, involving different stakeholders (Törnroth et al. 2022). Although in this article, we will refer solely to urban design, for us, a sharp line between architectural and urban design cannot be drawn, as both fields share methods, problems and tasks. We see urban design as an independent

discipline that connects architecture to other fields such as landscape architecture and traffic planning. Many of the subjects taught in urban design education are central to the work of an architect, and vice versa. This is particularly the case during the ongoing climate catastrophe, which calls for concentrated, collaborative efforts; or, as Steinitz, referring to landscape architecture, puts it:

> »We must learn to understand that almost everything we do to change the landscape by design requires collaboration, whether with architects at the smaller scale, urban designers at the middle scale, geographers at the larger scale, and with engineers at all scales and layers, and bankers and government officials. […] If we are to work on society's most important needs, both specialist knowledge and skills of collaboration in designing are essential« (Steinitz 2020: 3).

Moreover, Gilliard calls for inter- and multidisciplinarity to achieve the innovation necessary to tackle the climate catastrophe

> »because interdisciplinarity as a form of collaboration of disciplinary specialists serves the purpose of innovation, while multi-disciplinarity is a necessary condition for disseminating innovation into routine practices that are constrained by limited resources« (Gilliard 2020: 7).

While only emphasizing the urgency of the climate catastrophe is not enough to increase support for policy to fight the climate emergency (Fesenfeld/Rinscheid 2021), raising awareness of what is at stake and building alliances with various actors is central to action following suit. Education can serve both of these purposes and is thus a central factor to consider at the university level and equally, in the field of urban design as a whole. In this context, we view urban design and urban design education as collaborative fields, acknowledging that the complexity of the problems raised by the climate catastrophe calls for a joint approach that combines a variety of disciplines and approaches (Healey 1992; Allen 2009; Innes/Booher 2016; Cozzolino et al. 2020; Giseke et al. 2021). We argue that urban design is inherently collaborative, since it can never be performed by one person alone, and that collaboration is both a method as well as part of the stand we take as educators and scientists in fighting the climate catastrophe (Cozzolino et al. 2020: 3). Following Hodson (2010), we further argue that such normative statements,

with the severity of the climate emergency and the limited time to act at hand, are required to aptly respond to the climate catastrophe by changing and opening up urban design education, methods and practices, specifically focusing on collaboration, finding a path forward as

> »our ability to respond to these emergencies remains largely circumscribed by educational and professional agendas inherited from 20th-century Western paradigms [… making] a compelling case for radical change in the educational and professional structures of the built environment disciplines« (Yates et al. 2022: 1).

Historically, initiatives claiming alternative forms of practice and political discourse, as well as discussing radical ideas and crises within university teaching are not new to the fields of architecture and/or urban design. Particularly since the post-war era, necessary shifts toward inter- and transdisciplinarity (Giseke et al. 2021) as well as collaboration (Parker 1986; Steinø/Benbih/Oberling 2013) have been discussed, while the debates only having gained importance and become ever more urgent over the last decades. More specifically, Purbani sees collaboration in urban design as »a new paradigm of planning for a complex contemporary society through which it encourages people to be engaged in a dialogue in a situation of equal empowerment and shared information to learn new ideas through mutual understanding, to create innovative outcomes and to build institutional capacity« (Purbani 2017: 137). Seichter describes collaborative design processes as helpful for negotiating »a consensus with the stakeholders involved. Collaboration can be conducted in various forms, through different media« (Seichter 2007: 3). Viewed in this light, collaboration can be seen »as a means to democratically involve different stakeholders in the urban development process« (Steinø/Benbih/Oberling 2013: 2).[1] Also, scholars like Schneider, Till, and Awan demand a more collective approach to cities and architecture as a profession and to engage with the whole spectrum of spatial production, beyond building, collaboratively, in order to address the climate catastrophe (Schneider/Till 2009; Schneider et al. 2011). Collaboration is currently part of various urban design practices and architect groups such as *Urban Equipe* or *Assemble*, but to date, research that formalizes the process of collaborative

1 For an overview of the discussion around a shared definition of urban design, which is beyond the scope of this paper, see Cozzolino et al. (2021).

practices and groups in an urban design context and that focuses specifically on the interplay between the climate emergency and urban transformation is scarce (Urban Equipe 2020; Assemble 2023).

Collaboration as a Method in Urban Design Education

Following the identified need for more research, this paper primarily aims to provide an overview of the key facts and processes of our ongoing teaching formats in relation to collaboration and the climate emergency in urban design education, and to provide a methodological framework that allows comparison between different teaching formats. Second, we would like to elaborate on specific tools and methods that involve collaboration to present examples of teaching formats and to critically contribute to the discussion on how collaboration as a method could be further developed in architectural and urban design education in the face of the climate emergency.

In this article, we thus reflect on the question of enabling and strengthening elements of collaboration in architectural and urban design education against the backdrop of the climate catastrophe through the observation and evaluation of two teaching formats with a special focus on collaboration that are taught within the professorship as case studies based on the co-creation taxonomy method for formalization proposed by Seve, Redondo and Sega (Seve et al. 2022). The authors offer a »taxonomy for case study analysis [… which allows to] classify, preserve and propose diverse and inclusive strategies« (Seve et al. 2022: 591), looking at the tools used in co-creative processes, the time they take, the space they take place in and the purpose they serve. We adapt their approach toward education to summarize the results from two case studies and give an overview of the teaching formats by using indicators such as methodology used, space and time which the formats occupied or the intensity of collaboration (fig. 2, fig. 4). To distinguish specific collaboration formats and their outputs in our teaching, we differentiate between internal (students) and external collaborators (civil actors, researchers, practitioners, etc.). Internal participants can work either in groups or individually. External participants can be actively involved in the project, e.g. by taking part in discussions or giving interviews, or passively involved, e.g. by being observed in their everyday environment during mapping sessions, or not at all. Their participation may also be fictional. By relating the involvement of internal and external collaborators, we identify different dynamics of collaboration. For example, we classified individual work with no external

involvement as having a low dynamic, whereas we classified group work with the active involvement of external participants as having a very high dynamic. This allows us to recognize the different dynamics of collaboration that evolve depending on the methods used and to show differing levels of collaboration (e.g. analysis phase vs. evaluation phase), and reveal when and in what way collaboration is used in a teaching format.

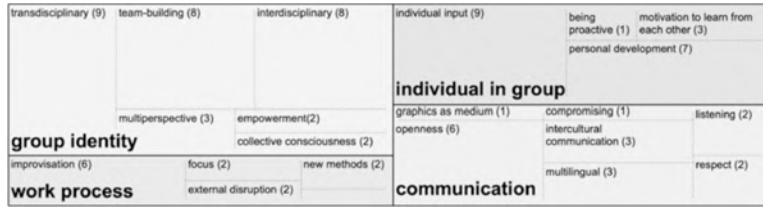
The two formats investigated represent an extraordinary block format open for interdisciplinary master's students and a regularly recurring urban design teaching format. The first takes two weeks of teaching on site; the second is offered during the regular semester for undergraduate students and takes 16 weeks. The two formats were chosen as case studies because they both focus on collaboration against the backdrop of the climate emergency but are very differently structured and thus can show on the one hand, how collaboration in the face of the climate emergency can take different forms within the possibilities and constraints of the architecture and urban design education curriculum at *TU Munich* (TUM), Germany, and on the other, how they can be assessed equally by the same methodology.

Case Study 1: Toward Transformative Research and Learning

The first case study is a transdisciplinary summer school format including multiple stakeholders and different levels of collaborating groups. The summer school is part of the transformative and transdisciplinary research project »Aqt-car reduced neighborhoods for a livable city« led by the professorship of urban design, and is part of the larger, interdisciplinary »Munich cluster for the future of mobility in metropolitan regions-MCube« at TUM. The cluster is funded by the *German Federal Ministry of Education* and Research within the *Clusters4Future* initiative. *MCube Aqt* explores ways to transform urban mobility from car centricity toward active and sustainable forms of transport, thus providing more livable urban space. Such strategies can significantly contribute to the urgent need for decarbonization in the face of the climate catastrophe and can be implemented in a socially just manner. *MCube Aqt* looks at two neighborhoods in Munich, Germany as living labs and runs from November 2021 until the end of October 2024. Among others, *MCube Aqt* aims to develop new integrative transdisciplinary teaching formats like the undergraduate summer school from September 2022 with engagement from different chairs and professorships of the *School of Engineering and Design* at TUM. This teaching format was chosen because

of its suitability for collecting and analyzing research samples in a compact period of time and, based on this, to develop first tangible ideas. Embedded within the participatory research strategy of the research project, it marks the first touchpoint in actively engaging with citizens in two neighborhoods. While the *MCube Aqt* project team already includes representatives from academia, the municipality, industry and non-governmental organizations (NGOs), the summer school further involved citizens and representatives from the district council. Collaboration occurred between the researchers (acting as facilitators) and the students, but also within the interdisciplinary team of students participating in master's programs in urban studies, civil engineering, landscape architecture and transportation systems and with citizens and local representatives.

The summer school process consisted of four different phases, including application, preparation, participation and documentation and reflection. After application, as preparation, each student compiled one case study of a European city to provide all the participants with a similar knowledge base on car-reduced neighborhoods. After discussing the case studies, two subgroups studied the two neighborhoods that were chosen as sites for the living labs within *MCube Aqt*. The subgroups applied various design research methods such as counting, mapping and interviewing citizens, and analyzed their findings. At the beginning, models from sustainability science were presented, such as the donut economy (Raworth 2017). In this first phase, students gained target knowledge to further elaborate on multi-faceted challenges like intense land use and air pollution or a shortfall in health, social equity and housing associated with the climate catastrophe (Raworth 2017). According to design thinking methodology (IDEO.org/ Design Kit 2015), »how might we« questions were drafted to develop problem definitions. A collaborative selection of questions and places marked the ideation phase. Within a moderated brainstorming session, the teams built upon collective ideas and came up with a pool of initiatives for further clustering and drafting design briefs. The students directly transformed their ideas into rough interventions (fig. 6). Following a collaborative design process, it was necessary to make ideas tangible and get feedback as soon as possible, so the students worked iteratively on their ideas, addressing both locally oriented problem statements and global challenges like the climate catastrophe. On the last day of the summer school, political representatives, citizens, and the *MCube Aqt* project team joined the students for a site walk through the two neighborhoods. While presenting the status quo of the



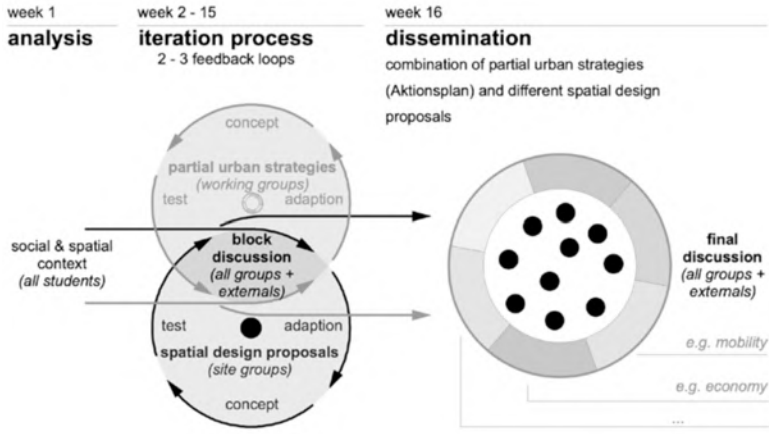
case study 1				
time frame	2 weeks			
format	summer school			
internal participants	12 master students (urban studies, landscape architecture, civil engineering, transportation systems)			
external participants	research associates, partners of research project, citizens, elected representatives of citizens			
location	Munich, 2 neighborhoods			
scale	1:2.500 (analysis)- 1:1 (mock ups)			
hypothesis	How can we bring about greater acceptance and use of multimodal transportation that significantly reduces individual car ownership and use, thereby increasing the value of liveability in the area?			
process section	**methodology**	**intensity of collaboration**		
		internal	***external***	***resulting collaborative dynamic***
preparation	case studies	individual work	none	low
analysis	quantitative: counting	group work	passive	high
	mappings: behavioral, spatial mapping, tracing	individual work	passive	low
	qualitative: structured interviews, research dairy	group work	active	very high
synthesis	problem definitions	group work	passive	high
ideation	how-might-we-questions		none	medium
	brainstorming	group work	active	very high
testing	redesign		none	high
	interventions	group work	active	very high
dissemination	implementation		active	very high
	discussion	group work		

1.
Overview of keywords used in the reflection on the summer school, 2023.

2.
Overview over the intensity of collaboration in case study 1, 2023.
Depending on internal team constellation in combination with the form of involvement of external participants, we find different resulting collaborative dynamics in the process sections.

prototypes focusing on car-reduced neighborhoods, the students received feedback from the participants of the site walk and were part of an open discussion with experts and citizens. Finally, the students wrote reflections on their experiences and findings, and the facilitators invited the students to gather and discuss the reflections collaboratively. Based on the reflections the students submitted, we analyzed their perception of collaborative dynamics throughout the summer school to further develop our teaching formats. We had two reviewers who independently read the reflections and allocated group keywords according to the frequency with which the students mentioned certain aspects (fig. 1).

Results show that the students found the case studies a useful introduction for reaching a similar level of knowledge around car-reduced neighborhoods. All students referred to collaboration as a main feature that characterized the summer school. Based on the keywords allocated by the independent reviewers, we placed the students' remarks in four categories: »Group Identity«; »Individual Role«; »Work Process and Communication«. Most remarks were related to group identity, which the majority (nine out of twelve) described as interdisciplinary and transdisciplinary. Most of the students emphasized team building being highly valuable during the summer school. When reflecting on their individual role in the team, most described their specific contribution but also their role in the team's constellation during the process. Most of them felt that they were able to gain valuable insights for their personal development. The ability to improvise during the work process was described six times as key to achieving the design intervention. Half of the students highlighted the importance of open communication. Difficulties during the summer school's collaborative process appeared when discussing complex ideas, especially in a multi-lingual environment. Using sketches or graphics to overcome those obstacles was mentioned as helpful. The overall time frame of two weeks was described controversially. On the one hand, students felt that their output, e.g. syntheses and prototypes, could have been more elaborate with more time, especially when it came to global challenges like the climate catastrophe. On the other, they acknowledged the efficiency of the collaborative process, which helped them to formulate clear statements because of the involvement of third parties like citizens in the process. Especially in this phase particularly, students were able to gain valuable transformative knowledge on the complexity of implementing socio-technical ideas.



case study 2				
time frame	16 weeks			
format	semester studio			
internal participants	15-25 bachelor students (architecture)			
external participants	actors and fictional (e.g.local citizens and shop owner), local initiatives, researchers, practicioners			
location	Munich, 1 neighborhood			
scale	1:1.000, 1:500, 1:250, 1:100			
hypothesis	How might we transform and design urban spaces towards more equal and more climate friendly neigborhoods within ten years?			
		intensity of collaboration		
process section	**methodology**	***internal***	***external***	***resulting collaborative dynamic***
analysis	mappings, interviews, visual analysis, data analysis	group work	passive	high
iteration process	partial urban strategies (Arbeitsgruppe)		fictional & active	very high
strategical framework	combined urban strategies (Aktionsplan)		none	high
spatial design proposals	architectural and urban design		none & active	high
block discussion	all groups with external participants	group work	active	very high
dissemination	final discussion with external participants	group work	active	very high

3.
Collaborative iteration process of the »Final Countdown« format in case study 2, 2023.

4.
Overview of the intensity of collaboration in the »Final Countdown« case study 2, 2023. Depending on internal team constellation in combination with the form of involvement of external partecipants, we find different resulting collaborative dynamics process sections.

For the research team of *MCube Aqt*, the collaboration with the students and neighborhood stakeholders marks an important milestone for the development of teaching formats and the participation strategy. The two weeks had a strong impact on team building and collaboration within the project team. From the facilitators' perspective, the students showed great interest in teamwork. They committed themselves to the summer school's aim and contributed to a very productive and trusting working environment and exchange with all the stakeholders involved. Therefore, following the taxonomy by Seve, Redondo and Sega, we typically find high levels for the collaborative dynamic resulting from the intensity of collaboration between internal and external stakeholders in the more advanced process phases of the summer school while initially, some of the collaborative dynamic can be described as having rather low levels of collaboration, especially in the preparation phase where students worked on individual case studies (Seve et al. 2022) (fig. 2).

Case Study 2: Toward Collaborative Urban Strategies to Tackle the Climate Emergency

A second example for teaching formats used at our professorship to foster knowledge on urban design and collaboration in the face of the climate emergency is the format »Final Countdown«, where students collaboratively develop strategies for the transformation of specific urban blocks and neighborhoods that finally lead to a collaborative action plan (»Aktionsplan«) for the next ten years on how to design and transform urban change to create more equal and more climate-mitigating cities with involved actors. The teaching format focuses on urban transformation and how we as architects, researchers and planners can collaboratively transform the built environment with the climate emergency as a backdrop. Thus, we find it essential to provide our students with the necessary tools and methods to inform and act within the set boundaries of the urban realm and involve local conditions and environments in their projects. This includes working together to design spatial answers and discussing alternative forms of mobilities, shared infrastructures, socially inclusive housing, climate mitigation and public spaces for various actors.

The recurring teaching format addresses the transformation of two existing neighborhoods, which are chosen by the facilitators beforehand,

over the course of one semester.[2] Fifteen to twenty-five students and three to four facilitators from the professorship form the group of internal participants. External participants include various local stakeholders but also imaginary actors (with each student representing a specific actor or actant so that students can change their role and discuss and position themselves outside their own perspectives).

The format can be seen as a policy making and urban planning simulation game, engaging various local initiatives, institutions and entrepreneurs, experts and inhabitants. The process corresponds to realistic planning conditions in which architects and urban planners must discuss and design bearing in mind the constantly changing regulations and demands of various stakeholders, leading to a collaborative output, but they also have the opportunity to change and discuss policies and to engage in strategies related to the climate emergency by intervention. This demands thorough communication by all participants and especially the students who inhabit many different roles during the process. The studio specifically focuses on collaboration as a method and aims to include various participants, leading to a common effort, design and output as well as potential further interventions, long-term discussion and transformation. In the teaching format, we specifically discuss changing methods of urban design education in a university, as well as in a broader practical context, and believe that changing attitudes to climate mitigation can only happen with a collaborative effort and a shift from a predominant focus on building and architectural design.

The process of the studio can be subdivided into four different elements: group analysis; formation of the collectively developed »Aktionsplan« which is used as a strategic framework; development of spatial design proposals on site (groups of two students) and discussions in different formats (»block discussions« and the final citizen discussion). The analysis at the beginning and the final discussion frame the process (fig. 3).

In the teaching format, the »Aktionsplan« and its spatial implementation are developed in parallel, with the »Aktionsplan« developed and designed by the whole group: In this constellation, the students discuss and define the strategies that they want to bring to the forefront, with the condition being that they are tied to the climate catastrophe, including various actors and transforming urban spaces collaboratively. This strategic urban design plan

2 Up to now, the teaching format has been used twice, during the winter semesters of 2019/2020 and 2021/2022.

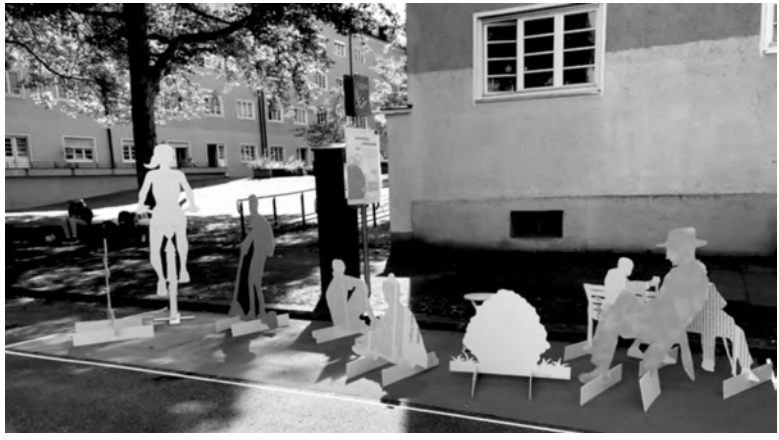
defines guidelines and rules on how to transform a neighborhood according to the challenges posed by the climate catastrophe and to collaboratively steer urban transformation. To work on specific strategies, students are organized in smaller »Arbeitsgruppen« (working groups) of four to six students as was decided upon beforehand in the first studio session. Adhering to their specific project aims, such as mobility, social infrastructure, green spaces, sustainability and so on, these working groups formulate strategies and possible interventions. Those partial strategies combined to form the basis for further work on and refinement of the collaborative »Aktionsplan«.

Parallel to the development of the »Aktionsplan«, spatial design proposals for parcels of the pre-defined urban block are collaboratively developed and tested to facilitate the implementation of the urban strategies related to the goal of just and climate-friendly transformation in smaller »site groups« of two students. The strategic framework and its spatial design proposals evolve as a circular feedback loop. For this, the students have to organize themselves and communicate and discuss their ideas, they have to decide on suitable methods to communicate their ideas about spokespersons, representatives and how to present information.

An additional element for feedback is the »Blockdiskussion« (block discussion) (fig. 5). The students meet regularly to discuss and present their ideas to involved actors and citizens. Additionally, the overall project of the »Aktionsplan« and the spatial design proposals developed by the smaller site groups are discussed within the bigger group with other students but also with involved actors and external guests. The feedback from the »block discussion« leads to the adaptation of the former proposal. This feedback loop is repeated two to three times. At the end of the semester, the students present their ideas and projects to additional related actors (inhabitants, shop owners, municipalities, planners and local institutions) for dissemination.

The students work independently and largely organize themselves. The only restrictive element is the project's predefined outcome: the development, design and presentation in form of the »Aktionsplan« and a collaborative group model built of recycled materials, where all of the working groups' ideas and urban design strategies have to be collaboratively presented. The model is a bricolage of various materials at the ratio of 1:250, with the design proposals developed in scales from 1:1000 to 1:100.

The »Final Countdown« format shows how collaboration can serve as a crucial element in engaging with, and discussing, complex urban challenges



5.
Urban Design Chair TUM: *Block discussion in the »Final Countdown« format in case study 2, 2019.*

6.
Impression of an intervention developed by students during the summer school in case study 1, 2022. Photographer: Stiefenhofer.

in urban design education and architectural curricula. It furthermore shows how a variety of methods and formats can provide students and thus, future urban planners and architects with a set of tools to deal with current complex questions regarding urban transformation and the climate catastrophe beyond mainly design-oriented outcomes. By acting as facilitators between practice and academia to build connections and engage directly with various stakeholders, we guide students toward collaborative forms of work and self-organization. We provide the institutional background and the methodological guidance necessary to build long-term relationships within this process. The outputs also show that in our academic educational setting and within our Western cultural context at German universities and architecture schools, collaboration and self-organization are not apparent. Students need targeted method training, time and space for discussion and reflection integrated into open, process-oriented and self-organized formats that are often missing in regular teaching formats. In our observations, students initially struggle with open formats such as »Final Countdown« but engage quickly with the process and the several feedback loops and definition of individual proposals and themes. Bearing this in mind, we conclude that conventional architectural education needs to be questioned more intensely while bringing collaborative and student-led formats to the forefront of architectural curricula. We believe this is essential to prepare future planners to work and adapt to changes such as the climate emergency. In line with this, the need to strengthen alliances and create new connections with existing initiatives like »Architects4Future« is evident. It is also important to emphasize the necessity of questioning our canonical and often Western-oriented perspective. We need to incorporate a more diverse, postcolonial perspective, where collaboration and bottom-up practices are already part of architectural curricula (as for example shown with guests from the Philippines within our block discussions).

