

# City Form and Cognitive Model

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## Abstract

*In 1975, Rosario La Duca published *Cartografia generale della città di Palermo e antiche carte della Sicilia (General cartography of the city of Palermo and ancient maps of Sicily)*, containing 40 plates and about 100 charts. Among the plates is the *Pianta geometrica secondo lo stato presente della città di Palermo capitale del Regno di Sicilia col suo porto, sobborghi, molo e campagna, drawn in 1822 by F. G. C. B. De Behrend*.*

*After a brief note on the model, the contribution presents a recent didactic experience related to surveying and digital representation, in which it was decided to study and investigate the De Behrend cartography according to a procedure that, starting from the redrawing of a historical map, arrives at the construction of a physical model of the structure of the 19<sup>th</sup> century city, in an optical/tactile dimension. The model is to be understood in its double value of outcome and incipit for other studies; if on the one hand it returns an image of the city in its entirety, the result of progressive stratifications, on the other hand it offers the possibility of investigating the morphological aspects of the urban fabric to trigger classificatory processes that never neglect the contribution of History.*

*The construction of the physical model allows the transition from the abstraction of the two-dimensional representation of the iconographic document to the material concretisation of the building structure of the historic city. Sensory involvement as an amplifier of knowledge finds its concrete dimension in the 'model'.*

*Keywords: reading, interpretation, survey, redesign, model.*

## Brief notes on the model

The architectural model has always been a tool for controlling and communicating the design idea. Its ontological role was for a long time acclaimed for its value in the presentation of the project when orthogonal projections and, a little later, axonometry had not yet been codified; the representation of the project found, in this sense, in the construction of the model the most appropriate modalities for the description and presentation of the idea [Giaffreda 2005; Scalzo 2010; Del Pesco 2015].

The term model is thus linked to that of project in an inseparable pair in which the two words complement each other. As Tomás Maldonado has stated, this association is very reductive because "the use of models (which in

modern epistemology is known as modelling) does not only concern problems pertaining to design and communication processes, but also a wide range of other issues that have long been the subject of controversy, especially within the philosophy of science. Modelling is certainly a creative strategy, but it is also a cognitive one. And the relationship between creativity and knowledge, as we know, is an issue that is far from settled" [Maldonado 1987, p. 57]. The Argentine philosopher-designer, who is also an Italian citizen, with great lucidity tries not to slip on a definitive affirmation of the concept of the similarity of the 'plastic' by posing some questions about the values of models, from prototypes of industrial design to those relating to



Fig. 1. Scale model of Pompeii. Museo Archeologico Nazionale di Napoli (MANN).

historical-archaeological documentation with both didactic and touristic implications.

Think, for example, of the car prototypes by Le Corbusier; Walter Gropius and Buckminster Fuller or the extraordinary instructive model of Pompeii, preserved in the Museo Archeologico Nazionale di Napoli (National Archaeological Museum of Naples, MANN), which represents the archaeological excavations of the ancient city buried by the eruption of Vesuvius in 79 A.D. [1] (fig. 1).

And again, think of the tourist who, visiting the Musée d'Orsay in Paris, discovers, situated at the end of the museum's great central aisle and set up by Richard Peduzzi, the polychrome plaster model of the longitudinal section of the Opera House as it was at its inauguration on 5 January 1875 (fig. 2); the visitor, undoubtedly amazed by the beauty and the large size of the model (1,578.0 x 110.0 x 240.0 cm), meanwhile rests his feet on a transparent floor walking on another 1:100 scale model of the Opera House district, which is still from the year 1914 (fig. 3).

The tool of the model, in the history of architecture, has basically been linked to show the 'magnificence' of the building or, in the purely engineering field, to verify the capacity of resistance to mechanical actions and the structural goodness of the design [Blasi, Coisson 2015].

The model, as a transmission of knowledge, has also assumed the dimensions of the colossal when its scale of

representation has become that of the real 'thing', or of that which no longer exists while still manifesting itself in its 'supposed' metric consistency.

In order to show the architectural ornaments, for example, the model has become a true copy. For this, one only has to visit the *Cité de l'architecture et du patrimoine*, Europe's largest institution dedicated to the promotion of architectural and urban planning culture, which occupies part of the Palais de Chaillot, a majestic architectural complex designed for the International Exhibition *Arts et Techniques dans la Vie moderne* held in Paris in 1937.

Fig. 2. Scale model of the Paris Opera. Musée d'Orsay, Paris (photo by F. Maggio).



La Cité has two missions: the first is to enable a dialogue between architecture of the past and contemporary architecture, areas that have long been in opposition; the second is to make the architectural heritage, predominantly French, known to the general public.

Begun by Eugène Viollet-le-Duc, the Museum's collection brings together a selection of monuments that best represent the excellence of French art. Reproduced to scale and in minute detail, or presented in the form of models and drawings, these emblematic buildings of French architecture make up a truly extraordinary collection. The permanent collection is displayed in three galleries: the *Galerie des moulages*, the *Galerie d'architecture moderne et contemporaine* and the *Galerie des peintures murales*.