At the same time, it has to be acknowledged that the format is a time- and resource-consuming design process for both facilitators and students, and that for the latter, such a collaborative process is new in the teaching environment of TUM. The format also leads to discussions with students about the clarity of the concept that collaboration, as a design tool, should be further developed in order to be transparent. Furthermore, the specific allocation of time for meetings and dialogue as part of the design process and additional discussion of new forms of urban design education and practice should be more integrated to enable students to grasp the communication process

as part of their urban strategies and future toolbox as urban designers. Throughout the seminar, student empowerment could be observed, for example when preparing their own communication strategies, group discussions, framework for organizing the project results and moderation for the final presentation, as well as when communicating with external actors. Moreover, results after submission were presented as an intervention in public space and so the students continued their work as a team even when this teaching format ended. The feedback provided stated that working collaboratively on a model was especially appreciated. For future reference, a concept for clear communication and guidelines on how to balance design and communication could be developed further, as well as how the collective organizes and how it communicates (e.g. Miro). Using the taxonomy based on Seve, Redondo and Sega, we generally find very high levels of the collaborative dynamic between internal and external stakeholders (sometimes even fictional) in the »Final Countdown« teaching format during all phases of the process (Seve et al. 2022) (fig. 4).

Discussion: Elements of Collaborative Urban Design Education

Presenting two teaching formats at the professorship of urban design at TUM, we argue that collaboration is an essential method of urban design, especially as part of architectural and urban design education programs, to foster sustainable urban transformation tackling the climate emergency.

Our analysis of the teaching formats shows that presenting, comparing and critically examining different teaching formats based on a methodological framework is possible and helpful to identify different dynamics of collaboration that evolve depending on the methods involved. Our results show differing levels in the intensity of collaborative work (e.g. analysis phase vs. evaluation phase) and reveal when and in what way it is used in a teaching format. Based on our observations and on student reflections, we agree with Bryant that we provide students with an appropriate environment to address problems such as the global climate emergency through interdisciplinary collaboration (Bryant 2021). When comparing our findings with Bryant's three categories: immersion, new language techniques and trust, we found that the results of students' reflections, especially on the summer school, emphasize similar topics: Most of their comments referred to group identity (e.g. transdisciplinarity, interdisciplinarity). We understand this identification with the group as necessary to develop trust between the

participants in the teaching format. Trust can be seen as a crucial element, especially regarding problems in the collaboration process, as students have to work toward a common goal in our teaching formats and not only focus on their individual designs. In both presented teaching formats, members of the professorship acted as facilitators in leading and evaluating the students, but also collaborating with them. This led to a certain hierarchy between facilitators and students, potentially hindering true collaboration, and raising a potential source of tension in regard to Bryant's trust category – while Purbani stresses the importance of leadership in collaborative processes (Bryant 2021; Purbani 2017). For future teaching formats, separating the role of facilitators and evaluators might prove useful in increasing students' trust. The students' emphasis on individual input and personal development in the reflection on case study 1 shows parallels with Bryant's description of immersion describing high commitment in an intensive working environment. Bryant explains how new language techniques are important for gaining a common understanding of shared goals and the limitations of language. Comparing the different team constellations of both case studies, we find that the interdisciplinary team of case study 1 is more dependent on these communication skills than the team in case study 2. For case study 2, we found that giving students the freedom to set their specific goals to help realize a common one tackling the climate catastrophe, led to intense discussions and was time consuming on the one hand, but on the other, allowed students to become part of a collective articulating their aims for future urban transformation and identify with their projects as well as with future interventions. Our experience from the »Aqt summer school« (case study 1) shows that this is also the case in a highly diverse interdisciplinary group. Related to Bryant's observation that the ability to collaborate increases according to students' educational progress, we propose formats such as the »Final Countdown« semester studio (case study 2), in which undergraduate students first practice collaboration, resolving conflicts related to work allocation and fairness within their own disciplines before integrating the challenge of interdisciplinary exchange into advanced formats at higher levels of university education like the »Aqt Summer School« (case study 1).

It must be noted that our classificatory approach was only used retrospectively, meaning that we applied the categories in figures 2 and 4 to the contents of the presented teaching formats only after they had been finished. It remains to be analyzed whether our approach to gauge collaboration would be effective in prospectively planning new teaching formats

and a more extensive study of the impact is crucial. Both examples show how collaboration in educational practices contributes to gaining transformational knowledge and enabling new ways of designing (Irwin 2018). In general, the question remains open as to where urban design positions itself in the global debates on transformation research and where it commits itself to these approaches and develops them cooperatively. Systemic approaches to addressing the aforementioned global challenges already exist, also specifically in relation to design and the built environment. One of these is the emerging transition-design approach. Irwin developed this evolving framework of knowledge, action and self-reflection, focusing on the importance of stakeholder involvement in systems transitions (Irwin 2015; 2018). The logic of »bringing together knowledge and practices outside the design disciplines« (Irwin 2018: 4) and its collaborative application to design interventions are illustrated in the two case studies presented; they exemplify that new theories of change will motivate the search for new and more relevant knowledge.

Taken together, our findings reveal the potential of collaboration in urban design education in dealing with an ever-growing complexity in urban design practice, reaching beyond traditional approaches to design and planning by strengthening communication skills and applying analysis methods and strategies to integrate various actors in the early stages of planning. The extent to which the content of our teaching formats will persist in the students' future practices is an open question but by raising awareness of the complex dynamics and processes of urban design, we hope to foster a discussion and encourage participants to participate in urban transformation to achieve climate-friendly and equal cities. With our teaching formats, we aim to prepare the ground for students to internalize the need for collaboration in the face of the climate catastrophe in their future professional life by showing the possible ways to collaboratively act on it.

Discussion: Limitations and Outlook

While we see collaboration as a powerful tool in urban design education to help mitigate some of the causes posed by the human-made climate emergency, it is no panacea.[3] Downsides exist too, like the amount of time

3 Also caused by individuals not collaborating sufficiently and acting in the common interest but putting individual or corporate interests first.

and resources needed or the difficulties in communication processes and different levels of information necessary for professionals and non-professionals to understand the task at hand (Steinø et al. 2013). Furthermore, collaboration should not only entail internal stakeholders from just one university or academia in general, but also include external stakeholders and fields like politics and governance, both at the local and international level (Lassen/Laugen 2017). Considering, exchanging with, and including work from international stakeholders even more, especially from countries with innovative approaches away from the path forged by Western researchers (Stojčić 2021) will enhance the location of solutions to counter some of the local effects of the global climate catastrophe and contribute to including those from countries that are most affected by the climate emergency in discussions about possible future mitigating approaches (Klingelhöfer et al. 2020). Additionally, involving collaborators from different organizations prevents the abandonment of innovative solutions that were developed together, making their adoption more likely, which is of the utmost importance in fighting the climate emergency (Greco et al. 2020).

Looking to the future and working on necessary changes to urban design methods due to the climate emergency, we continue our work in additional teaching formats such as »Interventionsklasse« (intervention classes) that directly question common architectural practices and link our teaching to urban interventions. We believe that urban design as a practice is changing and furthermore, should question current practices and necessary changes related to our practice that is still centered around building and planning. We must foster a discourse on practices encouraging dialogue, collaboration and forms of planning that encourage the use of resources such as space in a cautious way and look at the impacts on urban environment.

We specifically selected two teaching formats at our professorship that focus on collaboration as a method of architectural education. Further research on other formats related to urban design education, the climate catastrophe and changing practices is planned and will be rigorously studied in the future. Additionally, explicitly linking entire architectural and urban design curricula and not only some formats within the curriculum to the climate emergency is of utmost importance in educating and adequately equipping coming generations of urban planners and architects with the knowledge they need for a future in a time of crisis.

Conclusion

The enormous challenge that humankind, and we as architects, researchers and urban designers, face show that a »business as usual« approach is not the way forward. The consequences of the Anthropocene are visible in our cities and neighbourhoods but also globally in heat waves and the climate catastrophe. We have known this since at least the 1970s (cf. Meadows et al. 1972; World Commission on Environment and Development 1987). More than 50 years later, we must acknowledge that not much has changed and we are still seeking individual solutions to a collective problem.

In the above collaborative teaching formats, we discuss how to expand urban design and architectural education, methods and practices by integrating various actors and discussing common goals. We need to enable democratic design processes and cooperation at eye level, as we can only work collaboratively toward a common future in the face of the climate emergency. Thus, we aim for students and participants to meet civil society as equals and to involve them as early as possible in design and decision-making processes. By remaining open for debate and seeking out exchanges with external collaborators, the participants in our courses look for joint opportunities for action. In addition, rethinking architectural and urban design education leads to questions on how to integrate collaboration as a method into architectural curricula and about the changing role of architectural practices apart from planning and building. Architectural and urban design education must focus on collaboration and on forming alliances with various actors to transform cities and landscapes and achieve climate mitigation. In the future, the role of collaboration in architectural and urban design practices in general, rather than only as a method in education curricula should be studied further and processes, as well as outcomes, should be discussed, including questions like who is involved and who is not, as well as what kind of knowledge is produced and for whom.

Urban design is a discipline with various definitions and without a fixed set of methods (Giseke et al. 2021). Perhaps that is why collaborative work fits so well: Urban design education has the imperative and the potential to enable collaborative design processes. Architecture and urban design are both inherently about making connections and communicating these processes; learning from each other-in short: collaborating.

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Collaborative Approaches for Sustainable Design. A Conversation with Sofie Pelsmakers

Rafael Sousa Santos

In 2008, in a series of articles titled *Changing Practices*, Sofie Pelsmakers argued that as a profession and as individual architects, we need to reframe our role in design to meet the challenges of a changing world. To achieve this, we must understand how to measure the impact of design, which she refers to as »design validation«, and use this data to inform new designs. Moreover, this involves the ability to draw upon the knowledge of others and requires architects to collaborate with professionals like material scientists, building physicists, chemical engineers, and ecologists, to address design problems as a team. This will challenge us to assume roles that are significantly distinct from those associated with conventional architects. In this conversation, we will discuss how to address sustainable design processes with Sofie Pelsmakers – whether in professional practice, education, or research – inevitably entails the adoption of collaborative approaches. This involves recognizing the competencies of architectural training but also its limitations and, therefore, the need for co-creation with communities and across disciplines. It also involves a critical stance on education, moving away from a model centered on individual design skills and the praise of great master architects. Instead, it fosters a learning environment of dialogue with students that cultivates empathy and inclusivity, as well as tackling conflicting interests. In doing so, this approach significantly influences their broader worldview. This will lead us to rethink some of the established values, as well as the very idea of creativity and beauty. It's a SUPER architecture that Sofie Pelsmakers proposes to us: an architecture capable of undoing past damage and minimizing harm, but also creating a positive impact, and that was developed through interdisciplinary exchange and collaboration.

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Rafael Sousa Santos | To start, could you please provide a brief introduction to yourself and your work?

Sofie Pelsmakers | I research sustainable housing design and living environments and I lead the »ASUTUT sustainable housing design research group«. My work is about responding to and anticipating changes and challenges in society and what the implications are for everyday architecture, and through building an evidence-basis, reimagining ways of living and creating new futures that challenge the current status quo and creating new knowledge and influencing the real world. I also bring experience and perspectives from the UK, Denmark and Belgium, where I was born.

In ASUTUT, more specifically, we investigate the implications of current and future societal and environmental challenges. We undertake basic housing-design research, such as research into housing quality and the everyday living environment, and research in sustainable living environments, which includes the aging population and specifically older adults living at home. We also study resilience and climate change adaptation and the just transition in housing and living environments, alongside low energy and low-carbon housing design and transformations, and the actual performance of buildings. To achieve this requires many brains around the table and uniquely, we have expert researchers in our group who specialize in adaptable, inclusive, and collaborative processes as well as in ecological design issues and energy policy. And of course, we work with colleagues in other units and faculties within and outside the university, such as engineering, gerontology, natural sciences, nursing and social sciences, social and energy policy, futures studies, real estate economics, and urban planning. It has been truly inspirational to work with so many colleagues in our own university across these disciplines.

RSS | You've devoted a substantial part of your research to the climate crisis and how design can address it. As you propose a climate emergency design approach, how do you evaluate the pivotal role of collaboration in it?

PS | We cannot solve our societal, climatic, and environmental issues alone, nor can any single discipline, let alone architecture. In architecture we know a little about many things; it makes many architects great lateral thinkers, able to connect across fields. However, we often think we know it all and therefore do not see the need to involve others. This has been damaging as we have made siloed decisions based on shallow knowledge. It goes without saying that having read a book or having studied something briefly does not make us an expert compared to the real experts. Instead, we need much more inclusive, democratic processes. We need to collaborate and co-create, and this requires actively listening to others and valuing others' expertise equally. It means bottom-up approaches with communities as local experts on the context and their own needs, instead of us assuming we know better, as well as other professionals. This requires life-long competences that go beyond subject knowledge that are often not taught in architecture school as design focuses so much on the individual »genius« idea and leadership. So, a lot of our values in architecture are outdated and are a barrier in our profession in terms of truly tackling the climate emergency.

RSS | In your co-authored book, *Designing for the Climate Emergency*, you state the need for a holistic approach to design that doesn't narrow its focus to a single issue but instead considers the broader global challenges. Can you delve into this idea and elucidate the role of collaboration within it?

PS | Architecture, as part of the building industry, is a big contributor to climate change, mainly because in the production and use of the spaces and buildings we design we use a lot of energy. That energy is typically fossil fuels that we burn, releasing CO2, that is now irreversibly changing our planet. And our interventions »lock in« bad decisions for a very long time. Sustainable architecture must both mitigate – so prevent but also adapt to climate change – but it must not only be reduced to that. Sustainable architecture must be holistic and restorative, undoing past damage, and minimizing damage, but also creating positive impacts. That's why I often call sustainable architecture »SUPER architecture«.
While it is crucial to tackle climate change, it is also about a just green transition. By that we mean inclusive and fair, and that also includes principles of radical inclusivity, considering nature and non-humans equally. Moreover, it is about genuinely involving people in our design and planning

processes, not just designing low-carbon materials and spaces, but also supporting health and well-being, and so on. In the book you mentioned, we used ten themes, and only one theme relates to energy and CO2. The other nine are: future and global responsibility; environment; infrastructures; passive resilience; materials; health and well-being; people and community; delight, and performance. So, as you can see, it tackles the global challenges too and it highlights in »people and community« the importance of undertaking inclusive and democratic processes. After all, a sustainable solution is not sustainable if it does not meet people's needs or transgresses their rights, or is not maintained over time. A sustainable solution is only sustainable when adopted and loved by the community.

RSS | Could you provide insights into the distinctions between consultancy, participation, and co-creation, and their role in an ecologically oriented design?

PS | To simplify, consultancy in architecture is typically architects asking members of the community to give their opinion on options that the designers have already created. This is very top-down and usually, the community are not part of defining the problem or brief, nor solutions. Participation is also still rather top-down, but often happens a little earlier and the designers might embed themselves more in the community. Yet the community members are not in an equal position at the decision-making table. So, typically, the community may have some input in defining the problem or brief, but not the solutions, which is the remit of the designers/client. Instead, co-creation offers a more meaningful way to collaborate bottom-up with members of the community sitting at the same table as the designers, and the designers try to understand the problems and issues that the community faces. Then, they try to co-create solutions to these issues together and reach some sort of consensus with the community and its diverse voices. This process is more inclusive of the community and the diversity within it too, especially if an effort is made to include marginalized people for example, and hear their needs and perspectives.

This of course shifts the »power«, and fundamentally questions the traditional values and position of the architect. No-one likes to lose perceived »power« and there is a lot of resistance to, and a sense of loss about, this in architecture. But we need this to stop being part of the problem and become part of the solution. We ultimately serve the planet and the public, not ourselves.

RSS | Your work places a strong emphasis on pedagogy, particularly that directed toward students. Could you elaborate on your motivation behind this focus?

PS | *Designing for the Climate Emergency: A Guide for Architecture* Students was clearly written with students in mind and it is supported by material in the ARCH4CHANGE project.[1] It is centered around ten climate emergency design themes mentioned earlier and has key checklists, built examples, guidance about what to do in certain situations, so it is centered around the design process to guide students. The *Environmental Design Pocketbook* was written for both students and practitioners, and my intention was to cut through the plethora of sustainable information available by creating one easy-to-use guide to help make better architecture. Despite the fact that we are not short of sustainable knowledge, this has not led to the mainstreaming of sustainable architecture. We now know that while most students, educators, and architects are looking for more knowledge about sustainable architecture, pragmatic tips, references or examples of more sustainable design approaches, and technological fixes, it is not possible to make the »right« decisions when they stem from unsustainable values, cultures, or behaviours. Instead, sustainability should be internalized in our values and motivations so as to be the starting point, the process, and the outcome of all we do. Unsustainable values, behaviours, and norms are formed in the first year of architecture education and reinforced by society, and the broader architectural culture. Hence, the focus on education is so crucial, to influence and redirect these values.

RSS | Drawing from your experience as an educator and researcher, do you believe that students are prepared for collaborative work and co-creation?

1 More information can be found at www.arch4change.com.

PS | No, they are not prepared, although this is slowly changing, education and some in practice are leading the way in how to practice and design differently. But it also goes beyond teaching collaborative skills, we also need to teach our students in more democratic, collaborative, and low-hierarchy ways. Being taught collaboratively and learning collaborative skills is not only useful in the real world for the new role that the architect should play, but in the process of doing so, the students also learn empathy, inclusivity, and how to tackle conflicting interests, and in so doing it also positively affects their world view. In our article for the *Architectural Review*, we highlight the prevalent issue in architectural education where the emphasis is often placed on individual design capabilities, following the traditional master-apprentice model.[2] We argue that this model may not be the most effective approach to teaching critical reflection in students and may also perpetuate problematic norms. In contrast, collaborative peer-to-peer learning embodies the idea that no individual can possess all the answers, and knowledge should be shared and discussed collectively within a learning environment. This approach not only aligns with a democratic process but also mirrors the practices required in the real world. Examples of this educational approach include students and teachers collaboratively forming briefs, focusing on the process, not the outcome, and the ongoing sharing of thought processes during the design, trough workshops, discussions, field trips, peer-to-peer learning, and other active learning events. At the same time, leading students to challenge the *status quo*: is architecture building new?, how to include non-human user habitats in design projects? A more democratic, non-hierarchical, non-exclusionary way of teaching and learning encourages us to decentralize ourselves as architects and center those, including nature, who we design for.

RSS | Recently, *Anglia Ruskin University* organized a conference to discuss the relevance of doctoral research in architecture. One clear takeaway was the diversity of methodological approaches, ranging from engineering and programming to sociology, philosophy, history, art, and even biology. How

2 Nisonen, Essi/Pelsmakers, Sofie (2022): »Architectural education in the climate emergency«, in *Architectural Review*, https://www.architectural-review.com/essays/architectural-education-in-the-climate-emergency, accessed September 8, 2023.

relevant do you think collaboration with other disciplines is to the consolidation of architecture as a field of knowledge?

PS | Collaboration and co-creation across disciplines is fundamental! As I mentioned previously, architects are typically generalists and interested in many things, so we know little about many things and as such are well-placed to make connections and work across disciplines. However, we should never be so arrogant or naïve to mistake that for being an expert equal to those who have dedicated years to studying a subject in depth. Architects, including architectural researchers, often tend to do this, yet they need to realize that while we may teach at the general level, architectural research cannot be conducted at the shallow level. Research must always sit in the deep end, and this is what is crucial to consolidate architecture as a field of knowledge. Collaboration is needed to help understand the world, and to understand how to make better architecture in the real world, and by working with other disciplines we can gain the knowledge that we would never gain on our own. We uniquely bring our lateral thinking and creative skills to collaborations and our own area of expertise, but we should be careful of adopting others' field methods without first becoming an expert as bad research tells us nothing. The problems in the world are real and we should not waste time doing bad research that others have more expertise to undertake, and instead, we should be a support act. We don't expect a biologist or medical researcher to suddenly undertake a building design either, right, so why would we think we can undertake genetic sampling? So, collaborate yes, but we also need to know and openly acknowledge where our knowledge and skills are limited.

RSS | This is a challenging question, but what about the current state of architectural research? How do you see the research that has been produced, and what do you imagine it will be like from now on?

PS | If we are not careful, architectural research will risk becoming obsolete because a lot if it is shallow and lacks depth, and is not of a high-quality standard. There is also a pressure to research and publish fast, and quantity jeopardizes quality, and we must resist this. All of this often leads to polemical essays where methods or ethics were insufficiently considered, often not at all, and we call them »research«. This comes from the old traditions. Furthermore, we should build on the knowledge gained before

us and not reinvent the wheel. For instance, these days everyone claims to be an expert in sustainability when people have barely dedicated time to it, and research keeps restarting at a basic level from 20–30 years, or more, ago and coming to similar conclusions. We need to build on others' work and advance science from there while working with other experts to achieve this, and leave that work to the real experts, not think we can do it. Through collaboration and more in-depth architecture PhDs, and pressure to apply for external research funds, where one must list relevant prior research, this will hopefully change as it sets the bar higher for our own field and decent peer-reviewed output helps to secure research funds. Individuals and architecture research communities need to build a research track record, which means becoming an expert in a few things, not a generalist. This will elevate architecture as a field of knowledge. Regarding future areas of research, there is no shortage of areas where we can contribute with expertise, if we have it in depth. I particularly see a lot of room for research around how to create circular construction, how it influences the procurement and design of buildings; how what we design works in reality, and how architecture can positively affect the well-being of humans and non-humans. Then architecture education itself, and inclusive ways of teaching, but also the changing role of the architect and especially our role in democratic processes are a crucial area of research.

RSS | Finally, in *Designing for the Climate Emergency*, you emphasize that the need for a climate emergency design approach should not be seen as a constraint on design creativity, but rather as a call for creativity to address this complex problem. Do you think that collaboration can also be seen as a hindrance to creativity in the design process?

PS | Firstly, I think it all depends on how we define creativity. We will need to be smarter in creating complex interventions with a different design process. We have more constraints when designing sustainably as it closes certain doors, e.g., not using certain materials or cutting down trees to create development, or transgressing others' rights. But it also requires more of our imagination and creativity to solve these issues and come up with alternatives. So, while doors may close, it also opens doors to innovation. Secondly, I think in architecture we often equate creativity with the outcome being beautiful or aesthetically pleasing. But we judge this by our old unsustainable and intersubjective values and norms. However,

how can we truly call architecture that is not sustainable, beautiful? This is my first talk to students at master's level now, a lecture that I call »The Ugliness of Unsustainability«. We keep aiming for sustainable architecture to be the same as unsustainable architecture and we keep evaluating it in the same way, but it simply cannot be. We must shift our mindsets about what sustainable architecture is and will look like. And there is so much to experiment and be creative with here as it has been underexplored! So, »SUPER architecture« created with sustainable values and processes, including co-creating with the community and stakeholders, means that the design will be very different from what we would have come up with when we designed on our own or with other unsustainable values. We might see it as less creative and as less beautiful if co-created, exactly because it is different. I argue here now for a change in our own aesthetic values. A starting point is assigning cognitive values to beauty and not just visual aspects. So, I can look at a building and think »strange composition«, but when I learn that it is angled a certain way to catch the late evening sun in a community space and that the entrance is in a certain location to make the walk for the less mobile in society shorter, then my judgment shifts to »this is beautiful, and creative«. Each of us need to make this shift, including architecture media and awards too, as we still see images of concrete spaces and spaces with no people in them, based on outdated values, processes, and decision-making. This influences our intersubjective values of what we strive for in our own projects. Yet, these are spatializations of unsustainable values and unsustainable architecture that are sold to us as »beautiful« because they are based on old traditions from modernist times.

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INTERACTIONS

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Patronage as Collaboration. Dante Bini's Villas in Sardinia

Michela Bonomo

Abstract: In 1970 on the rugged coast of Costa Paradiso on the Italian island of Sardinia, the encounter between one of the most renowned Italian film directors, Michelangelo Antonioni, and an architect with an engineering vision, Dante Bini, produced a holiday villa that was defined by Rem Koolhaas as one of the best buildings of the last hundred years. The reason for its exceptionality can be understood at first glance by merely considering its shape, a semi-sphere, resulting from inflating concrete and free of any internal structural partitions, which was why it was renamed *La Cupola* (The Dome). This article's main argument is that the collaboration between Antonioni and Bini was instrumental in the creation of *La Cupola* and led to a surprising hybridization of architectural language within and beyond this building. *La Cupola* is the starting point to tell the story of the other villas designed and built by the same architect, in the same years, in the same region and exactly by means of Antonioni's patronage. These can be understood in fact as the products of specific economic and political conditions that had an impact on architectural production in post-war Italy.

Keywords: Holiday Villa; Post-war Italian Architecture; Sardinia; Costa Paradiso; Co-authorship; Binishells; Client-Architect; Dante Bini; Michelagelo Antonioni; Monica Vitti.

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Introduction, Material, and Methods

In the collective imagination, the villa could be understood, in Inaki Abalos's words, as a manifesto for »the good life«, often representing to architects the laboratory for stylistic and technological experimentation or an exception to their portfolio (Abalos 2017). This is even more true when looking at the so-called *otium villa* or *villa suburbana*, which we would define today as a holiday villa, intended for pure pleasure as a second residence often located away from the city.[1] Since their inception, villas were the result of injections of capital by private clients who allowed the vision, status, or power of their patronage to be embodied in the architecture of the building, often the excuse to display ingenious technological solutions. The literature on the relevance of patronage in private residential buildings and specifically in villas, in monographs or catalogs, is extensive (cf. Friedman 1998; Volker 2019).

This article inserts itself into this field with the aim of reframing the notion of patronage as a collaboration by taking the case of *La Cupola*, a dome of 19.5 meters in diameter and 6 meters in height, obtained by inflating concrete, and designed by architect Dante Bini for Michelangelo Antonioni and his partner Monica Vitti as a holiday home in Sardinia. The technology patented by Bini and applied for the first time in a private villa for a renowned client is considered the starting point in a process that saw Michelangelo Antonioni heavily involved not just as a patron but also as a designer and developer. This article adds a new perspective to the existing literature on *La Cupola* by stressing the links between this building and the other villas designed by Bini. How could we go beyond the conception of the architect as an independent actor and recognize the collaborative role of the client as both a designer and developer in fostering and supporting architectural production? In what way did the building of *La Cupola* function as a blueprint in relation to the other buildings Bini designed in Sardinia? Does the relative anonymity of the other villas hide the many issues at stake when talking about coastal urbanization in post-war Italy?

1 The literature on the typology of the villa is extensive. The most notable scholar who has written on the topic is James Ackerman, who in his book *The Villa: Forms and Ideology of Country Houses*, examines the genealogy of this type from its invention in Roman times until the 21st century.

Answering the above questions requires looking beyond *La Cupola* to consider it part of a larger project. By providing a review of the state of research on the major literature published on this building, the revealed gaps in knowledge justify why a new approach to this topic is urgent. By reconstructing the genesis of *La Cupola* through information sourced from the literature and cross-checked during a recent interview with the architect Bini in early 2023, a deeper analysis on the collaborative nature of patronage is unpacked (Bonomo 2023). Through a typological analysis of the three other villas built by Bini in the same location, Villa Balboni, Villa Vacchi, and Villa Spagnoli, similarities with and differences to *La Cupola* will be revealed with the aim of demonstrating how this building functioned as a model. As some of this material has never been published, a close architectural reading is necessary to argue the central role Antonioni played in fostering the career of Dante Bini and in developing a name for himself in the world of private commission. This article argues that the fruitful encounter was not only an opportunity for Dante Bini to experiment with alternative construction methods beyond inflatable concrete but was also representative of the phenomenon of land parceling which was affecting large stretches of coastal areas in Italy.

La Cupola's Narrative

In his article »Dante's Inflatables«, McLean gives an account of Bini's biography through the development of the Binishells technology (McLean 2013).[2] In the same year, he also published the volume *Building with Air* based on Bini's own account (Bini/Dioguardi 2012). The book is structured in six chapters and the epilogue is dedicated to the history of the creation of *La Cupola*, seen as an encounter between two major actors while ignoring the neighboring villas designed by the same architect.

It is with the exhibition curated by McLean and Maak at the *XVI Venice Architecture Biennale* in 2014 that *La Cupola* starts obtaining more mediatic attention. In the same year, Goswin Schwendingeron, in his article »Paradise

2 *La Cupola* is celebrated as »the place where his construction system is deployed to the most artful effect«, suggesting how the involvement of a private client could impact an architect's career as well as change the reception of technology. (McLean 2013: 21).

Regained«, gives *La Cupola* the central stage (Schwendingeron 2014).[3] In *Dante Bini's Mechatronics*, Ricci gives a precise and detailed account of the project from its inception (Ricci 2016). In the same year, the film director Volker Sattel released the short documentary *La Cupola*, portraying the decaying state of the building and prompting a reflection on heritage, or lack of it, in the context of post-war Italian architecture. Given the mounting attention, the *Environmental Fund for Italy* (FAI) accepted a public petition in 2015, which was advertised by the non-specialist press, to protect this building from demolition.

Alongside the publications already listed, the *Binishells* technology has been the subject of a large number of publications in the field of engineering where it was analyzed in its construction and structural attributes.[4] In the publication *Architecture Beyond the Cupola: Inventions and Designs by Dante Bini*, we find an original comparison between the prefabricated housing models and the ad hoc projects for private clients, implicity revealing the agency of patronage (Pugnale/Bologna 2023).

The Genesis of La Cupola

Dante Bini met the actor Monica Vitti in the ski resort of Cortina d'Ampezzo, in 1968. Needless to say, the possibility of holidaying in such an exclusive place was not available to everyone, but it is important to remember that during the 1960s class composition in Italy experienced a dramatic change, allowing more people to enjoy a higher level of prosperity. As Hartmut Kaelbe has argued »at no time in human history have so many people become affluent within one single generation« (Kaelbe 1992: 12).[5]

At 37, after returning from a successful period at *Columbia University* in New York, Bini was definitely an »up-and-coming« professional, having founded *Binishells* a few years before. Specializing in a patented technology bearing the same name, the company produced concrete domes lifted and shaped by air pressure and completely load-bearing. The reasons for

3 The medium of photography is used to enhance the dramatic character of the building while putting the accent on the meta element of this architecture, designed for a film director and resembling a movie set.

4 The book *Building with Air* contains an account of the most relevant publications within this field in the bibliography.

5 Kaelbe refers to the German context, Italy was no exception in experiencing its very first industrial revolution in the 30 years after the war (Ginzburg 1990; Tafuri 1989).

Binishells' success were twofold: the speed of construction, which eliminated the need for lengthy formwork, and the relatively »inexpensive manufacturing method«, which did not require a large site crew.[6] However, between 1968 and 1972, Bini was ousted from any relevant professional role within the company he founded.[7]

It is possible to speculate on Bini's need to network and acquire new clients, and to deduce the relevance of the brief conversation with Monica Vitti. It was only a matter of time before the architect met with the film director Michelangelo Antonioni, who at the time was secretly dating the actor, his muse and protagonist in the acclaimed *L'Avventura* (1960), *La Notte* (1961), *L'Eclisse* (1962), and *Deserto Rosso* (1964). These movies, like most of Antonioni's productions, also share a recognizable spatial sensibility used to describe the emotional turmoil of a generation through the use of »extremely long takes, striking modern architecture, painterly use of color, tiny human figures adrift in empty landscapes« (Dalton 2019). In *L'Avventura*, the vulnerable middle-class subject – a product of the Italian »Economic Miracle« – is exposed and contrasted with abstract and pure architectural forms, the only reassurance in a world where restlessness, anxiety, and disorientation characterize the human experience. It is easy to see how the simplicity and abstract qualities of Bini's prefabricated domes could have seduced Antonioni's imagination to build a refuge of his own. One could even speculate that there could not be a more ideal shape to host the house of a director whose celebration of the dome appears as a constant in his movies, as a symbol of divine guidance (fig. 1).

Nature also holds an important role in Antonioni's movies, embodying both isolation and refuge in contrast with, as he put it »the inhuman industrial world which oppresses the individuals and leads them to neurosis« (Chatman/Seymour 2004: 91–93). The image of the volcano on the island of Lipari in *L'Avventura* for example, echoes powerful archetypical shapes, symbols of a lost connection with the environment; one which could be

6 The company *Binishells* is still active today and is managed by Dante Bini's son, Nicolo' Bini. For more information: https://binishells.com/.

7 In *Binishells'* company brochures between 1968 and 1972 the name of Dante Bini is missing from most of the major projects built. The reasons for ousting *Binishells'* founder are not clear (Bonomo 2023). A possible explanation could be related to the increase in the company's scale and the need to control the production of patented technology from a managerial perspective rather than an architectural/artistic one. This has also been documented in *Building with Air* (McLean 2012:74).

1.
Michelangelo Antonioni: Frames from L'Avventura / The Adventure *(1960) and* L'Eclisse/ The Eclipse *(1962).*

2.
Michelangelo Antonioni: Frames from L'Avventura / The Adventure *(1960) and* Deserto Rosso/ Red Desert *(1964).*

3.
Dante Bini: Site plan of La Cupola. *Courtesy of the Municipal Archive of Trinità D'Agultu.*

4.
Dante Bini: Model of La Cupola. *Courtesy of Bini's private archive.*

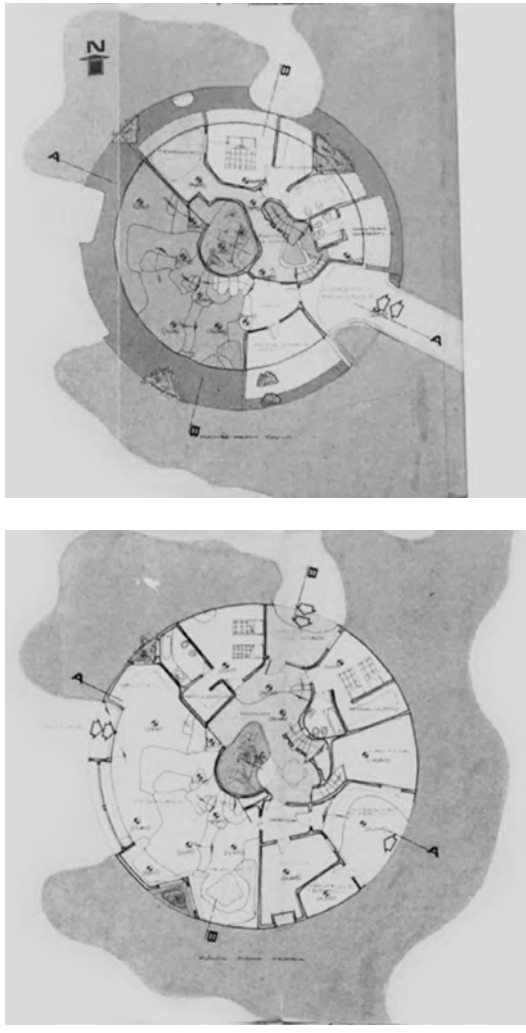
reinstated through escape or imagination, as for the young girl in the story told by Vitti in *Deserto Rosso*. While shooting this movie on the island of Budelli, Antonioni, struck by the beauty of the place, picked Sardinia as his refuge from public life. Initially faced with the impossibility of acquiring a plot on Budelli, owned by the Milanese developer Pierino Tizzoni, the director accepted the plot gifted to him in the Gallura region, 70 kilometers north of Sassari.[8] The inhospitable land, hit by strong winds, almost unsuitable for agriculture or pasture, and characterized by rocky cliffs, was almost uninhabited when Antonioni and Vitti set foot on it. There, Tizzoni saw an opportunity of developing this area known as *S'ara Niedda* (Desperate Land) into Costa Paradiso (Paradise Coast), with the aim of creating an alternative tourist resort for the cultural elite of Rome and Milan (Ricci 2016: 133) (fig. 2, fig. 3).

The unusual and binding conditions of the appointment were »imposed«, to use Bini's words in the first meeting between client and architect (Bonomo 2023). Firstly, the architect had to respect the confidentiality of the project as well as the professional relationship between the parties, coupled with a commitment not to disseminate any information about it. According to Bini, Antonioni was planning on using *La Cupola* as a set for a movie, and for this reason, the architect had to promise that in case of a successful appointment, that no camera would be allowed on site. Secondly, Bini was asked to set out a preliminary sketch of the project, which had to be developed in conversation with the client. Lastly, the payment for the architect's services was limited the reimbursement of expenses, with the promise of other jobs from Antonioni's friends, which would then »pay« for *La Cupola*.[9]

The contract did not just contain the promise of one dome but of many others as well. The destiny of *La Cupola* and its financing, therefore, depended a lot on what was still coming, making this building the testing ground for successive projects. With the signing of the contract, the architect was asked

8 The island of Budelli was recognized as protected territory only in 1992. This includes the radius of 300 meters around the island in which transit by boat and swimming is prohibited. According to Law 349/91, following an increase of tourism on the island which was endangering plants and animals and affecting the composition of the recognizable pink sandy beach. The island is currently part of the *La Maddalena Archipelago National Protected Area*.

9 The director was inspired by a scene in the movie *La Cagna* (1972) by Marco Ferreri, which is partly filmed in a dome-like shape, as documented in *Dante Bini Mechatronics* by Antonio Pennacchio and Giulia Ricci (2016: 138).



5.
Dante Bini: Ground floor and first floor plan of Villa Antonioni – La Cupola, *1970. Courtesy of Bini's private archive.*

to sustain the director's company for months on end on-site, with the aim of »absorbing the environment« in all its nuances, which at times proved »challenging« (Bonomo 2023). The design had to be inspired by the local Sardinian tradition of the sighting towers, responding to the prevailing winds, the sound of the waves on granite rocks, and the smell of the stones and local Mediterranean shrubs. In line with a cinematic approach, two-dimensional drawings were parked by Antonioni's requests in lieu of three-dimensional physical models, which were used as design tools to make layout changes and major design decisions (fig. 4, fig. 5).

The result was a villa which in many ways, and for the reason described above, was designed and conceived of as the set of a movie. Once crossed the pedestrian bridge, which gives access to the building from the street, one is welcomed by two opposite spatial experiences. Frontally, a staircase composed of stacked large slabs of local pink granite rock – handpicked by Antonioni at a nearby quarry – allows the descend into a double-height living area with large windows overlooking the sea. On the right, a narrow corridor running parallel to an indoor garden leads to the master bedroom with a dressing room and *en suite* bathroom. On the opposite side of the living area, a series of spaces surround the indoor garden which receives light from a cloud-shaped oculus. Going clockwise, there are: two rooms at either side of the secondary entrance (probably for guests) equipped both with *en suites* and dressing rooms, with a kitchen, and service spaces connected to a storage room at the basement level. The mute and atomized exterior was the product of negotiations between the client and architect, who agreed on the removal of a chimney flue, initially proposed by Bini, and on the rendering of the external finish to blend the shape with the surrounding landscape (Bonomo 2023) (fig. 6–9) .

La Cupola was, in many ways, a testing ground for both Bini and Antonioni. For the architect, it was the promise of payment for future commissions, an excuse to alter a prefabricated prototype, which until then was used purely functionally, but it was also a challenging project for a demanding client. For the client, it was an opportunity to become the director of his own idea of domesticity, liberated from a strict hierarchy through the use of a circular shape. The collaboration between client and architect allowed this building to emerge, and soon, to be surrounded by others.

6.
Dante Bini: Villa Antonioni – La Cupola, *2023. Photographer: Michela Bonomo.*

7.
Dante Bini: Villa Antonioni – La Cupola, *2023. Photographer: Diana Lanciotti.*

The Cupola as Blueprint

Between 1970–1974 Dante Bini built three more villas in Costa Paradiso: Villa Vacchi, Villa Balboni, and Villa Spagnoli, all for friends or acquaintances related to Antonioni's public life in Rome and Milan.[10] One could argue that the concept of patronage as collaboration effectively applies to all the Sardinian projects, a product of the network of people surrounding the film director. In other words, *La Cupola* was one of the first private villas built in the area, becoming a blueprint for successive projects.

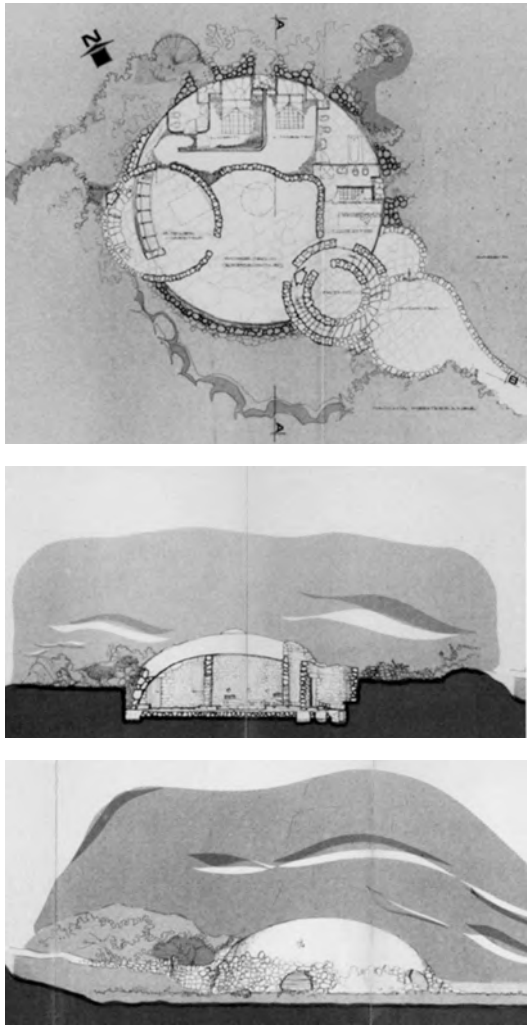
Bini was commissioned to design Villa Vacchi by the painter Sergio Vacchi after acquiring a plot adjacent to *La Cupola*, with the aim of building a painting studio. The layout of Villa Vacchi however, contradicts this statement. The project was submitted for planning in 1970, together with Villa Balboni as one individual residential unit, despite clearly being two individual buildings separated by less than ten meters and owned by a couple (fig. 10, fig. 11). Villa Vacchi also adopted *Binishells*' dome technology and shared a few similarities with *La Cupola*. The access is provided from the top via a series of chambers, which function as an open courtyard that leads to a narrow spiral staircase contained within two stone walls. The living room is connected to the adjacent round atelier and bedrooms by small openings enhancing the feeling of being lost in a domestic labyrinth. Natural light, like at *La Cupola*, floods the space by means of an oculus located above the living area and side sunken courtyards are carved out of the exterior shell in correspondence with the two double bedrooms of identical size. In doing so, the architect possibly envisaged the use of these by friends, or even by a couple who wanted to enjoy some privacy. In this sense, Villa Vacchi was effectively designed as a holiday house and it was used for that purpose. As for the materiality, the inflatable concrete shell was partly clad in local stone, grounding the building to the landscape of Costa Paradiso and the tradition of the Sardinian sighting »Nuragh«, in many ways an ode to the tradition, a trope that Bini will deploy in Villa Balboni as well (fig. 12).[11]

10 As stated by Dante Bini, during those years the director was a constant presence on site for both the construction of La Cupola and the other three villas.

11 The Nuraghs or *Nuraghe* is an ancient type of megalithic structure, which developed in Sardinia during the Nuragic Age between 1900 and 730 BC: The buildings' function is disputed, some archeologists believe that they were military strongholds but they could have also been ordinary dwellings or religious temples, or a combination of both.

8.
Dante Bini: Interior views and pink granite slab of Villa Antonioni – La Cupola, *2023. Photographer: Michela Bonomo.*

9.
Dante Bini: Villa Antonioni – La Cupola, *2023.*
Photographer: Michela Bonomo.



10.
Dante Bini: Floor plan, longitudinal section and elevation of Villa Vacchi, 1971. Courtesy of Bini's private archive.

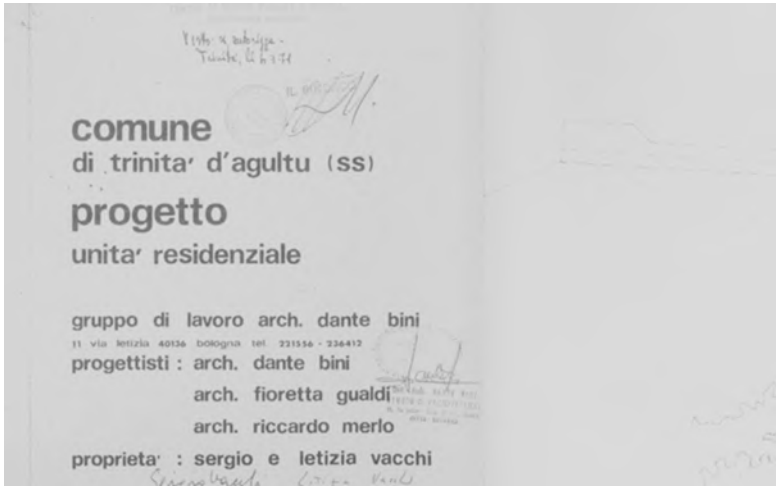
Despite being part of the same project, Villa Balboni represents the first exception in Bini's portfolio, which had, until now, relied on the *Binishells* template.[12] In the plan, it is possible to appreciate how the constraint posed by space was overcome by embracing the logic of a clear axis demarked by horizontal retaining walls. The entrance on the long side of the rectangular shape cuts this rhythm perpendicularly, creating an open view toward the sea in correspondence with the living area. On the right-hand side of the entrance office, kitchen, and service spaces are arranged in one line, one bedroom and a studio are arranged on the left-hand side. These two spaces both have access to an inner courtyard, maximizing the use of flat surfaces while bringing light and privacy to the spaces and providing a ceiling height. Tucked between the existing rocks, the building adapts to the irregular terrain by means of mezzanines and platforms; one is located above the studio, giving access to a »sleeping area« and the second is above the office, which is also accessible via an external ladder. The house could potentially sleep four people but the lack of hierarchy and the proximity of the secondary spaces to the office suggests a new type of domesticity (fig. 13).[13] One where life and work are indistinguishable and where the traditional idea of the nuclear family is deconstructed, by means of bedrooms that allow little privacy and are more like resting spaces for guests or close friends. On the facade, the pure geometry of the pitched roof is contrasted with local stone cladding, rooting the house in the local tradition of the Sardinian rural longhouse of the »Stazzo« (fig. 14).[14]

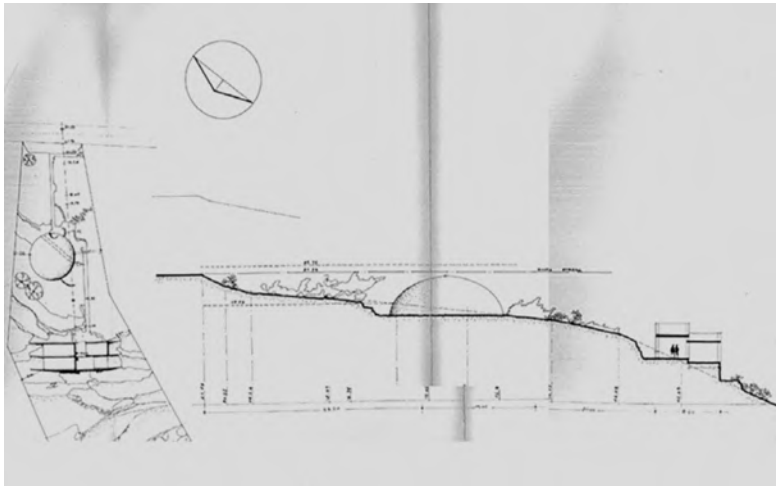
Villa Spagnoli is Bini's last project on Costa Paradiso to bear a little of both *Binishells*' prefabricated design and the relationship with local traditions. Bini was commissioned to work on the villa by the nephew of the famous Italian

12 One reason could be the personal history between the commissioner and Antonioni. The actor Letizia Balboni was married to Antonioni for twelve years and with the design of Villa Spagnoli possibly wanted to distance herself, not only emotionally but also architecturally, from *La Cupola* since she then re-married to Sergio Vacchi.

13 There is no label indicating the children's bedroom anywhere on the plan.

14 The archetypical pitched roof brings to mind Venturi House, the most notable example using this trope, a project also commissioned by a woman, and the symbol of a new attitude toward modern architecture. The »Stazzo« is a Sardinian domestic typology which started appearing in the 17th century. It is similar to a longhouse in that it consists of three bedrooms arranged in a rectangular shape and a pitched roof. It is common in the region of Gallura and used by shepherds and landowners. It is often surrounded by arable land and is constructed using local stone. Openings are normally all the same size.





11.
Dante Bini: Original building permit of Villa Vacchi and Villa Balboni, 1971. Courtesy of the Municipal Archive of Trinità D'Augultu.

12.
Dante Bini: Site plan and section showing Villa Vacchi and Villa Balboni, 1971. Courtesy of the Municipal Archive of Trinità D'Augultu.

fashion designer Luisa Spagnoli, another friend of Antonioni's, and little is known about this building.[15] The house is perfectly mimetic; the green roof, resulting from an undulated concrete slab is supported by the load-bearing walls of local stone. Similarly to Villa Vacchi, the access happens here via a spiral staircase – the only feature visible from the street – which descends to the house within a Nuragh-like chamber. The introverted access is in contrast to the entrance of the house at the bottom of the staircase, where an uninterrupted view of the sea from an open terrace reveals the building. The living, dining, and kitchen face the panoramic terrace and bathrooms and service spaces were most likely arranged against the retaining wall. The bedrooms in the extreme wings were contained by a local stone wall punctuated by large windows (fig. 15).[16] During the construction of Villa Spagnoli, Antonioni was directing the movie *Zabriskie Point*. Nestled on the side of a hill, with an open glazed facade overlooking the rocky landscape and the sea this villa shares some features with the one in the final scene of the movie (fig. 15).[17]

Beyond the Dome

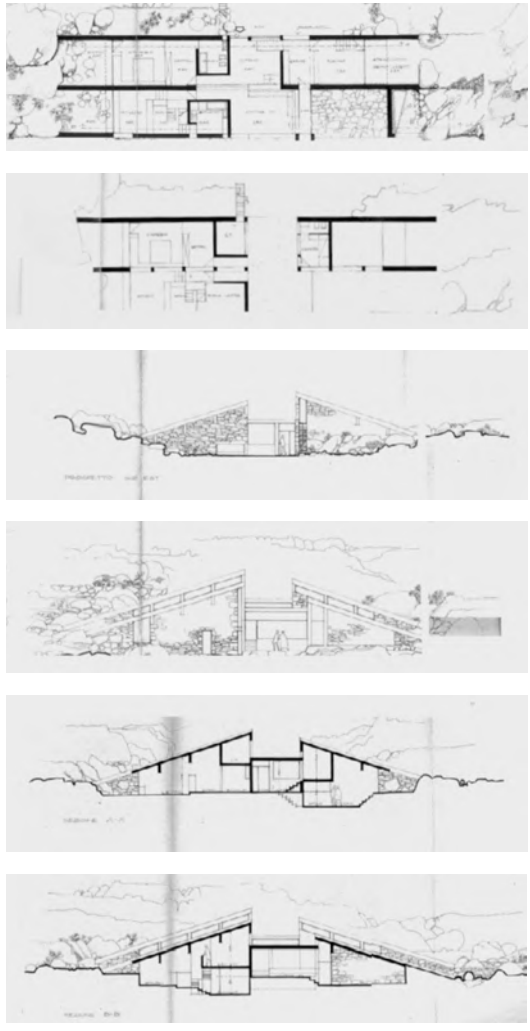
While studying the four villas designed by Bini in Costa Paradiso, one is asked not to simply look at them as the symbols of a successful collaboration with patronage but rather as exemplary of two specific historical conditions that impacted architectural production in post-war Italy.

Until 1985 the practice of »lottizzazione« (allotment), which in Italian planning law refers to the fragmentation of land to obtain individual portions or lots, which become distinct units both legally (as far as ownership is concerned) and administratively (requiring cadastral subdivision), was

15 The analysis of Villa Spagnoli is based on the documentation submitted to the Comune of Trinità d'Agultu, historic photographs shown by Bini at a conference at the University of La Sapienza and coming from his archive. A recent site visit made possible to have a better understanding of the project's current status. However, the lack of architectural plans does not allow a meticulous comparison, so a photographic and satellite analysis study is adopted in lieu of a careful layout analysis.

16 The impossibility of obtaining plans from the Municipality of Trinità d'Agultu meant that the layout had to be deduced from photographs.

17 The villa featured in *Zabriskie Point* is a copy of the building designed by Hiram Hudson Benedict near Cave Creek Arizona, which was rebuilt and blown up by the director for one of the final scenes of the movie. Given the documented constant presence of Antonioni on all his clients' villas sites during the shooting of this movie, one could speculate an implicit message is encapsulated in the design of Villa Spagnoli.



13.
Dante Bini: Ground floor plan, frontal elevations, and logitudinal sections of Villa Balboni, 1971. Courtesy of the Municipal Archive of Trinità D'Augultu.

unregulated. In becoming a tool to extract value from land, »lottizzazione« was used with speculative gains extensively, allowing small entrepreneurs to become large developers thanks to loopholes in the legal system.[18] This was the tool used by major real-estate developers like Pierino Tizzoni in Costa Paradiso. The Italian coasts, in fact, due to a renewed discovery of the sea and the advent of mass tourism paid the highest price, falling prey to speculators. This article argues that private villas were often the first development to take place, paving the way for heavy infrastructure and other construction to arrive. This was not a new phenomenon, as villas have been the materialization of land extraction throughout history, however, the scale on which this phenomenon occurred during in the post-war years was unprecedented. Antonioni, consciously or not, enabled and supported the practice of »lottizzazione« in Costa Paradiso through his close involvement in the construction of *La Cupola*, as well as by his attitude to ensuring the construction of his friends' villas, which adapted more than *La Cupola* to local construction traditions.

As argued by Nele Dechmann in the book *Costa Smeralda*, and in the large literature produced on tourist architecture, in the case of Sardinia, local traditions were instrumentalized and completely transfigured for this purpose in the hand of large developers who were responsible for the creation of a new vernacular as part of the project of Sardinia's colonization (cf. Carlotti et al. 2015; Cappai 2015; Dechmann 2019). This attitude, I argue, is visible in all of Bini's projects in Costa Paradiso. In a certain way, these villas are the symbol of the hybridization of highly technological prefabricated solutions like *Binishells*, altered to match a new attitude in Italian post-war architecture. Despite mostly looking at large housing examples, scholars have analyzed the new aesthetic in the architectural production of the Italian Postwar and the critical attitude toward the implementation of prefabricated technology (cf. Poretti 2008; Williams 2002; Casciato 2002; Tafuri 1989). The distancing from the technological attitude of the Modern Movement, which was seen as too close to the Fascist regime, led to the endorsement of an anti-technological attitude – close to the vernacular building practices. It can be argued that Bini's villas represent a tension between the need to showcase

18 Between 1962 and 1964 the Minister of Public Works, Francesco Sullo, attempted a reform to contain the phenomenon of »lottizzazione« and proposed the institution of a national planning framework for Italy. His proposal, then renamed *Legge Sullo*, was opposed under the mounting pressure of large landowers and developers (cf. Blecic 2019).

14.
Dante Bini: Villa Spagnoli, 2023. Photographer: Michela Bonomo.

technology, a characteristic that is common in private buildings designed by architects, and what could be defined a »new vernacular« attitude.

For the reasons explained above, *La Cupola* is the perfect case study as it encapsulated a portion of Italian history. The common practice of »lottizzazione« with the aim of extracting value from the landscape was enabled by Antonioni in his wish to become more of a developer than a client. The collaboration with Bini determined the alteration of a prefabricated model, leading to surprising and unconventional results for domestic architecture, a creative process that probably allowed Bini to manage the inferiority complex he had suffered during his university years and finally wear the hat of the architect rather than the one of the engineer, leading to successful commissions abroad.[19] Antonioni and Vitti enjoyed this house together, and apart, until the mid-1980s when the building was abandoned following the couple's break-up, and with it ceased the clause of non-disclosure and the anonymity of the project. The increased maintenance costs and the disputes between Antonioni's and Vitti's families led to a slow and inevitable decay, an abandonment that in many ways reveals the impossibility of escaping the »industrialized« world or perhaps the director's coming to terms with his own contradictory decision of building a villa – the ultimate and tangible embodiment of capitalism – and the consequences that had on this corner of paradise (fig. 16).

19 Dante Bini admitted in various accounts, the most recent one for the *Versus* seminar in February 2022 at *University La Sapienza* in Rome (https://www.youtube.com/watch?v=JgE7jKbjFPc&ab_channel=ScuoladiDottoratoinScienzedell%27Architettura) that his inferiority complex about the Master of Architecture made him embrace a more constructive/engineering approach that eventually led him to patent *Binishells*. Following the Sardinian experience, Bini moved to Australia where he stayed for six years and was involved in a large number of public projects.

15.
Michelangelo Antoninoni: Frames from the final scene of Zabrienskie Point, 1974.

16.
Michela Bonomo: Costa Paradiso land parcelling and Sardinian map highliting Costa Paradiso.

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Palladio, the Computer Program. Source Code and Architectural Principles

Pablo Miranda Carranza

Abstract: In 1992 MIT Press published P*ossible Palladian Villas (Plus a Few Instructively Impossible Ones)*, the result of a chance collaboration between Richard Freedman, an undergraduate majoring in Computer Science, and George Hersey, Professor of Art History at Yale. The book described their findings while writing the software called Palladio, which was included in a floppy disc accompanying the book. Software and book presented a new type of architectural historiography, one that used writing and running programs to analyze and explain a body of architectural work. The third partner in this collaboration was the computer. In its capacity to impersonate Palladio and mimic their intellectual toils the computer embodied many of the myths, and even some of the anxieties, of 20th-century architecture. This paper looks at how Palladio, the software, incorporated and exposed some of the contradictions of a project of disciplinary autonomy partly resting on analyses of Palladian villas by Rudolf Wittkower and Colin Rowe. It proposes a close reading of its code, written in the C programming language, to understand how the principles of this disciplinarity, presented as so intrinsically human, could be translated into the mechanical operations of a computer program.

Keywords: Architectural Principles; Formalism; Disciplinarity; Interactivity; Debugging; Conversation; Code; Heuristics.

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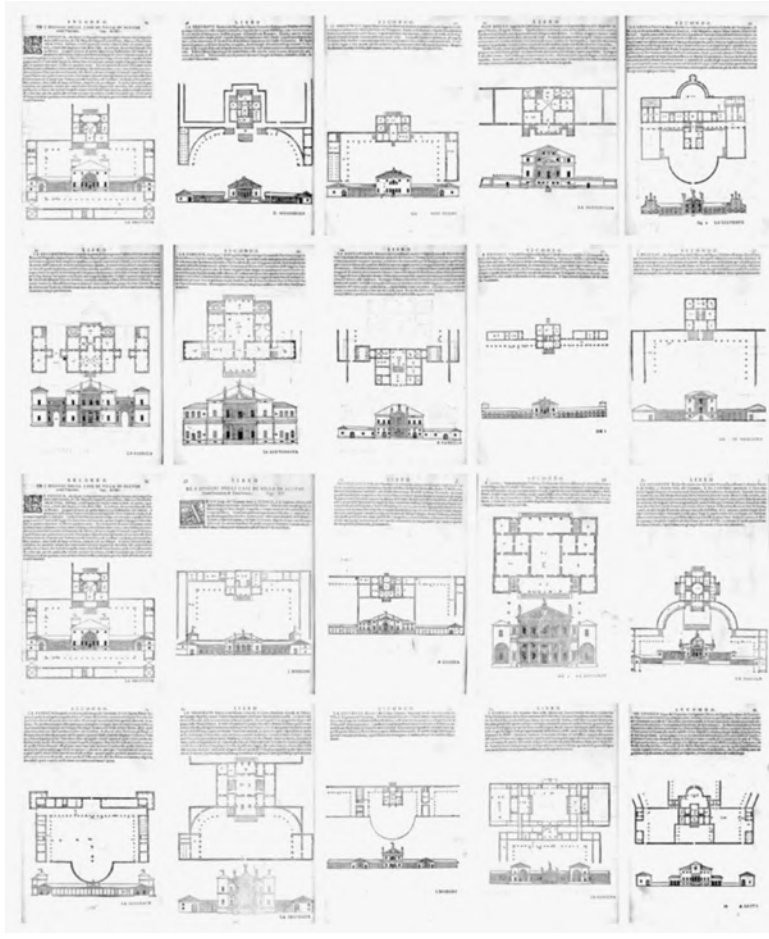


1.
Andrea Palladio: Pages 47 – 65 from Il Secondo Libro dell'Architettura.

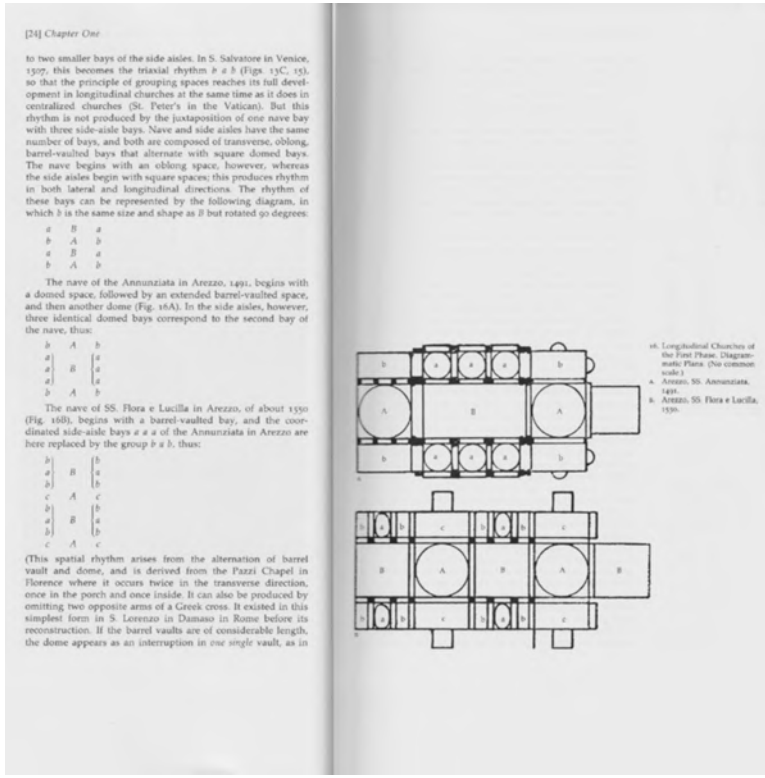
Palladio, the Author of *The Four Books*

»He is inside my Mac!«[1]

Since its publication five centuries ago, architects have been fascinated, time and time again, by the work of Andrea Palladio. Besides the neo-Palladianism of Lord Burlington and Thomas Jefferson, or Palladio's influence on Jean-Nicolas-Louis Durand, analyses of Palladio's architecture became central to articulating the idea of a disciplinary autonomy during the mid-20th century. Palladio's productivity stands as one of the reasons for this interest. From 1531 to 1580, his output included 143 buildings and architectural works, a productivity hard to match by most architects then and now (Puppi 1975). As with Frank Lloyd Wright almost four centuries later, Palladio's sizable output was the result of a building bubble, one that demanded a new form of exurban dwelling in response to the agricultural reorientation of the Venetian Republic's economy. Palladio reinterpreted the villa's original Roman model and delivered it to the administrators of the new type of agricultural estate that emerged in the Veneto during the sixteenth century (Ackerman 1966: 50).

This profusion of work was paralleled by Palladio's own efforts to present his architecture as something beyond its factuality as buildings. As the representative of the new cadre of humanist architects, Palladio bolstered his authorial credentials by including detailed descriptions of his own works in his famous architectural treatise *The Four Books of Architecture*, of which his *Second Book* was dedicated to his villas and palazzi. The purpose of this inclusion was to present his »inventions«, the innovations in the layout and design of domestic architecture for a clientele of affluent landowners and financiers around Vicenza, alongside the classical models he documented as their sources. According to Kurt Forster, *The Second Book* constituted the first *oeuvre complète* in architecture, identifying the person of an architect as coincident with their work (Eisenman 2000). Palladio's technique of representation coordinated plans, elevations, and sections to present idealized versions of his own work, linking them to classical examples from Antiquity by drawing them the same way. This systematization through graphical conventions set the stage for its future interpretations. It implied, particularly to modernist

1 Richard Freedman, author of *Possible Palladian Villas*, referring to Andrea Palladio in conversation with the Author.



[24] *Chapter One*

to two smaller bays of the side aisles. In S. Salvatore in Venice, 1507, this becomes the triaxial rhythm *b a b* (Figs. 15C, 15), so that the principle of grouping spaces reaches its full development in longitudinal churches at the same time as it does in centralized churches (St. Peter's in the Vatican). But this rhythm is not produced by the juxtaposition of one nave bay with three side-aisle bays. Nave and side aisles have the same number of bays, and both are composed of transverse, oblong, barrel-vaulted bays that alternate with square domed bays. The nave begins with an oblong space, however, whereas the side aisles begin with square spaces; this produces rhythm in both lateral and longitudinal directions. The rhythm of these bays can be represented by the following diagram, in which *b* is the same size and shape as *B* but rotated 90 degrees:

a B a
b A b
a B a
b A b

The nave of the Annunziata in Arezzo, 1491, begins with a domed space, followed by an extended barrel-vaulted space, and then another dome (Fig. 16A). In the side aisles, however, three identical domed bays correspond to the second bay of the nave, thus:

b A b
a | *B* | *a*
a | | *a*
a | | *a*
b A b

The nave of SS. Flora e Lucilla in Arezzo, of about 1550 (Fig. 16B), begins with a barrel-vaulted bay, and the coordinated side-aisle bays *a a a* of the Annunziata in Arezzo are here replaced by the group *b a b*, thus:

b | *b*
a | *B* | *a*
b | *b*
c A c
b | *b*
a | *B* | *a*
b | *b*
c A c

(This spatial rhythm arises from the alternation of barrel vault and dome, and is derived from the Pazzi Chapel in Florence where it occurs twice in the transverse direction, once in the porch and once inside. It can also be produced by omitting two opposite arms of a Greek cross. It existed in this simplest form in S. Lorenzo in Damaso in Rome before its reconstruction. If the barrel vaults are of considerable length, the dome appears as an interruption in *one single* vault, as in

16. Longitudinal Churches of the First Phase. Diagrammatic Plans. (No common scale.)
a. Arezzo, SS. Annunziata, 1491.
b. Arezzo, SS. Flora e Lucilla, 1550.

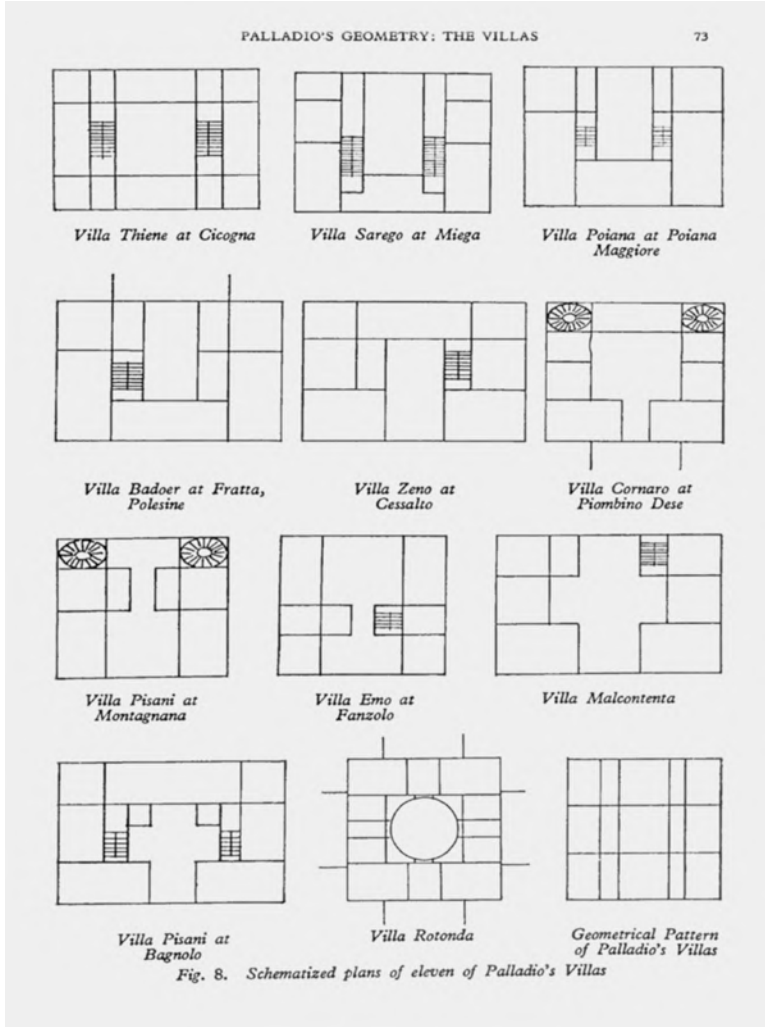
2.
Paul Frankl: Analyses of Churches from Principles of Architectural History: The Four Phases of Architectural Style 1420–1900.

readers, a system that would perhaps not just underpin the disposition and presentation of the work in print, but also explain the mechanisms behind its production (fig. 1).

Palladio's systematic representations lend themselves as ideal objects for the formalist architectural historiographies of the mid-20th century. Their methods of diagrammatical abstraction and systematization were in fact not that dissimilar from Palladio's own, as exemplified in Paul Frankl's typographical abstractions of configurations of Renaissance churches (Frankl 1968) (fig. 2). Following the logic of estrangement underlying formalist methods of analysis, which, as in literary analyses of Russian formalism, attempted to dislodge form from its context to discover what was intrinsically literary, or in this case, architectural (Jameson 1972), Rudolf Wittkower further isolated Palladio's readily abstracted plans in search of their »Palladian-ness«. By focusing exclusively on the master houses of the villas and disregarding their wings or »barchesse«, as much as signs of their productive and social functions as architectural responses to the landscape and conditions of their locations, Wittkower effectively foregrounded them as abstract compositions disentangled from their contexts. Most of this foregrounding was already implicit in *The Four Books*, which relegated any information external to the abstracted architecture of its graphical conventions to text, as noted by Kurt W. Forster (Eisenman et al. 2000). In Wittkower the geometric syntaxes of the villa's central bodies became the artistic and symbolic expression of a humanist culture manifested through proportions, ratios, and symmetries, rather than indexes of political, social, and economic conditions. James Ackerman explained how this »almost religious« commitment to an idea of universal harmony was closely lodged in post-war architecture and zealously sought by the likes of Wittkower after a war that they saw as the result of political extremism (Cohen/Delbeke 2018).

As part of this investment of meaning into abstract form, Wittkower and his most eminent follower, Colin Rowe, saw the plans of villas in *The Four Books* as indices of Palladio's own intellectual work, of his tinkering and struggles. Their analysis would reveal the cognitive processes behind the genesis of his architecture, even if the plans in the book were known to be subsequent idealized versions of the actual buildings.[2] This identi-

2 Or as Wittkower asked: »What was in Palladio's mind when he experimented over and over again with the same elements? Once he had found the basic geometric pattern for the problem villa, he adapted it as clearly and as simply as possible to the special requirements



3.
Rudolf Wittkower: Diagrams of Palladian Villas from Architectural Principles in the Age of Humanism, *1949.*

fication between Palladio's thoughts and the abstract geometric patterns traced by Wittkower and Rowe on the plans of the villas followed the principles of gestalt psychology driving formalist analysis in art (Jarzombek 1999). As gestalts, mental entities born from Palladio's toils, these patterns synthesized the disparate intentions and specific conditions of each project into a whole. These figures signified Palladio's architectural essence, the »principle« resulting from and governing his mental operations. During the following decade, and especially through Rowe's influence, this reading of Palladio became the template for architecture as a humanist autonomous discipline. This disciplinarity was based on being literate in, on being able to read and write, these abstractions of form that were its »principles«. These defined its theoretical domain, what was intrinsically architecture. Writing and reading these forms, or rather drawing and perceiving them, defined architecture as more than a mere response to economic, social, or technological demands (fig. 3).

Enter the Computer

In 1985 Richard Freedman, a student at Yale majoring in Computer Science, enrolled on a course that art history professor George Hersey was teaching on the Italian Renaissance. Interested in architecture, Freedman studied a copy of Palladio's *Four Books* that he had borrowed from a close relative, particularly the over 40 villas and buildings from *The Second Book*. Seen through his programming habits, he explained how *The Second Book* constituted a database, one sufficiently large and regular so that it might allow him to abstract some underlying design rules, so that a computer could be programmed to generate Palladian villas. With Hersey's encouragement this became the theme for his course assignment and an article in the journal *Architectura* (Freedman 1987). It finally led to their collaboration on the book *Possible Palladian Villas* (Hersey/Freedman 1992), which explained the development and consequences of Freedman's program.

In contrast to the art theoretical ideas of Wittkower and Rowe, Freedman's digital encoding of Palladio recast his work into the different technologies

of each commission. He reconciled the task at hand with the ›certain‹ truthof mathematics which is final and unchangeable. The geometrical keynote is, subconsciously rather than consciously, perceptible to everyone who visits Palladio's villas and it is this that gives his buildings their convincing quality.« (Wittkower 1944: 111).

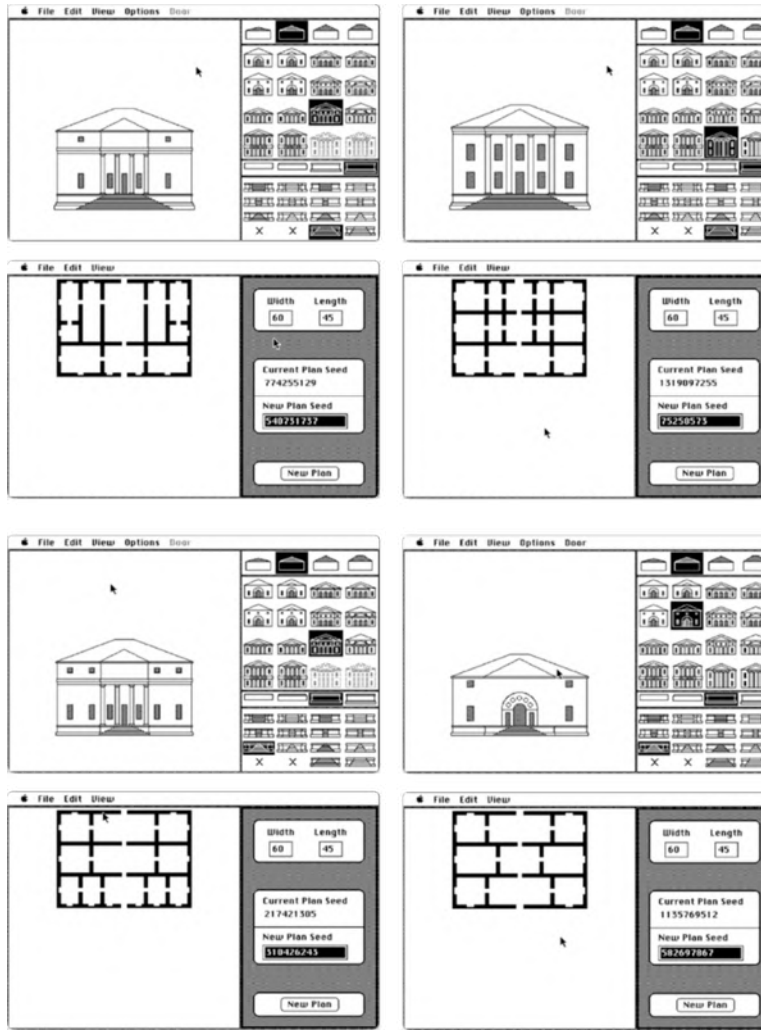
and ideologies of programming. Though codified through computer science, programming as a practice also consists of a multitude of conventions, habits, and tacit know-hows that regulate how to develop the complex artifacts that are programs. The practices Freedman deployed came from his own story with computers: As did many other programmers, he learned how to code as a teenager using the popular but limited BASIC programming language, which during the 1970s became the entry point for anyone not studying science or technology at university and wanting to learn how to use computers. Yet despite the increasing availability of computers that enabled teenagers like Freedman to learn programming, writing programs were still a complicated business in the early 1980s. Anyone wanting to compile larger programs beyond what BASIC interpreters could execute needed access to machines that were often too expensive to be personally owned. Their availability at Yale, Freedman explained, allowed him to learn how to put larger and more complex programs together (Richard 2022). Things were changing rapidly though. In 1984, just a couple of years before Freedman took Hersey's course on the Italian Renaissance, the Apple Macintosh had made the use and programming of graphics available to a general public and successfully commercialized the *Graphic User Interfaces* (GUI) first developed at Xerox PARC during the 1970s. Freedman first used the larger computers available at Yale to write the programs explained in *Possible Palladian Villas*, but the popularity of the Macintosh gave him the idea of distributing his programs along with the book. After many months of working at a Macintosh SE using the Aztec C compiler, he could finally run his interactive software; the result, he described, was the feeling that »Palladio was inside my Mac« (fig. 4).

Debugging

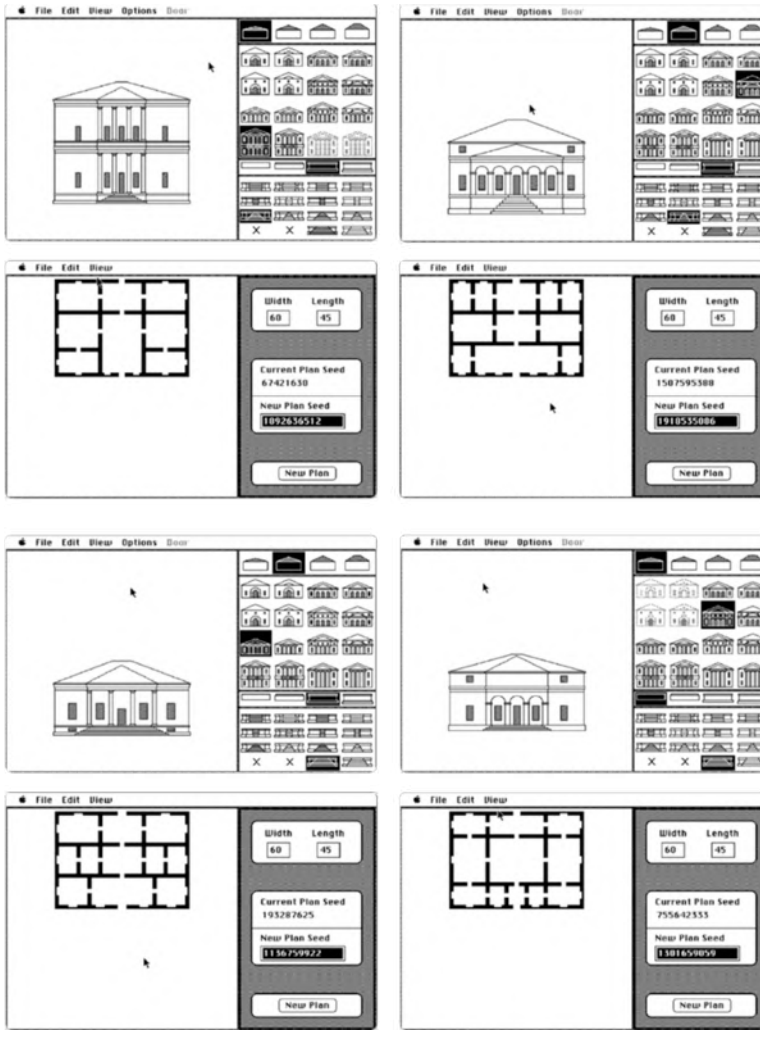
Freedman's initiation into programming in BASIC was that of the self-taught enthusiast, rather than the result of his more formal and academic studies in computer science. This may seem anecdotal, but this influenced his reading of Palladio, especially compared to the parallel efforts of William Mitchell and George Stiny, who instead used »shape grammars«, a mathematical formalism first proposed by them in 1971 to encode the generation of Palladian villas (Stiny/Gips, 1971; Stiny/Mitchell 1978b, 1978a; Mitchell, 1990). Most relevant to this case were the programming methods that began with BASIC. Mainframe computers such as the IBM 700/7000 series, first available to governmental organisms, universities, and corporations during the

1950s and 1960s, operated under what is known as »batch mode«: programs were first written into »batches« of punched cards that would run during some allocated time in a mainframe. The results would then be printed out or otherwise punched back into cards to be processed further. Since computers were in short supply, time allocated in a mainframe was considerably expensive. Access to these scarce computational resources was limited to scientists and technicians in the universities and corporations that could afford them. The BASIC language that allowed Freedman and many other teenagers to learn programming was an effort to make programming available to a wider public as computers became increasingly available. Developed first at *Dartmouth College* in the early 1960s, BASIC wanted to be a user-friendly language for non-scientists. Rather than batch mode, BASIC initially made use of time-sharing, the technique to grant access to many users to the same computer and the basis of multi-tasking in today's computers. What this implied, compared with »batch mode«, was interactivity: programs could now be written by anyone with access to a teletype-like terminal (later substituted by a keyboard and a screen) linked to the mainframe, and executed immediately. The increasing availability of computers, which had prompted this change in the first place, also meant much cheaper computer time; now it was affordable to waste it running incorrect programs with bugs and errors. Programming changed then from a process of carefully engineering code to one of iteratively writing and testing programs, observing their behavior, and modifying them accordingly, what is generally known as »debugging«. It became a sort of conversation between a programmer and a computer which, given a set of instructions to execute, would either answer with its results, often not necessarily the expected ones, or with error messages, to which the programmer would respond by rewriting the program. The text of *Possible Palladian Villas* and the code that is at its core mirror this process of software production and which informed the personal habits and practices of programmers like Freedman. A close reading of the code that formed the basis of *Possible Palladian Villas* shows how the technical conditions of writing programs also shaped the conceptual framework within which Palladio was transposed into the computer (Hersey/Freedman 1992).[3]

3 Richard Freedman kindly provided me access to the code written in C language of »Palladio«, the software for the Macintosh that was published at the same time as *Possible Palladian Villas* and distributed in a floppy disk.



4.
Richard Freedman: Screen captures of a Macintosh Emulator (Mini vMac), running System 6, and the Palladio *software.*



5.
Richard Freedman: Screen captures of a Macintosh Emulator (Mini vMac), running System 6, and the Palladio *software.*

Setting up the Conversation

The result of these »conversations» between Freedman and the computer was the code, written in the C language, that ran *Palladio* in the Macintosh. All C programs have a function or subroutine called **main();**[4] this is the entry point for the execution of the program, the starting point from where its labyrinthine structure will unfold in time. An inspection of *Palladio*'s **main()** discloses a record of the technical conditions at the end of the 1980s when it was written **main()** called for example another function, **iwindows()**, which set up the monochrome display of 512 × 342 pixels of the Compact Macintosh. This limited screen real state, considered high resolution at the time, presented a design challenge to Freedman, who had to use it as efficiently as possible both to interact and display the results of *Palladio* (Miranda Carranza 2022). **main()** took care of dealing with all the preliminaries of the program: it initialized all parts of the interface such as fonts, windows, menus, and dialogues, and managed all the necessary memory, a requirement in a language like C. It also set up the bitmap image in which to draw the plans and eventually the facades of the generated villas (with **setbitmap()**, called from **startplan()**). The first drawing in this image would be an undivided rectangle defining the generic perimeter of the villa (via **drawroom (pr)**, also called from **startplan()**). All the drawing was done using the Macintosh QuickDraw 2D Application Programming Interface (or API) for the Classic Mac OS operating system and which defined the operations, such as drawing a line or a rectangle, on a Macintosh. QuickDraw is still accessible from contemporary MacOS versions more than 30 years later, a digital fossil lodged in the operating systems of 2023. Unravelling the function call in **main()** also exposes the interesting transfer of typographic conventions into digital screens: The resolution of the Macintosh display followed the convention originated in mechanical printing of 72 points per inch, translated in this case to a resolution of 72 pixels per inch (Apple Computer, Inc. 1994). Correspondingly, all translations between dimensions on the plans of Palladian villas and those on the screen were done using a constant defined in the program as **PIXPERFT** or pixels per Vicentine feet, defined in the **plan.h** file and called through **startplan()**. **startplan()** in turn

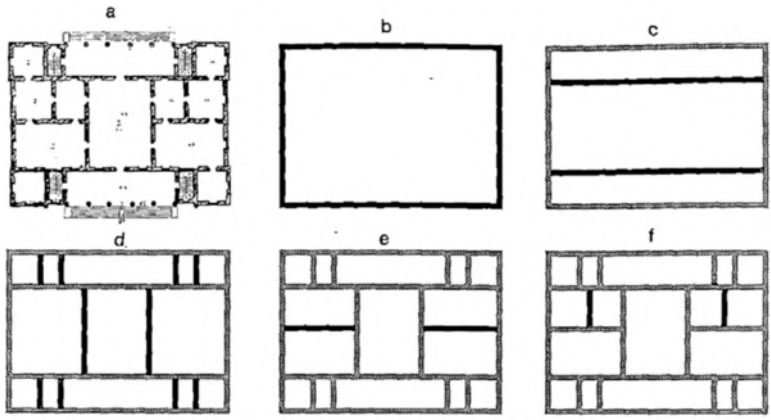
4 Function is a sequence of instructions that are grouped under a name that can be invoked anywhere else to run it. Functions can receive data as input for instructions and output or »return« data back to wherever in the program they were called from.

contained all the necessary steps to generate the plans of Palladian villas, and it was also called through the **eventloop()** function, which would take care of generating Palladian villas after pressing the »new plan« button by the user. Called here in **main()**, **startplan()** generated the first plan to display by the software. Besides taking care of setting up the data necessary to calculate a plan, **startplan()** contained the kernel of *Palladio*, the **split()** function, which encapsulated the automation of Palladio's design process. Its code was the final result of the conversation between Freedman and the computer. **split()** had as its input parameter a *pointer* to a *structure* describing a room in the villa (initially the whole undivided perimeter of the villa).[5] The result returned by **split()**, its output, was another *pointer* to the data of the left-most and top-most room of the subdivisions generated by the program, a position in the generated plan that would allow the program to access all other rooms in the villa.

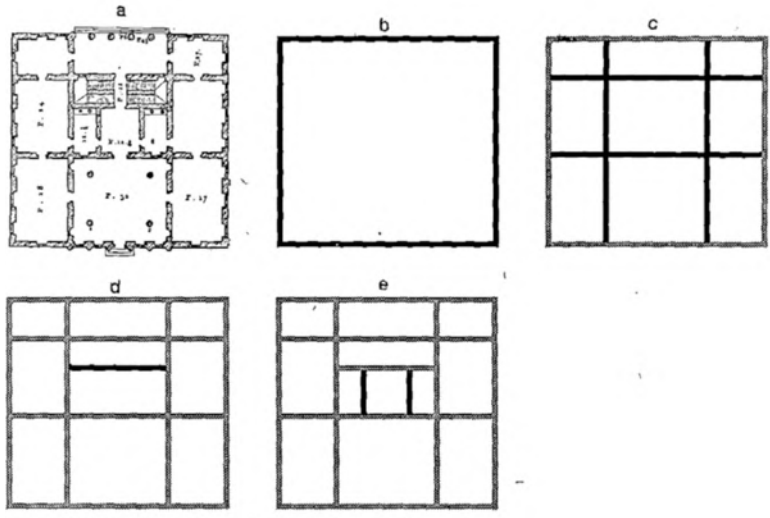
```
main()
{
  itoolbox();
  iwindows();
  imenus();
  idialogs();
  iprint();
  startplan();
  eventloop();
  terminate();
}


itoolbox()
{
  InitGraf (&qd.thePort);
  InitFonts();
  FlushEvents (everyEvent, 0);
  InitWindows();
  InitMenus();
  TEInit();
```

5 A pointer in C is an index to data, an address in the computer memory. In this particular case it pointed to a »structure«, a collection of values that in *Palladio*'s code described the properties of a room.



2. Split description of the Villa Valmarana



3. Split description of the Palazzo Antonini

6.

Richard Freedman: Recursive subdivision process, from A Computer Recreation of Palladian Villa Plans, *1987.*

```
  InitDialogs (NULL);
  InitCursor();
}

terminate()
{
  unallocplan();
}
```

Divide and Conquer

The interesting thing with **split()** is how it operated on the room description it got as its input: first, it subdivided it into smaller rooms (if possible), and then called **split()** again with each of the new smaller rooms as input, to be further processed and subdivided. This programming technique is called recursion and it produces the programming equivalent to a *mise en abîme*, a matryoshka doll of telescoping code in which a function self referentially calls itself. Recursion enables the defining of a large and complex task – in this case, splitting a large room representing the perimeter of the whole villa into the many smaller ones making up a Palladian plan – as made up of smaller versions of the same task – splitting any room into a couple of smaller ones. This type of procedure is called a »divide and conquer algorithm«, a method for factorizing jobs common in programming. Freedman programmed how **split()** would decide to nest splits into other splits, making up a recursive subdivision process that would generate the room layouts of any possible villa (fig. 6).

The generation of these recursive subdivisions was fundamentally different from the gestalts at the center of Wittkower's analyses. Rather than »principles« in the guise of elemental or ideal forms, the program used a set of »heuristics« or rules of thumb to decide how to split, or not, a room. Their development followed the process explained in *Possible Palladian Villas* of trial and error, of the logic of »debugging« typical of interactive programming and software development. Faced with the production of »improvable« villas by the code, Freedman iteratively ran and tested, and added and tweaked a set of rules that would make the subdivisions of rectangles more probable, more like the plans in *The Four Books*. There was no essential or underlying principle there, just the accumulative result of being able to produce, at the press of a button, an almost limitless number of variations in applying the same rules, and of modifying the code depending on the results.

```
pROOM split (pr)
pROOM pr;
{
  SPLITTYPE stype;
  SPLITRATIO sratio;
  pROOM ptopleft;
  int atts = 0;
  MYBOOLEAN yessplit;

  if (pr == NIL)
    return();
  if (pr->stage == 0)
    roomcount = 1;

  resetcontext();
  if (yessplit = splityn (pr, roomcount)) {
    do {
      if (yessplit = (atts++ < MAXATTEMPTS)) {
        getstype (pr, &stype);
        getsratio (pr, &stype, &sratio);
      }
      else
        break;
    } while (lookahead (pr, &stype, &sratio, _H));

    if (yessplit) {
      ptopleft = dosplit (pr, &stype, &sratio);
      incroomcount (pr, &stype);
      split (ptopleft);
    }
  }
  if (!yessplit) {
    split (pr->right);
    split (pr->down);
    return (pr);
  }
}
```

This cumulative work, »the conversation« between programmer and computer, is still readable in the code of **split()**. The series of steps given in the book, the trials and errors that made its second chapter, entitled »Planmaker«, (the same ones summarized in Freedman's article in the *Journal Architectura*) (Freedman 1987) appear in code as a set of decisions layered on top of each other, different bits of text that modulate the general behavior of previously encoded assumptions. But even if Freedman treated the plans in the *The Four Books* as merely empirical data for his code, his programming could not bypass the influence of the architectural culture of the second half of the 20th century. Thus, the proportional system suggested by Wittkower, and which presented the villas as equivalents of musical compositions, also regulated the subdivision scheme of *Palladio*, now transformed into an operational procedure rather than a symbol of the humanist spirit of the Renaissance.[6] As a computer science major, Freedman had little stake in the ideological investments architects had made in Palladian architecture and *The Four Books*. Since their identification by Wittkower, the absence or presence of equivalent formal »principles« in buildings separated what Rowe described as utilitarian answers to specific problems from concerns with the universal problem of architecture (Rowe 1956). The iconographic and gestaltist understanding of form behind this idea of »principle«, with its emphasis on human conception and perception, had little place in the computational makeover of Palladio. Hersey, the art history professor, was fully aware of Palladio's role in the discipline and the consequences of downgrading his work to a mere mechanical procedure, of the danger to »have

6 The only procedural description of proportional relations in *The Four Books* that could be transcribed as an algorithm refers to the proportions of the rooms, rather than of the whole plan: »By numbers it will thus be found: The length and breadth of the room in feet being known, we'll find a number that has the same proportion to the breadth as the length has to the number sought. This we find by multiplying the lesser extreme with the greater; because the square root of the number which will proceed from the said multiplication, will be the height we seek. As for example, if the place that we intend to vault be nine foot long, and four wide, the height of the vault will be six foot; and the same proportion that nine has to six, six also has to four, that is the sesquialteral« (Palladio 1738: 28). Palladio discussed the proportions of the rooms at length (proportions that he does not always follow, not even in the edited version of the plans of his buildings in the *Four Books*), but not of a system to order these throughout the whole building. This idea, with the abstraction of walls to lines, tracing general geometrical relations in the plan, are Wittkower's invention and discovery.

devalued the originality and genius of this architecture« and »have reduced Palladio to a game«. But he turned the argument around however, presenting instead the idea of *The Four Books* as almost a work of conceptual art. In this view, *The Four Books* consisted in the description of certain rules describing »procedures for assembling given parts into new wholes«, rules that a reader may want to reuse (Hersey/ Freedman 1992: 1). According to Hersey and Freedman these rules were given by Palladio in an applied from, rather than explicitly stated: hidden precepts for the combination or elements rather than the iconographic figures of Wittkower and Rowe. Writing a program to produce the plans in *The Second Book* was simply to accept Palladio's challenge of discovering the rules behind his systematization. Palladio's buildings became reinterpreted after their digital representation by Hersey and Freedman as the first representatives of a type of game-like architecture identified by the recurrent application of a rule-based principle on a corpus of work. Palladio's example would be followed by Claude-Nicolas Ledoux customs houses, Le Corbusier's villas, Frank Lloyd Wright's prairie houses, or even the prefabricated systems and modular kits of the 20th century. Hersey and Freedman called this type of architecture »paradigmatic«. In it, buildings were produced similarly to how sentences are produced following grammatical rules. *The Four Books*, after the precedent set by Francesco di Giorgio and Sebastiano Serlio, were then a set of specimen plans, doorways, windows, or columns that seem to ask to be »conjugated« according to some rules in order to produce architecture (Hersey/Freedman 1992: 8–9). In the challenge of deciphering Palladio's language game, the computer would be taught to design, or rather speak, Palladian villas. According to Hersey and Freedman, the difference with applying the rules by hand was in the computer's ability »to calculate a huge number of possible permutations and combinations based on Palladio's rules«. The computer would do this instantly and straightforwardly, in contrast to how »an unaided human being« would (Hersey/Freedman 1992: 10).

But to teach the computer to speak »Palladian« it was necessary to establish its grammar by a computer that could only dutifully conjugate it, and a programmer who could only tentatively define it and subjectively compare the results against an existing corpus of plans. Rather than an in-depth analysis of the diagrammatic drawings of *The Four Books*, the process of decoding Palladio's game consisted instead of the progressive adjustment of elimination of error, a definition of Palladio's architecture more by what it isn't than what it is. To find what Palladio did, it was necessary to discover »everything

he would not do«. Lacking any personality of its own or any idea of the programmer's intention, the computer would simply do what it was told, making every rule »explicit and unambiguous« (Hersey/Freedman 1992: 10).

This process of iterative and pragmatic approximation, rather than one based on ideal forms, would be the basis of a new type of historiography that Hersey and Freedman proposed more than 30 years ago. A historiography consisting of writing software, and which would remove »architectural connoisseurship from the realm of instinct and sets it within that of the verifiable«, where articulating the immanent rules of architecture would have the advantage to »etch out, with hitherto unexperienced clarity, the procedures and habits that distinguish this great architect from all others« (Hersey/Freedman 1992: 12).

Machine Psychologies

Incidentally, the verifiable representation of what was only the realm of the instinct was one of the ideological foundations of programming. The invention of programming languages during the 1950s was closely linked to the propositions of cognitive psychology, which, during the same period begun explaining the internal mechanisms of thought, including instinct, as computations. Palladio, the software, can be seen then as the recasting of architectural theorizations influenced by the premises of gestalt psychology – the immediacy of visual perception, the subsumption of the parts to an organizing whole – under the logocentric, fragmented, and procedural logic of the computer. This psychological dimension of programming is perhaps best summarized not in works of cognitive psychology, but in the foreword to *Structure and Interpretation of Computer Programs*, the textbook for the introductory course to programming at the Massachusetts Institute of Technology (MIT), where Alan J. Perlis wrote how »Every computer program is a model, hatched in the mind, of a real or mental process« (Abelson/Sussman 1983). This statement encapsulates the equivalences between thought processes, language, and logic that, as the basis of analytical philosophy, were also the starting point for programming languages, artificial intelligence, and cognitive psychology at the end of the 1950s.

The first step in the method put forward by Hersey and Freedman was to create a language to describe Palladian plans, a notation, using the recursive subdivision process discussed earlier, that could account for the room configurations in the villas in *The Second Book*. This was not a description of

geometry, form, or shape, but a notation of the process for generating it. Being a procedure, rather than a figure, permitted the suggestion of a correspondence with Palladio's own cognitive processes through the equivalences between programs and thoughts underpinning programming. To strengthen the possibility of this equivalence, Freedman and Hersey suggested that Palladio himself would have thought in terms of the recursive »divide and conquer« logic of their program, by identifying a similar subdivision technique in Palladio's description of a method to design entablatures in *The Four Books* (Hersey/Freedman 1992: 46).

The representation of Palladio's hypothetical thought processes as programs followed a pragmatic logic of approximation made up of tentative adjustments, patterned by the »conversation« between Freedman and the computer. Whereas Wittkower's analysis of eleven Palladian villas led to the synthesis of an ideal twelfth villa, an imaginary patter underlying all the others, Hersey's and Freedman's approximations were never conclusive. Despite their unambiguous nature, the programs that would »etch out, with hitherto unexperienced clarity« the procedures and habits of Palladio remained a tentative hypothesis that ruled out their consolidation into a final and idealized schema. Rules of thumb, or *heuristics*, were at the heart of this pragmatic approach. Their use as part of an ad-hoc accumulation of adjustments is clear in the structure of the **split()** function, which, to anyone that can read code, shows the process of embedding loops, conditional statements, and functions like **lookahead()** that are ostensibly solutions to problems that occurred as the program was written, rather than as implementations of an algorithm carefully planned in advance.

In the context of operations research, »heuristic« were proposed by artificial intelligence pioneer and Nobel Prize laureate in economics, Herbert Simon, in the 1950s as way of expanding the field's area of applicability. Whereas previous methods in operations research and management science dealt with well-structured problems, »heuristics« would help to address those tackled with judgment and guess (Simon/Newell 1958). »Heuristics« enabled programs to be written that mimicked thinking habits learned from experience, rather than simply implementing mathematical methods for problem-solving. Programs could become »theories in a completely literal sense, of the corresponding human processes«. These would be verified by comparing the behavior of a computer running the program with the behavior of a human performing the same task (Simon/ Newell, 1962). While »heuristics« were not mentioned anywhere by Freedman and Hersey, their

rationale clearly drove their propositions as an ingrained technique in the practice of programming. It is through the ideas behind »heuristics« that the **split()** function above can then be seen as a theory »of the corresponding human processes« of Palladio, as Simon would put it, or as Hersey and Freedman intended of »the procedures and habits that distinguish this great architect from all others« (Hersey/Freedman 1992: 12).

But »heuristics« and the cognitive motivations behind programming were not the only psychological models involved in the writing of *Palladio*. The very »conversation« between Freedman and the computer had also been theorized under ideas from psychology. Besides BASIC, the expansion of the potential user base of computers from the1960s onward demanded other ways to increase computer literacy. Teaching children how to program and the use of computers in teaching became a worthy research pursuit during the 1960s. Seymour Papert, Co-director of the *AI Lab* at MIT, developed a pedagogical framework that had the idea of »debugging« at its center. Papert reimagined the conversational model that was becoming standard in computer-human interaction through the constructivist psychology of Jean Piaget, with whom he had worked in Geneva. In the conversation between a child and a computer, concepts that were initially intangible and abstract would slowly be given concrete form. Errors in the code written by a child would play an important role in the process: they would force the child to understand the reasons behind them to fix them, and in the process improve the concretization of their knowledge, both in their mind and in the unambiguous notation of a computer program (Papert/Solomon 1972; Papert 1980).

Besides the influence that Papert's ideas had in the development of modern graphic user interfaces at Xerox PARC (Kay 1972), later mass-marketed through the Apple Macintosh that also run Palladio, his Piagetian theorization of »debugging« as a way of constructing knowledge fits quite aptly the process followed by Freedman and Hersey. The idea was to first »let loose« a program using »incipient Palladian rules«, which would come up with plenty of mistakes from which to learn (Hersey/Freedman 1992: 53). The code would then be refined, slowly constructing a model of Palladio through this interaction between programmer and computer. The C code of *Palladio* is a trace and record of this conversation and of the iterative concretization of a hypothesis of Palladio's own working process. What both »heuristics« and a constructivist understanding of »debugging« highlight is the lack of a »principle«, of an ideal. This was substituted instead by the deployment of guesses, tests, and experiments that could, but may not, correspond

to Palladio's design process. In their capacity to endlessly produce plans that look somehow »Palladian«, their rhetoric differs importantly from Wittkower's or Rowe's idealism. »Palladio«, the program, is not a representation of a hidden ideal but a hypothetical and pragmatic encoding of Palladio's thought processes.

Possible Palladian Villas takes over many of Wittkower's premises: the formalist isolation of the abstract form of a building, a process started by Palladio himself in *The Four Books*; the proposal of proportion and ratios as an underlying and unifying logic for the geometry of the plans; the reading of these plans as indices of Palladio's cognitive work, and the possibility to reconstruct, or at least speculate on, the mental processes involved in this work. In their effort both showed a psychological leaning that was not necessarily explicit but part of the respective discourses of formalism in art and of programming and software design. Both were invested in the explanation of the villa's plans in *The Four Books* as the play of forms in Palladio's mind, rather than on the material, technical, economic, and social conditions for their production as buildings and their reproduction in print. Both implied a subject, Palladio, as their source. But the writing systems employed in each case are also fundamentally distinct: one graphical and typographical, where Palladio's figure as an architect is presented as one of the first examples of the very humanistic culture it promoted; the other algebraic and mechanical and where subjectivity had been substituted with an objective rationality. Wittkower's logic was fundamentally visual. Form, broadly understood as »gestalt«, worked as a principle unifying both the intention behind artistic work and its perception. Freedman's and Hersey's was instead sequential and algebraic, based on written symbols and their processing by computers. These two forms of writing produced two distinct architectural subjectivities: the first, one in which the production and experience of form create the respective subjects of the author and of the reader. The second, one where human capacities and actions become disembodied mechanical procedures and fragmented actions that can be indistinctly performed by humans or machines. They thus propose two Palladios: one, the humanist artist, the prototypical Western architect with all its baggage; the other, a name that is a placeholder for a set of procedures, of »inventions«, that are anything but inalienable.

Conclusion

Etymologically, collaboration means to work together; in the writing of the software *Palladio* and of the book *Possible Palladian Villas* that supplemented it, work was distributed between two humans and the computer. As the non-human partner in the collaboration, the computer brought the capacity to work relentlessly, to carry out Freedman's commands unquestioningly and to present back the results of their execution. Their relation was patterned by the explicit and implicit discourses, the technologies, and the practices shaping and regulating their interactions. The relationship between Hersey and Freedman was framed on the other hand by its institutional settings – the difference in roles at a prestigious *Ivy League* university – their generational difference – Freedman a young computer science student, Hersey a humanist scholar born before computers had even been invented – but more importantly by the two literacies represented by each of them: a humanistic and academic, one funded on the reading and understanding of texts and artistic artifacts as human products; and a literacy of algebraic writing where letters, symbols, and signs lost any reference to a human voice. The collaboration comprised then a double translation, each of them carried out mainly by Freedman and Hersey respectively: a first one of the plans for *The Four Books* which, seen as data, became indices of a hidden program to generate them, a set of tacit rules used by Palladio that could be transcribed into the algebras of programming; and a second translation of these technical inscriptions into their meaning to the historical conditions of the Renaissance and the historiographical context of the second half of the 20th century, to which analyses of Palladio had been key. The conclusions reached by this double translation could not escape the discursive practices and ideological formations of its two writing systems and their inherent contradictions. In their common identification of Palladio as the principal source of the plans for *The Second Book*, their contrasting ideas of subjectivity, one human and the other mechanical, reproduced the very conflict between system and authority that the villas in *The Four Books* present to modernist thought.

But the lack of followers of their software-based historiography also points to the distance between these two forms of writing and their conflicting ideologies, and emphasizes the serendipitous circumstances behind the improvable encounter between Freedman and Hersey. More than 30 years later, and in the midst of a renewed interest in AI, we see many of the

themes that played out in the writing of the software and the book. Rather than the playfulness behind their propositions, today the mechanical reproduction of what were believed to be exclusively human performances conjure instead apocalyptic futures without any nuance or critical distance, perhaps because the gap between these two literacies, despite their current inextricable interdependence, is at least as large as it was three decades ago.

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Gio Ponti and the Shape of Collaborations. A Conversation with Salvatore Licitra

Fabio Marino

In this interview Salvatore Licitra, Gio Ponti's grandson and founder of *Gio Ponti Archives*, broadens the discourse on the Milanese architect's interdisciplinary creativity, expressed through impressive collaborations with artists and artisans, reflecting on two enduring duos, along with the associate and wingman engineer Antonio Fornaroli, and the daughter Lisa, right-hand vice director at *Domus*.

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Fabio Marino | As is wellknown, in 1954, Gio Ponti published, with Daria Guarnati, a special issue of the magazine *Aria d'Italia* dedicated to his own work, calling it »Espressione di Gio Ponti«, in which he critically examined his own history as a »continuity of individual expression«. However, we know that the variegated universe of forms developed by Ponti, despite this clear expressive mark, aside from the developments throughout the decades of his work, is populated by an impressive number of figures that accompanied him over that time. Do you think this attitude has deeper origins?

Salvatore Licitra | Gio Ponti had been collaborating with architects who were part of the Novecento group since the 1920s: Giovanni Muzio, Tomaso Buzzi, Mino Fiocchi and Emilio Lancia. He shared a studio with the latter from 1926 to 1933. During those years, they designed houses and furniture inspired by classical forms, publishing them in *Domus*, founded in 1928, and exhibiting them at the *Triennale di Milano*. When the projects started to incorporate rationalist forms, Ponti separated from Lancia. After completing the construction of the Rasini Tower in Milan (1932–1935), in his new studio, Ponti wanted not another architect but two engineers as his partners.

FM | Is this the beginning of the Ponti–Fornaroli–Soncini studio?

SL | Exactly. Ponti was an exuberant character, constantly driven by the passion for making things. On the construction site of the Rasini Tower, he met Eugenio Soncini, who was then a practitioner at Lancia studio. Ponti proposed that he joined him in his new professional venture. This collaboration continued until the end of the war when Soncini decided to open his own studio with his architect brother, Ermenegildo. The encounter with Antonio Fornaroli occurred on the construction site of the Montecatini Palace (1935–1938). Fornaroli stayed and worked with Ponti until the end. As Ponti began to undertake an increasing number of larger architectural projects, such as this one, his approach to design changed. The concept of the architect as a director, overseeing collaborators and assistants, matured. The architect-director needed individuals who could translate his poetic creations.

FM | What type of collaborator was Fornaroli?

SL | In Antonio Fornaroli, Ponti had not only found a partner who was able to understand and execute his architectural projects but was also an ally in the exciting campaign for a cultural and lifestyle renewal that was emerging at that time. For years, they functioned as an inseparable duo. The idea of the partnership was to promote technologies and innovations and make them look good. One played the role of the artist and the other that of the translator of the concrete fact. I have always believed that for Ponti, the architect should not scrupulously follow the technique but should be capable of intercepting new materials and asking whether it is possible to create something that did not yet exist.

FM | What was Fornaroli's significant contribution?

SL | Besides his role as a translator, Fornaroli managed to digest the spectacular aspect of Ponti's work. After the war, the new Ponti–Fornaroli–Rosselli studio, which included his son-in-law, Alberto Rosselli, became a theatrical place. I remember that after completing the construction of the Pirelli skyscraper, undoubtedly a spectacular work, the executives expressed their desire to give Ponti a gift. He asked for three Citroën DS cars for himself and his two partners to stage a theatrical entrance on the day of the inauguration. If I recall correctly, my grandfather and uncle accepted the cars, while Fornaroli declined.

FM | Do you think these were exceptional or recurring events?

SL | I believe they were not so unusual. Another fact comes to my mind involving Bruno Munari. As soon as Ponti's studio on Via Dezza was inaugurated, he asked Munari to design a bike path leading to the drawing table. Instead of designing a bike rack to place at the entrance, Ponti envisioned the bike's arrival as a dramatic entrance itself.

FM | It seems like a theater company?

SL | Ponti was undoubtedly a great director, perhaps not of actors, but certainly of artists and craftsmen.

FM | Who can we start with?

1.
Gio Ponti's Citroën DS in front of the main entrance of the Pirelli Skyscraper, Milan 1958. Courtesy of Gio Ponti Archives-Historical Archive.

SL | Ponti considered art as a strength. Architecture has to be inhabited by art. People have to live with art. He involved several artists in designing his houses. Ponti admired Lucio Fontana, possibly the artist he would have most liked to work with. Ponti referred to Fontana's »Concetti Spaziali« as lightning bolts. While Fontana wanted to defend the idea of art invading space, Ponti saw the spectacle of the gesture, which might have been misleading. Ponti also made no great distinction between craftsmen and artists.

FM | The elective affinity between Ponti and Fausto Melotti is exemplary, I think.

SL | Speaking of Melotti, I remember some events that occurred in his studio on Via Leopardi, where my mother often took me, sometimes leaving me for entire afternoons. Melotti let me scribble with crayons on sheets that he preserved. Years later, he returned them to me, and you could see that he had added his touch. I mention this because it makes me reflect on the ability of certain artists to intervene in the work of other artists, exactly what Ponti and Melotti did for many years between themselves.

FM | The same goes for your mother and your grandfather?

SL | Lisa Ponti began collaborating with her father from a young age, starting with magazines and her debut in Stile. Her father always had great respect for his daughter as a writer and poet, without imposing a direction on her. Lisa was literary and naturally gifted with language. Ponti had a more declamatory, 19th-century rhythm, while Lisa was always closer to the refinement of language. She could create electric energy between one word and the next.

FM | So once they returned to the *Domus* editorial team, the collaboration was on equal terms?

SL | Absolutely. Ponti had no prejudices of any kind, and one could do as they pleased. He let someone do something because he respected the person. This attitude was also pursued by Lisa. It's a spirit that also animated *Domus* under her leadership. So Lisa wanted Ettore Sottsass

as an editor for the magazine. It was a free and occasional collaboration, depending on the circumstances, but always based on admiration and respect. This created energy. Ponti and my mother didn't create a school. However, they left people free to contribute as they wanted.

FM | So the secret lies in the spirit of collaboration?

SL | I believe that the secret of *Domus*, or other episodes, lies in the complete freedom, on the free communication between special individuals.

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NARRATIVES

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Performing the Collaboration. How to Think from the Margins of Authority?

Debasish Borah

In this series of photographs and collages, I reflect on collaboration from a conceptual point of view: post-colonial living is collaborative; post-colonial bodies share a gray area between the local and the institutional, and they negotiate this gray area by collaborating with both, sometimes accepting, sometimes refusing. In the photographs and collages, I look at collaboration between social institutions and government, while considering the former as contributor of placemaking instead of resistance. The protagonist of this series is Pulin Hazarika, a resident of Salmora village, Majuli island, in Assam, India. A carpenter and a farmer, I met him on one of my field trips and he is now a good friend. He is not only the primary source, but also the creator of the archival photographs that he generously provided me. Thus, taking a position of epistemic disobedience towards treating his work solely as data and mine as critical thinking, this work is an equal collaboration between me and Pulin. For this series, I use Pulin's personal photographs to create collages with the photographs I took in Majuli. Pulin and the whole village of Salmora in Majuli comes together for the annual prayers in the local »namghor« (Hindu monastery community prayer hall). By late afternoon, Pulin and hundreds of villagers walk down to the shore of the mighty Brahmaputra River to collectively pray to the river and offer »him« (Brahmaputra is considered a male river) ritual objects to ask for his kindness during the upcoming flooding season. As Pulin prays to the river, knee-deep inside Brahmaputra, the architects, urban planners, civil engineers and technocrats of the *Brahmaputra Board* (government department responsible for flood control) are standing close to the crowd. Armed with official documents, drawings and total stations, the representatives of the institution for flood control are facing their competitor: the divine nature of the river itself.

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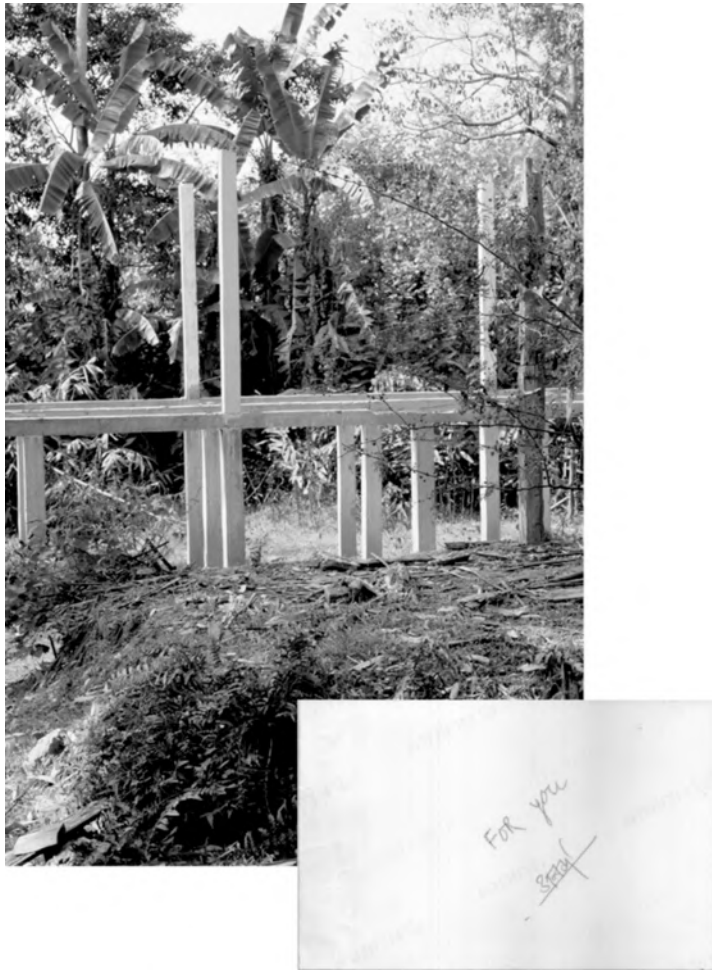
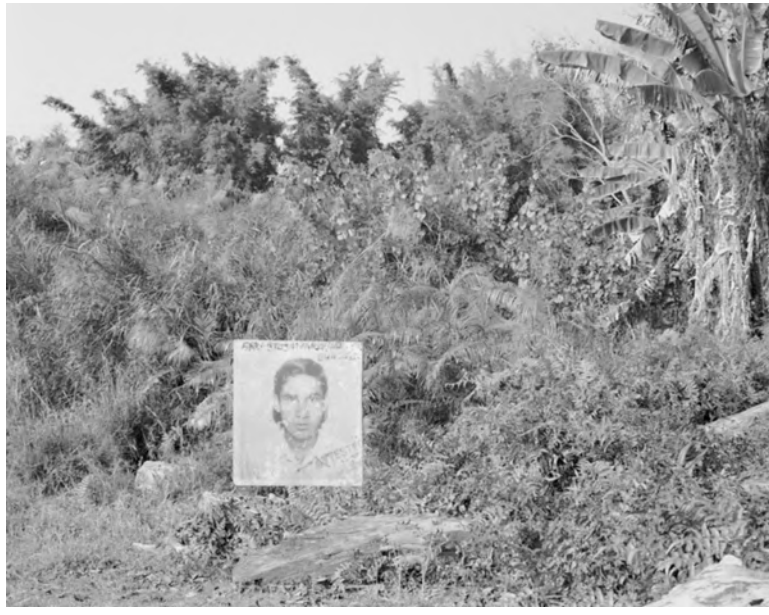
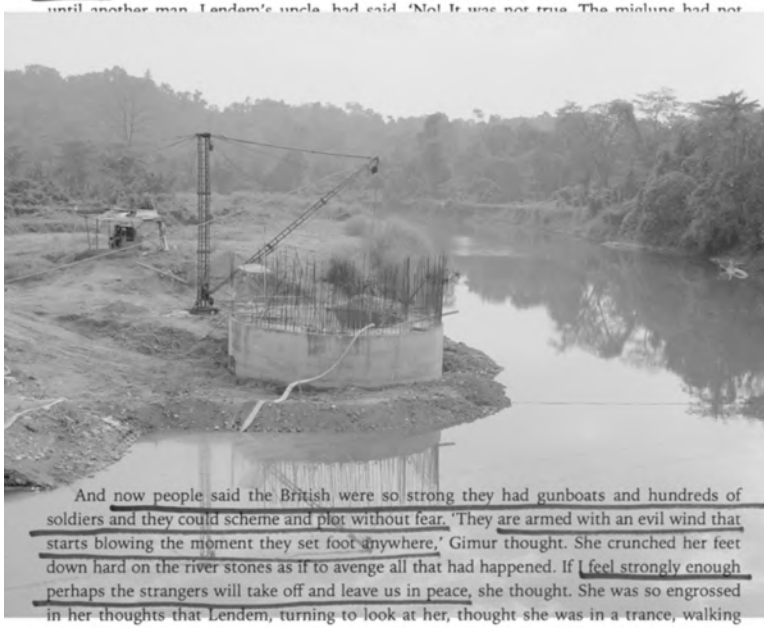

For you

Their final defect is a contempt for the customs of other nations, and the preference they give to their own; although theirs, in fact, [redacted]. I had a striking instance of this prejudice in the conduct of my fellow-passengers on board ship. Some of these, who were otherwise respectable characters, ridiculed the idea of my wearing trowsers, and a night-dress, when I went to bed; and contended [redacted] going to bed nearly naked. I replied, that I slept very comfortably; that mine was certainly the most decent mode of dress in the event of any sudden accident happening, I could run on deck instantly, and, if requisite, jump into the boat in a minute; whilst they must either lose some time in dressing, or come out of their cabins in a very immodest manner. In answer to this, they said, such sudden accidents seldom occurred, but that if it did happen, they would not hesitate to come on deck in their shirts only. This I give merely as a specimen of their obstinacy, and prejudice in favour of their own customs.

[redacted] I was frequently attacked on the apparent unreasonableness and childishness of some of the Mohammedan customs; but as, from my knowledge of the [redacted] character, I was convinced it would be folly to argue the point philosophically with them, I contended myself with parrying the subject. Thus, when they attempted to turn into ridicule the ceremonies used by the pilgrims on their arrival at Mecca, I asked them, why they supposed the ceremony of [redacted], by a clergyman, requisite for the salvation of a child, who could not possibly be sensible what he was about. When they reproached us for eating with our hands; I replied, 'There is by



Gimur was six years old when her father who had been fit and healthy had suddenly collapsed on the village road and died. 'It is the work of the white devils,' someone had cried. Her father, they said, had fought a war somewhere, the British had forced him to help them, and now they were getting rid of him. 'Wherever the migluns go they bring death and outrage!' Other men had taken up the cry and the village was seething with shock and rage until another man, Lendem's uncle, had said, 'No! It was not true. The migluns had not



And now people said the British were so strong they had gunboats and hundreds of soldiers and they could scheme and plot without fear. 'They are armed with an evil wind that starts blowing the moment they set foot anywhere,' Gimur thought. She crunched her feet down hard on the river stones as if to avenge all that had happened. If I feel strongly enough perhaps the strangers will take off and leave us in peace, she thought. She was so engrossed in her thoughts that Lendem, turning to look at her, thought she was in a trance, walking without looking where she was going. The sun was directly overhead and the heat and glare of the white sand along the river was becoming unbearable.

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Roof Extensions. Humans Wear Hats

Hannah Rochelt

Hats become a metaphor for collaborations. The impulse is given by a painting. As a reference, it provides information about existing and additional collaborations. Based on an architectural design *Roof Extensions in Munich's Southern Station* district the article makes design through thinking and different forms of collaboration accessible.

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1.
Karl Stankiewitz: Central Station at the Time of Travel *in 1904. The painting was found at the beginning of the project.*

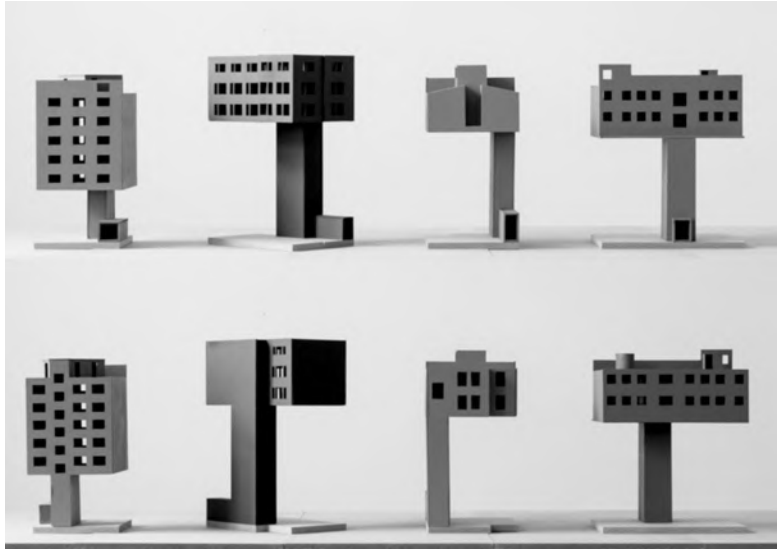
Humans Wear Hats

The painting *Central Station at the Time of Travel in 1904* (fig. 1) shows a scene: people; suitcases and boxes; backpacks and bags; a carriage; umbrellas and walking sticks; speed; direction; movement and gestures. Overloaded by impressions, the viewer's gaze is only gradually directed to what is still being depicted, but what we, as viewers, have already subconsciously taken in and classified. Hats, helmets, caps. Every person is represented with headgear. This allows us to read:

Humans wear hats.
Hats tell something.
Hats are part of human communication.
Hats are character.
Hats show status.
Hats have a function.
Hats are an addition.
Hats are on top.
Hats are combined.
Hats can contrast, complement, or continue.
All in all, hats show diversity, a next-to-one-another, a both-and.

Hats are a code. How do we start the contemplation and examination of a concrete subject? How do we encounter issues in the architectural process and how do we develop them? What helps us understand complexity? How do we classify findings and how do we use them? And what is strong enough to give us information and advice again and again in the process of designing?

The observation of a neighborhood and its people. Reading the characteristics, the life in this place, a neighborhood that is close to the Central Station and thus has some peculiarities in contrast to other inner-city areas. A neighborhood where people live, where people work and that many people walk and drive through. Where tourists pause, pass, or stay overnight. And the question of gentrification. What do architects have to do with it? And what about those who come to it, those who move there?



2.
The hand-cut colored paper shows the diversity of the existing facades, scale 1:100, 2017. Photographer: Simon Burko.

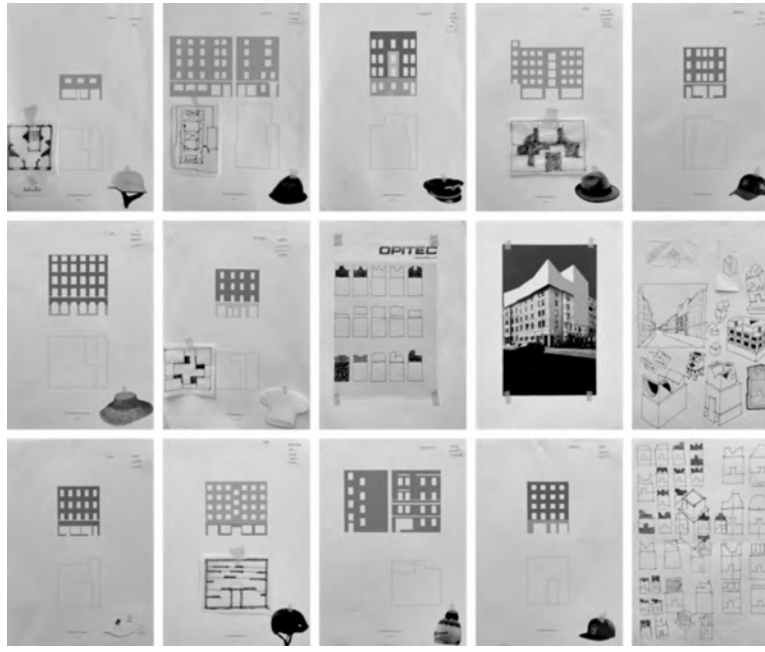
3.
Blue, green, red and brown additions, each standing on the existing and extended staircase, models, scale 1:50, 2017. Photographer: Simon Burko.

Collaborations

Hats become a metaphor for collaborations. And these become a method enabling thinking through various forms of collaborations in the design process: in the analysis, in the development of an independent attitude toward the subject matter and a resulting specific approach, as well as in the generation of ideas and in the concrete transfer into a design.

Collaboration 0. As headgear, hats always enter into a collaboration with the people who wear them and what they wear. They are worn for professional, religious, or functional reasons because of a particular occasion or out of passion. A headgear can change an outfit in a second. We can communicate something to our environment without talking about it. The choice of headgear and the way it is combined can represent a character or be read as such. All in all, these headgears again enter into a collaboration with those of others.

Collaboration 1. When you enter the southern station district in Munich, a new world opens up, »multicultural like hardly any other neighborhood in German cities, Kreuzberg included« (Stankiewitz 2015: 12, author's translation). Speeds, languages, and smells mix, plus the noise of cars. Traffic jams on the street, rushed on the sidewalks. In between, outdoor restaurant seating, displays of vegetables, and now and then a workshop. Neon signs, betting shops, night bars, hotel entrances. Above them residential buildings, office buildings, or hotels. Perforated facades, plastered, colorful (fig. 2). Now and then higher windows, other story heights, other times.
The reading of this neighborhood as an existing collaboration of buildings. A heterogeneous system that works with, perhaps because of, some inconveniences. Which has a character. And the decision not to change that.



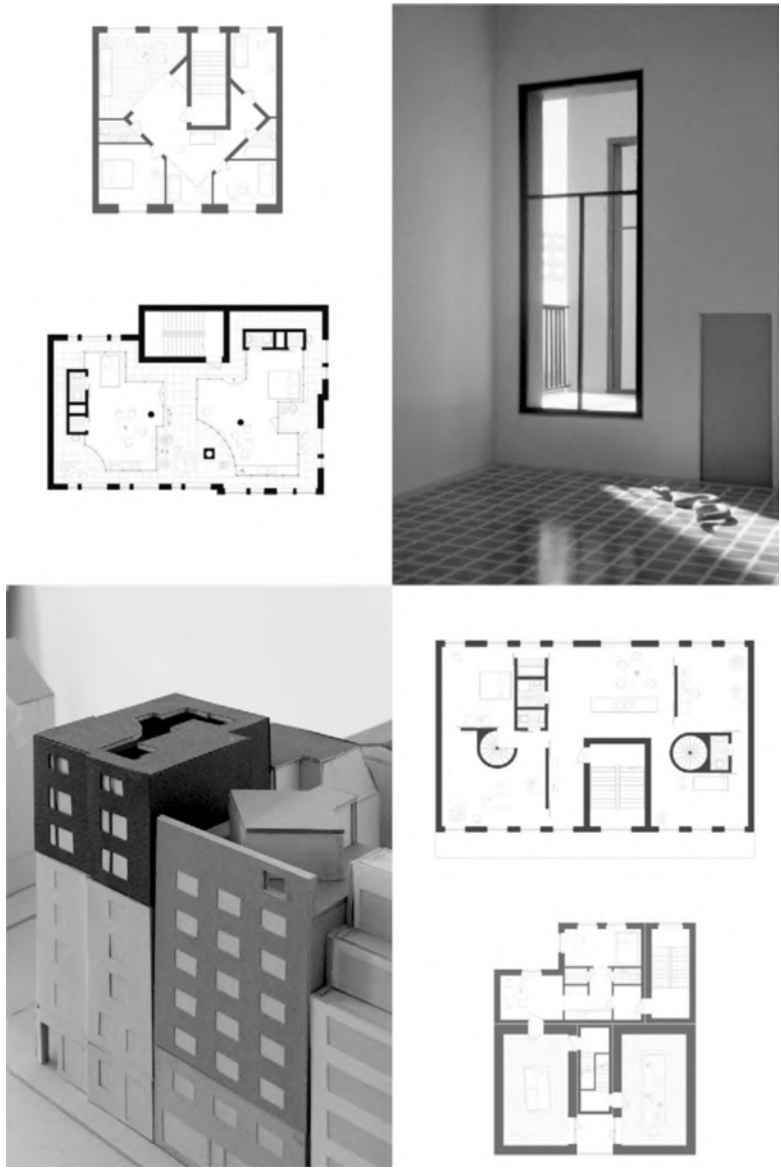
4.
Hannah Rochelt: Bringing together of facades, floorplans and printed hats, size 210 x 297 mm, 2017.

Collaboration 2. Humans. With and without hats. Individual, variety, diversity. With each other and next to each other. International. At the same time and parallel. The reading of people as an existing collaboration of different characters. A heterogeneous diversity. And the decision to definitely want to keep it. To strengthen and to continue.

Collaboration 3. Seeing, accepting, and taking in existing factors as the basis for further thinking. The further thinking of a neighborhood, of the city, of buildings, of architecture. Of influx without displacement.
The reading of existing combinations and their qualities and building on them, continuing to build. The decision to complement, continue to combine.

Collaboration 4 and 5. For whom do I design? *Roof extensions in Munich's southern station district.* Who else could live there? Which buildings will be added? Can buildings wear hats? How can a hat symbolize a possible resident? Which hat goes with which building (fig. 3, fig. 4)? Does this matter? The conclusion is character, individuality, diversity. Old, young, alone, together. How are the extensions envisaged? How is an addition designed? Does it fit in, continue, contrast? Inside, and externally. How many floors will be added? And the facades? What do they say to the city? What rules for design can be established?

The decision to transfer the diversity into the floor plans of the respective additions and to consider them in the sum of all. To think of the additions as a complement. To leave the existing buildings as they are. To continue the staircases in their position (fig. 5). Plastered facades. They can be continued, complemented, contrasted, or completed. All in all, diverse.



5.
The floorplans contrast sizes and values of rooms or work with elements, in function, form and specific positions. And they always keep the connection between existing and new, 2017. Photographers: Simon Burko and Hannah Rochelt.

Profit

The presented work stems from my independent master's thesis, undertaken in 2017 at the *Chair of Architectural Design and Conception* at the *Technical University of Munich* and was supervised by Professor Uta Graff. To understand the existing complexity, to consider it as a collaborative strength and then to expand upon it, becomes the design method in which fractures add value, benefiting in contrast to each other.

> »Ambiguity and tension are everywhere in an architecture of complexity and contradiction. […] These oscillating relation-ships, complex and contradictory, are the source of the ambiguity and tension characteristic to the medium of architecture« (Venturi 1992: 20).

The extensions are combined as a conglomerate of different characters, so that the coexistence of individual lives is designed. A both-and. An offer to think and conceive anew. To design based on a possible story, that of a collaboration, and to anchor it in a building. Hats are collaborations.

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Body, Space, Action. Performances as a Collaborative Tool

João Quintela, Tim Simon-Meyer

»Architecture is a verb as its true essence is always an invitation to action«. (Pallasmaa 2017)

Juhani Pallasmaa reminds us that architecture is first and foremost a sensual discipline that we, as humans, experience by relating to it with our bodies. Understanding architecture as a verb means that it implies action. Accordingly, the focus is not on the appearance of architecture itself, but on the impressions this appearance evokes, which in turn can lead to bodily actions. In our understanding, these are not actions that follow a functional intention, but are intended by the sensory perception of the architecture and characterized by a dialogue between architecture and human (Dewey 2005).

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1.
Atelier JQTS: *Kairos Pavilion, 2012. Photographer: Diana Quintela.*

We had the possibility to observe such dialogues as a number of our small and self-built projects were performed by artists. Some of the performances were planned, others weren't. None of these projects was designed as a stage from the outset. They were created for temporary uses within cultural contexts and mostly defined by a cooperative process with students.

The Kairos Pavilion (fig. 1) was initiated and mainly built by ourselves as a public for social and cultural exchange in Lisbon. The performance by the Spanish collective *Tostada es Pan* resulted from an open call for artistic intervention and was created as a site-specific play. In the case of the Povera Pavilion (see fig. 2) a performance by the Spanish artist, Luis Amália was planned for the *Almeida Theatre Festival* in an improvised manner to and with the architecture. Rather than a stage we, together with students from Lisbon and Évora, decided to build a multifunctional space.

The Gallery Pavilion (fig. 3) was realized in a workshop with local students as a spatial intervention for the art festival *Walk and Talk* in the Azores. The idea for a performance by the artists Vania Rorisco and Jochen Arbeit came to them while visiting the pavilion. The Alberto Pavilion (fig. 4) was the result of a two-week summerschool with students from Lisbon and Hamburg. As a kind of communal center for the festival *Materiais Diversos* in Minde, Portugal, it created space for various needs such as selling tickets, hosting discussions, or presenting books. The performance by Miguel Condeça, Catarina Monteiro and Diana Margarida was developed on the day itself as part of an informal opening.

The images show one specific moment of each performance that focuses on the relationship between the body of the artists and the body of the architecture. We can see naked and flaccid bodies lying on the concrete elements of the Kairos Pavilion, the pushing up of the artist's body next to the wooden elements of the Povera Pavilion, the manual cutting-out of textiles through deliberate actions in the Gallery Pavilion, or the vertical stretching of the entire body along the steel pillars of the Alberto Pavilion.

These observations of actions reveal relations between the physicality of the architecture and the physicality of the artists. We believe that these specific interactions can shed light on the experiential qualities inherent in these projects that have to do with a dialogue between the human and the architectural body.

2.
Atelier JQTS *with students of* University of Évora *and* Lisbon School of Architecture: *Povera Pavilion, 2015. Photographer: Diana Quintela.*

> »But others receive the impression of a heavy burden weighing down the column, just as it would a human being.« (Rasmussen 1980: 15, author's translation)

Steen Eiler Rasmussen refers here to the embodied knowledge that every human being collects over the course of his or her life through physical experiences. From that perspective, it can be expected that other visitors and users of architecture can also physically perceive and partly empathize with the vertical filigree of the Alberto Pavilion or the massive heaviness of the Kairos Pavilion.

And even if corresponding bodily actions like the ones of the performing artists are not taking place, we can assume that the architectural expression is stimulating bodily emotions. In these moments the perception of the architecture goes beyond a visual and functional one and can become a physical and sensual experience.

By looking retrospectively at the images of the performances we discovered a potential to gain insight into these moments of sensual experience and furthermore into architectural qualities. The performers seem to point out where the architecture expresses »invitations to action«.

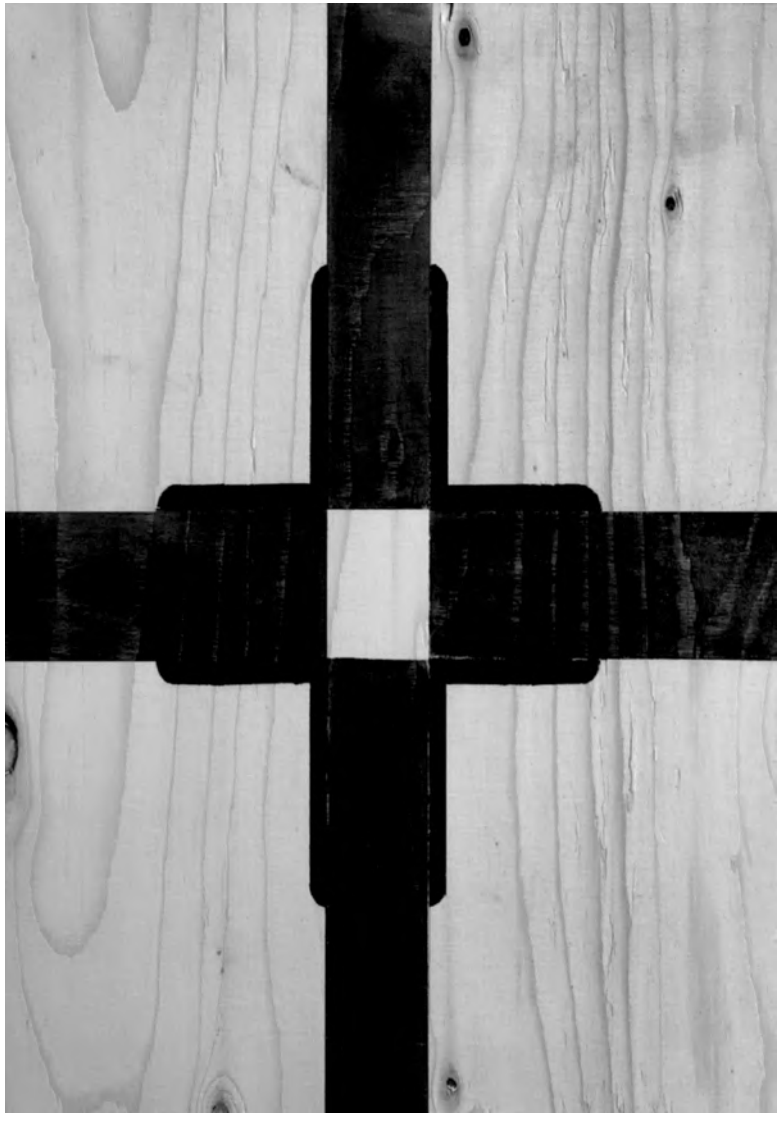
For instance the direct interaction with the filigree pillars in the Alberto pavilion shows a physical gesture of stiffness, verticality, solidity. The body of the artist traces the form of the pillar and presses against it. It seems that the body itself wants to become a pillar. In this sense we can assume that the filigree pillars provoke a dialogue with the human body.

For instance, the direct interaction with the filigree pillars in the Alberto Pavilion shows a physical gesture of stiffness, verticality, and solidity. The body of the artist traces the form of the pillar and presses against it. It seems that the body itself wants to become a pillar. In this sense we can assume that the filigree pillars provoke a dialogue with the human body.

The Cutting Out in the Gallery Pavilion is a physical reaction to the material expression of the architecture. More than interacting with the architecture, the artist is willed to change certain elements of it. In particular, a part of the architecture is transformed that doesn't have structural necessity but only works spatially. The artist's action expresses an understanding of structural layers and a sensibility to its meanings – consciously or unconsciously. This can be brought back to a clear differentiation between primary and secondary structure that allows the inhabitant of the space to comprehend its structural logics.

3.
Atelier JQTS *with local students: Gallery Pavilion, 2017. Photographer: Filipa Couto.*

4.
Atelier JQTS *with students of* HafenCity University of Hamburg *and* Autonomous University of Lisbon*: Alberto Pavilion, 2019. Photographer: João Barata.*



5.
Atelier JQTS: *Tectonic Drawing of Alberto Pavilion, 2020.*

The resting bodies of the performers in the Kairos Pavilion show a great correspondence with proportional and expressive characteristics of the concrete elements. In the same way, these elements are kept in place just because of their own weight, the bodies of the performers surrender gravity. The raw and »naked« materiality echoes in the naked bodies. Characteristics that can be experienced because of expressing materiality and emphasizing the bearing of the single elements by highlighting the horizontal joints.

As a reaction to the architecture of the Povera Pavilion, the artist enters into a gesture of balancing his own body on the neck and pushing up his feet to the sky. The form of this gesture corresponds to the spread of the structure on the bottom and its narrowing on the top. In the same way the artist is pushing the weight of his body against forces of gravity, the structure develops its specific form without a need to carry a load except its own.

These possible interpretations represent the attempt to draw conclusions for architectural qualities from the observation of bodily interactions with it. Through their movement the performers seem to reveal a poetry that goes beyond functional uses of architecture but ensures a sensual and emotional reaction to it. To gain insights into architectural qualities we interpret these actions and classify architectural characteristics that could trigger them.

Just as we use the medium of analog drawing to retrospectively capture the essential architectural and, above all, tectonic moments of architecture (fig. 5), performance can be a tool to reveal experiential qualities. Whereas in the case of drawing, we as designers look directly at our own work, in the case of performance we look at the human being who enters into a dialog with our work in a physically active way. In this sense, the performances represent part of a collaborative process of reflection that is characterized by different actors and actions and seeks to uncover architectural characteristics that can make an »invitation to action«.

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Broken Fire. Journey as a Tool

Oliviero Vitali, Rocco Vitali

Broken Fire is the archive of a journey and an opportunity to reflect on ways of working, living, and referring to daily events and the design choreographic process. It is the story of a project that finds its own narrative thanks to the uncommon but philological use of a unique palette of working tools that were applied to move freely around the project. Moreover, it is a moment of discovery and a throwback to ancient methods of craftsmanship where the architect and the builder could be the same author.

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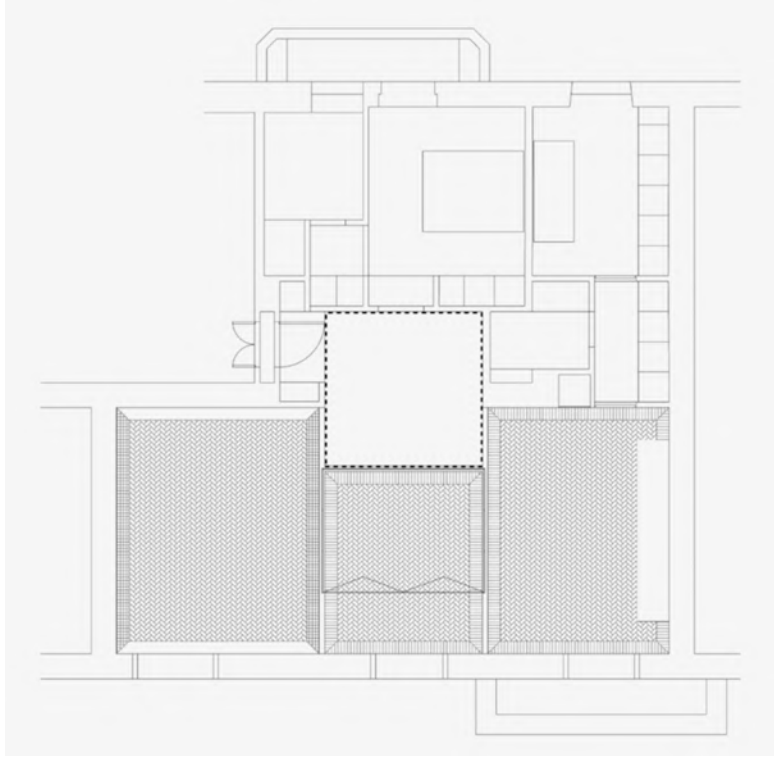
From the House to the City

The project begins in the summer of 2020. Marta is the client, a photographer who owns a flat in Milan and is about to renovate it. The layout of the apartment is simple: Many rooms gravitate around a central atrium (fig. 1). This space doesn't have a specific function even though it is the only one that must be crossed in order to enter the other rooms. The atrium floor is indeed a witness of crossings and paths.



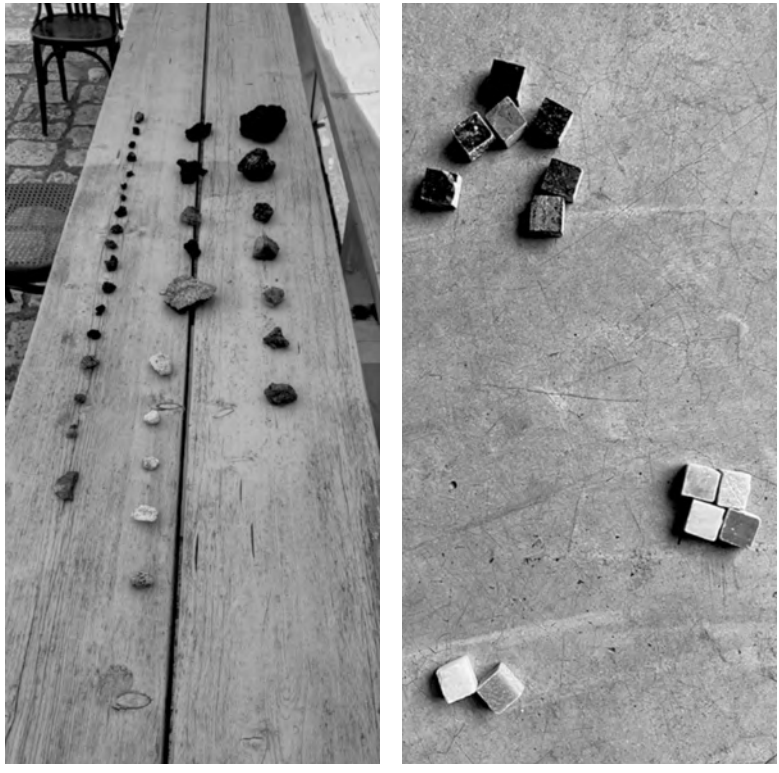
1.
Vitali Studio: *Apartment's plan*, 2020.

Client. Tools. Making

Marta invites us to design a new mosaic marble floor for the entrance hall without any other input. We carefully observe and map the house. Ready to go back to the studio we go downstairs, along the road to the street crossing where we locked our bicycles. In front of the lamp post the name of the street is displayed: Via Lipari. Via Lipari reveals itself as a link between the street the project is on and the volcanic island, a secret doorway that allows two geographies to occur at the same time, in the same space. On one hand this should not impact the project. On the other hand, it becomes fundamental as it leads to endless ramifications to follow and detect.

2.
Solid lava, 2020. Photographer: Oliviero Vitali.

A few days later we travel to the volcano, to climb, draw, photograph and research (fig. 2). At the feet of the the mountain the former eruptions are layered on top of each other, like an organic carpet that shapes the shoulders of the hills and gently fade into the forest through the valley. The solid stream of lava that runs from the pick of the volcano to the woods is the atrium of the landscape (fig. 3).



3.
Volcanic stones archive and mosaic tiles, 2020. Photographer: Oliviero Vitali.

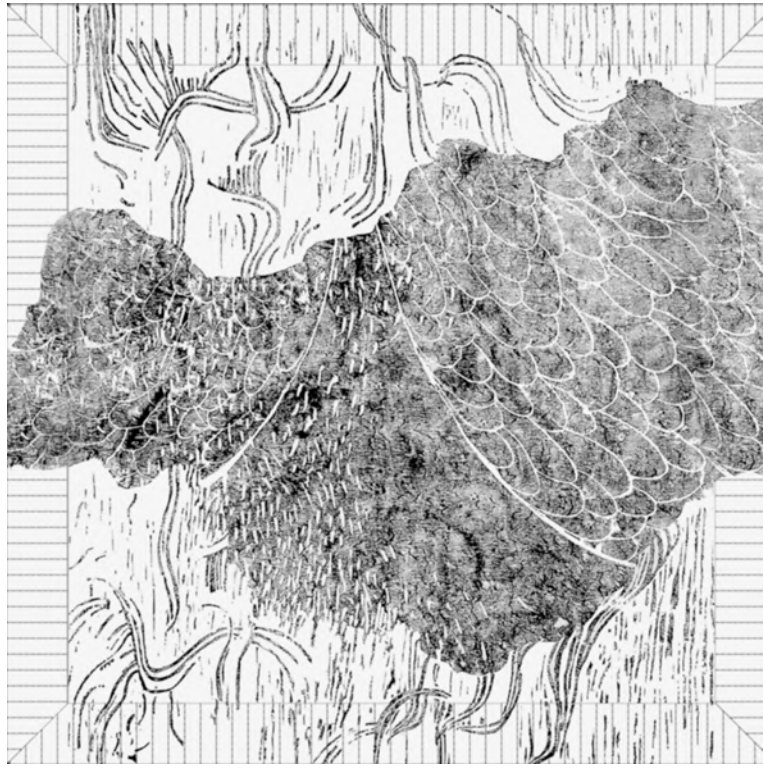
Catalog and Palette

Every stone of the magmatic stream is a storytelling of eruptions and stained by minerals and chemical substances that affected them during the bursts; the yellow sulphur rocks, the light blue and green patina of the gasses contained in the main crater and especially the abundant pyroclasts that shade from the very dark grey to the ivory black are molding the landscape with an elegant rhythm. All the rocks are cataloged and archived in lines of colors, shapes, and dimensions while several hand drawings of lava flows and eruptions are fixed on the wall. All the ingredients are surprisingly there, due to the effortless richness of the journey (fig. 4).

4.
Vitali Studio: *Woodcut plate, 2020.*

Xylography

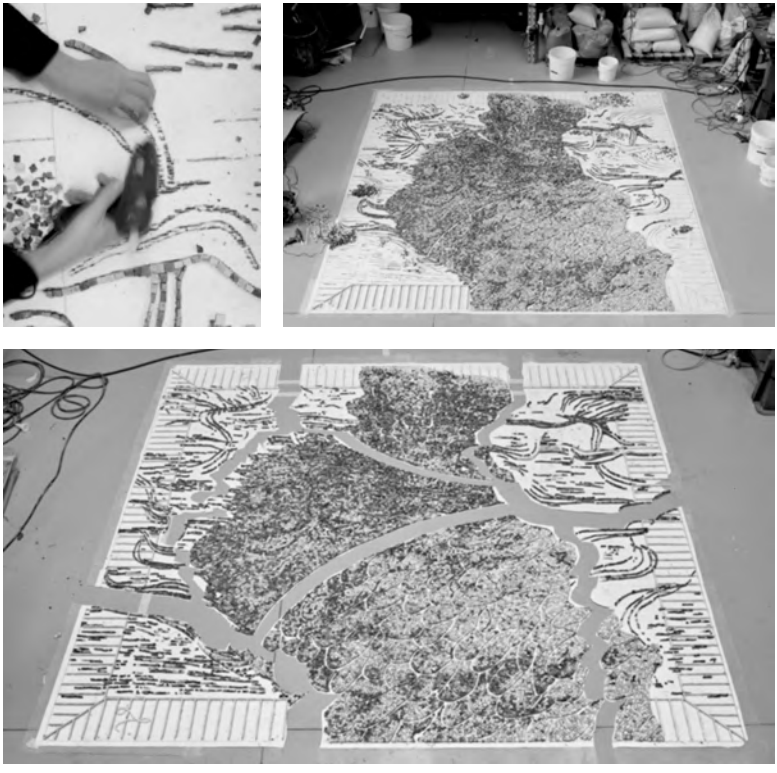
How is it then possible to bring the structure of a landscape into an architectural essence? No didactic analogy is allowed but only the transformation of its exterior aspect (its dress) while the meaning, the spirit, and the body are preserved. Tools available: hand drawing. Among various drawings one is selected and carved onto a wooden plate giving birth to a matrix that can be used to print infinte times. This technique is called *Xylography* or more intuitively, woodcut (fig. 5).



5.
Vitali Studio: *Woodcut print, 2020.*

Making or Equipe (Ode to the Team)

The wooden print is chosen, it gets scaled to the exact dimensions of the apartment hall and a fiberglass net, on which the tiles will be glued, is laid over it. In balance with the color of the volcanic rocks, mosaic tiles are brought into the laboratory in 13 different »species« of marble (fig. 4).
The discrepancy between the print's original colors and the color of the tiles allows mistakes of every variety to happen (fig. 6). The body of the subject is transformed once again making the project alive, made, and experienced, not delivered. No computer is involved.



6.
Assembly Process, 2021. Photographer: Daniele Colombo.

Mauro, an experienced flooring and paving artisan, let us assemble the mosaic in his warehouse in the suburbs of Milan where he lives with his little son Ettore in the middle of tools, resins, glues, toys, machines, and racing car magazines. The mosaic's assembly takes approximately 15 days before it is moved to Marta's apartment. The heavy floor is cut into seven sections in order to be transported to the house (fig. 7). Once there, it gets reassembled in the original layout and the last amendments are made (fig. 8).

7.
Process, 2021. Photographer: Daniele Colombo.

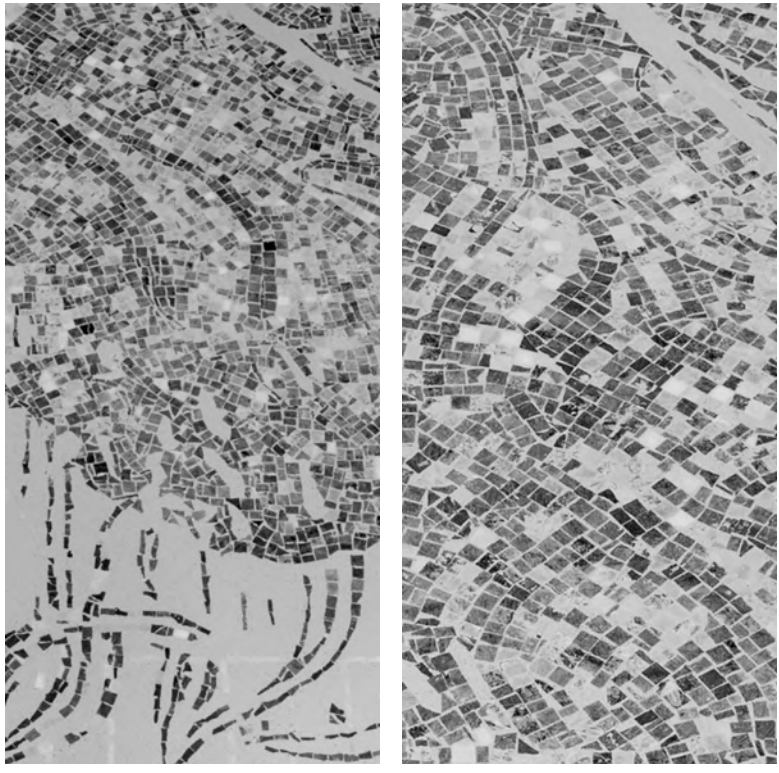
Finally the floor is drowned under a pound of light gray coating resin that completely covers the entire mosaic until it disappears behind the gray. Once dried, Mauro sands and polishes the surface, letting the bright constellation of dark green, turquoise, and shiny black come alive, and is now merged and knitted with the resin in a symbiotic trade (fig. 9).When we first started the project we discovered that so many people wanted to voluntarily participate in building something that is a socially valuable moment of sharing, learning, and exchange.

8.
Atrium, 2021. Photographer: Daniele Colombo.

The construction site resulted in a kind of party where everyone was glueing tiles under Mauro's expert direction. Little by little the roles merged until the entire group became a single unity representing the client, the architect, the builder, the advisor, the accountant, and the user. The hierarchical interactions were abandoned and replaced by a harmonic yet improvised orchestra.

Epilogue

Bashfully, we walk on the new marble carpet. As the naked foot touches the cold floor, the volcano takes place in our bodies as an image, a material, and a friend. In the blink of an eye we are all in Milan, we are all in Lipari.



9.
Detail of the mosaic tiles, 2021. Photographer: Daniele Colombo.

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is a visual artist and curator working with mediums of photography, video, performance, and publishing. His research interest lies in understanding the leftovers of European imperial modernity in frontiers of the Indian state. In his practice, he looks at the overlaps of cultural past and political modernity in postcolonial lived experiences. He works with mundane micro-histories, found objects, and self-made photography and video. Currently he

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practice studio komaba which takes part in explorative architectural competitions and project realizations in Switzerland and Germany.

Dennis Häusler

is an Architect, Research Associate and Lecturer at ETH Zurich where he investigates the perception and understanding of urban spaces and landscapes at the Institute for Landscape and Urban Studies. He is a co-founder of the Zurich-based architectural practice studio komaba and a partner at the experimental digital modeling firm scanvision.

Marco Kellhammer

is a research associate and PhD candidate at the Professorship of Urban Design at Technical University of Munich and holds a Master of Science in Industrial Design. His work focuses on a systemic design approach in sustainable and social innovation. Since late 2021, Marco is a co-project lead within the Munich Cluster for the future of mobility in metropolitan regions –MCube. For and on behalf of the Institute of Design Research Vienna, Marco curated and edited Tools for the Design Revolution (2012–2014) with Dr. habil. Harald Gründl and Christina Nägele. Alongside, he dedicates part of his time in non-profit educational projects and founded the association überkochen e.V. together with Constanze Buckenlei (2018).

Maria Francesca Lui

graduated in Building Engineering–Architecture in Padua in 2019 following a period of study and research spent in Panjim, India. In 2020 she was selected as a fellow of G124, the working group of architect and Senator Renzo Piano that deals with the regeneration of Italian suburbs. On this occasion she follows the project for the new Parco dei Salici, a public park in Padua. She is currently a doctoral student at the University of Padua (ICAR/14) and in 2022 spent a research and teaching assistantship at the Escuela de Arquitectura in Toledo (Universidad Castilla-La Mancha). In her research project »Form follows climate: bioclimatic devices for responsible architecture« she investigates the relationship between climate and architecture.

Federico Marcolini (Dr.)

works as a research fellow at Politecnico di Milano University in Milan. He did his Ph.D. in architecture design and theory at Politecnico di Milano. From 2016 he is collaborating within several design studio courses at Politecnico di Milano–Polo Territoriale di Mantova. In 2020 he worked as visiting professor at the University of Applied Science of Kaiserslautern teaching Ideal Stadt Theorie. His research focuses on architecture design in historical context, postwar architecture and railway architecture heritage.

Fabio Marino (Dr.)

currently takes part to teaching and research activities at Department of Architecture, Built Environment and construction engineering of Polytechnic of Milan as Postdoctoral Research Fellow. He received the Master of Science in Architecture from Polytechnic of Milan (2014), and the PhD in Architecture, History and Project from Polytechnic of Turin (2019). His interests of research deal with contemporary architecture focusing on both its connection to Italian Design, and cultural and professional migrations between Italy and the American continent during the Twentieth century.

Asma Mehan (Dr.)

is a researcher, educator, and architect working at the intersection of architectural humanities and critical urban studies. She is currently an Assistant Professor at Texas Tech University College of Architecture. She is the author of the books »Tehran: from Sacred to Radical« (London: Routledge, 2022) and »Kuala Lumpur: Community, Infrastructure, and Urban Inclusivity« (London: Routledge, 2020). Dr. Mehan is recently appointed as the Coordination Team (CT) leader of the Young Academics network of the Association of European Schools of Planning (AESOP YA). She achieved her Ph.D. in the »Architecture, History, and Project« program, in October 2017, from the Politecnico di Torino (Italy). After finishing her Ph.D., she worked as a senior researcher at various European universities such as the University of Porto, Leiden University, TU Delft, Politecnico di Torino and Berlin ZK/U Center for Art and Urbanistics. She has taught at TU Delft and Politecnico di Torino. She has been invited as a guest lecturer at various institutions, including TU Munich, ZK/U Berlin Center for Art and Urbanistics, University of Porto, and Deakin University, Melbourne (Australia). She completed visiting research stays in Australia (Deakin University, Melbourne, 2016–2017) and at EPFL

University, Lausanne, Switzerland (2017), and was a researcher in resident at the ZK/U Zentrum für Kunst und Urbanistik, Berlin, 2019.

Pablo Miranda Carranza (Dr.)

is a Senior Lecturer at Lund University's Department of Architecture and the Built Environment. His research looks at the discursive dimensions of computer programs and algorithms in architecture. In addition to his academic writing, his work includes also creating interactive software and installations. Currently, he is conducting research on the history of software in urban planning, supported by a research grant from VR, the Swedish Research Council. Miranda Carranza completed his PhD at KTH in Stockholm in 2018. During 2022 he worked as a postdoctoral fellow at MIT, examining how the introduction of computers challenged ideas of disciplinarity central to the architecture of the second half of the 20th century. Specifically, the project examined various attempts, starting in the 1970s, of using computers to generate plans and elevations in the style of Andrea Palladio.

Ayesha Mueller-Wolfertshofer

completed her Bachelor's in Architecture at Vidyavardhan's IDEA, Institute of Design Environment and Architecture, in India between 2010 and 2015. She completed her MA in Architecture at the Munich University of Applied Sciences, specializing in Urban Planning from 2015 to 2017. Ayesha has worked in various architectural and urban planning firms since she began her studies and is registered as an architect with the Indian Council of Architecture (COA) as well as the Bavarian Chamber of Architects (Bayerische Architektenkammer). In July 2020, she officially began her doctorate at the Technical University of Munich under the guidance of Prof. Dr. Benedikt Boucsein and Asst. Prof. Hussain Indorewala, funded by a scholarship from the Hanns Seidel Foundation.

João Quintela

is an architect, professor, and researcher based in Lisbon, Portugal. He studied at the UAL Lisboa and the Politecnico di Milano and gained practical experience at the firm of Pezo von Ellrichshausen in Concepción, Chile. From 2012 to 2017, he was a teaching assistant at UD Campo Baeza at the ESTAM Madrid, where he is also working on his doctorate, »From Structural Logic to Spatial Poetics: The Concepts of Core-Form and Art-Form in Contemporary

Architecture«. From 2017 to 2019, he was a teaching assistant of the artist Carlos Nogueira at the UAL Lisboa. Since 2020 he is professor at the UAL Lisboa. Together with the German architect Tim Simon-Meyer he founded the German-Portuguese architectural office Atelier JQTS in 2012.

Hannah Rochelt

studied architecture at the University of Applied Sciences in Würzburg and at the Technical University of Munich. In 2017 she graduated at the TUM. Since April 2017 she has been working as assistant and since September 2020 she is research assistant at the Chair of Architectural Design and Conception. She has been working in architecture offices in Barcelona and Munich. She is supervising the students of the first academic year and Master Projects, as well as Master's Thesis. Her research project »Collaging–A Method of Architectural Thinking« investigates the architectural tool of the collage in analysis, presentation and above all in design and conception. Since 2023 she is working at her media based doctoral thesis »Analog Collaging–A visible Process of Architectural Thinking«.

Stefanie Ruf (Dr.)

is a psychologist working at the intersection of traffic, social and environmental psychology with a focus on mobility behavior and sustainable mobility options for a just and resilient future. Her PhD at TU Dresden, Germany, focuses on cyclists' knowledge, attitudes and behavior when sharing the road with motorists. She is currently working at the Professorship of Urban Design at TU Munich, Germany, and is part of the »Clusters4Future–Cluster on the future of mobility in metropolitan regions« (MCube), funded by the German Federal Ministry of Education and Research.

Mareike Schmidt

studied architecture and urban design at the University of Stuttgart. She finished the Master of Science 2016. Before beginning her research at the Professorship of Urban Design of TU Munich, Mareike was working at UTA Architekten und Stadtplaner in Stuttgart and later at bogevischs buero in Munich. Parallelly, she assisted the education in undergraduate and graduate studios at the Professorship. Since 2021 she is Doctoral Candidate at the TU Munich and works as research associate on the living lab aqt (car-reduced neighborhoods for livable cities). Mareike is member of the Bayerische

Architektenkammer and of the Doctoral Training Network of EIT Urban Mobility.

Tim Simon-Meyer

is an architect, professor, and researcher based in Schleswig-Holstein, Germany. He studied architecture at the UdK Berlin and the UAL Lisboa and gained practical experience in the architectural offices of Pezo von Ellrichshausen in Concepción, Chile, and Max Dudler in Berlin, Germany, among others. From 2015 to 2017 he was research and teaching assistant with Prof. Uta Graff at the Technical University of Munich and from 2017 to 2022 with Prof. Matthias Ballestrem at the HafenCity University Hamburg where he is also working on his doctorate »The Potential of a Tectonic Approach for Experiential Qualities of Architecture«. From 2022 to 2023 he led the design studio Studio SM/S at the HCU together with Daniel Springer. Since 2023 he is professor for constructive design and experimentation at Bauhaus-Universität Weimar. Together with the Portuguese architect João Quintela he founded the German-Portuguese architectural office Atelier JQTS in 2012.

Rafael Sousa Santos

is a PhD candidate at the University of Porto since 2017, a Fundação para a Ciência e Tecnologia (FCT) Fellow, and a researcher at Center for Studies in Architecture and Urbanism in the Digital Fabrication Laboratory group. Between May 2021 and February 2022, he was a visiting student researcher at Politecnico di Milano, where he collaborated in the didactics of two courses of design in the master's degree in architecture. Between March and September 2022, he was a visiting student researcher at the Massachusetts Institute of Technology and a Fulbright Fellow.

Jessica Stuckemeyer

is from Austin, Texas and attending Texas Tech University in Lubbock to complete her studies in architecture and an interior design minor. She takes interest in sustainability, adaptive reuse, historical preservation, and longevity of architecture and intends to pursue a career in Dallas, Texas that facilitates these ideals. She has experience assisting architectural studios that focus on collaborative design and peer learning. Currently, she is assisting with an exhibition to be held in Venice that focuses on a cooperative, group-based selection of works generated by graduate students at Texas Tech.

Guzden Varinlioglu (Dr.)

is an award-winning expert in computational design who has dedicated her research to the preservation and presentation of cultural heritage. With 20 years of experience, she is now contributing her expertise to the fields of immersive technologies, game design, and design education. Her current project as principal investigator, Sustainable Information Lifecycle of Kervansaray (SILK), is a collaboration with Prof. Takehiko Nagakura (MIT). This project is funded by the U.S. Department of State, MIT International Science and Technology Initiatives–MISTI Global Seed Funds, TUBITAK, the US Fulbright program, and the UK Chevening Fellowship programs. Dr. Varinlioglu has broadened her research and teaching expertise with positions at prestigious institutions globally, such as Texas A&M University, Istanbul Technical University, University of California Los Angeles, Massachusetts Institute of Technology, Boston Architectural College, Oxford Centre for Islamic Architecture, and University of Liverpool.

Oliviero Vitali

graduated from Accademia di Architettura di Mendrisio in 2019, mentored by Yvonne Farrell and Shelley McNamara. His professional journey took him to STUDIO MAKS in Rotterdam in 2014 and ZUS in 2015. He later contributed to Bruther in Paris from 2017 to 2018. In 2019, alongside Rocco Vitali, he co-founded VITALI STUDIO in Milan. Their practice seamlessly melds art and architecture.

Rocco Vitali

secured his architectural degree from Accademia di Architettura di Mendrisio in 2016, under the guidance of Francis Kerè. He gained experience at Sou Fujimoto Architects in Tokyo in 2012, followed by Philippe Rahm architectes in Paris in 2013. From 2016 to 2018, he worked at de vylder vinck taillieu architecten in Ghent, and later collaborated with Studio Mumbai between Italy and India from 2018 to 2019. Joining forces with Oliviero Vitali, the duo established VITALI STUDIO in Milan in 2019. Their combined vision concentrates on the interplay between art and architecture.