With more than 350 plaster casts (some more than 10 m high) and sixty architectural models, the *Galerie des moulages* invites visitors to retrace nine centuries of French architectural history. From the Abbey of Moissac to the Cathedral of Notre-Dame, via the famous staircase of François I at the Château de Blois, France's most famous civil and religious monuments are presented (fig. 4).

In 2002, the *Cité de l'architecture et du patrimoine* initiated the *Le Corbusier project*, an extraordinary and unique 1:1 scale reproduction of a housing unit of the *Cité radieuse* in Marseille placed in the museum's *Galerie d'architecture moderne et contemporaine* (fig. 5).

In this flat, visitors can enter, touch the space, and experience for a few moments a house from a housing project considered to be among the most interesting and innovative of the post World War II period.

The exemplarity of this educational project lies in the active participation of 17 vocational high schools in the construction sector; depending on their qualifications, each high school was assigned a work package (carpentry, joinery, finishing, painting, plumbing, etc.). The construction of the model began in 2006 and involved the commitment of the students and their teachers, who used their skills and worked closely together to discover the architecture and its history [2].

The great and extraordinary models of the French institution, therefore, have an essentially popular and, in the case of the Marseilles Housing Unit, by its conception, purely pedagogical character.

But the model is also "an instrument of representation, a vehicle for the transmission of ideas, an anticipation of a constructive reality and of its overall effects, it is also at the same time an instrument of design work aimed at

Fig. 3. Scale model of the Opera district in Paris, 1914. Musée d'Orsay, Paris.

Fig. 4. One of the rooms of the permanent exhibition. Cité de l'architecture & du patrimoine, Paris (photo by F. Maggio).



verification, often temporary and partial, along its progress [...] In fact, the origin of the word *maquette* from the Latin *macula* (small stain, sketch, first draft) refers to the technical dimension of the ideational process, made of remakes, corrections, verifications. *Maquette* therefore as an open process where the first encounter between the necessary manuality of research and the world of physical things is realised, and through these, with the necessary, symbolic materiality of architecture" [Vragnaz 1987, p. 5]. The model as a 'contemporary' verification of the design process, and not as a mere 'construction' linked to issues of dissemination or communication to an external public, is a tool [3] adopted, for example, by the firm AM3 Architetti Associati [4] in many of their design works.

In some of these, the close link between the graphic representation of the project and the model is strongly recognisable, as the themes of assembling and composing [5] are in close relation to each other. The wire axonometric exploded views and the perspective views, in fact, seem to be the 'pieces' of the model that, once recomposed in space, tell the story of the project; the perspective views, the result of 3D modeling, emulate the views of the physical model, showing the close relationship between drawing and model (fig. 6). In the case, for example, of the proposal for the competition for the *Enhancement of the northern sacred area of the Sanctuary of Hercules Winner in Tivoli*,

Fig. 5. Scale model of an apartment in the Cité radieuse. Cité de l'architecture & du patrimoine, Paris (photo by F. Maggio).



announced by the Ministry of Cultural Heritage and Activities in 2010, the architects from Palermo, finding in the theme of the 'section' the question of the project, build a plastic model made of vegetal cardboard whose base is made up of 19 pieces equivalent to as many sections that study the orography of the site. The model was built, modified, altered, manipulated in a continuous comparison with the sketches of the project in progress [6]; ultimately the model was the representative system of the project whose graphic results were nothing but the effects of its construction, of its being a project itself (fig. 7).

It seems that certain issues on the subject of the model can, in a way, be reversed; the design becomes an imitation of the model and not the other way around.

But, after all, this is what happened in Renaissance workshops where sketches, pseudo-axonometries and pseudo-perspectives, described the model *in fieri* controlling all aspects of the design idea.

The model, moreover, may concern the shaping of one of the aspects of the design idea and not only manifest itself to show the project in its entirety. This is the case of the model realised for the study of the section of the central hall of the Church of the Immaculate Heart of Mary in Agrigento, built in 2022 by studio AM3. The element characterising the space of the hall is represented by a roof with soft lines, which, like the Virgin's mantle, gathers and protects the faithful. The ceiling seems to be suspended and finds its highest point at the altar; lit by zenithal light.

The comparison between the thematic model and the executive section of the project (fig. 8) recounts a possible declination of the construction of a model that, purged of the 'superfluous', tends to show, in the end, the true form.

### A didactic experience. The model to get to know the city and its history

The opportunity to have had, as part of the *Survey and Digital Representation Workshop*, out-of-town and Erasmus students to whom the city was practically unknown, led to work on the theme of knowledge of Palermo through the study of its shape and its transformation over time by means of a rereading of the cartography of the 19<sup>th</sup> century city and, through comparison, knowledge of its recent history.

In the early years of the 18<sup>th</sup> century, the cartographic production of the city of Palermo still showed an inadequate

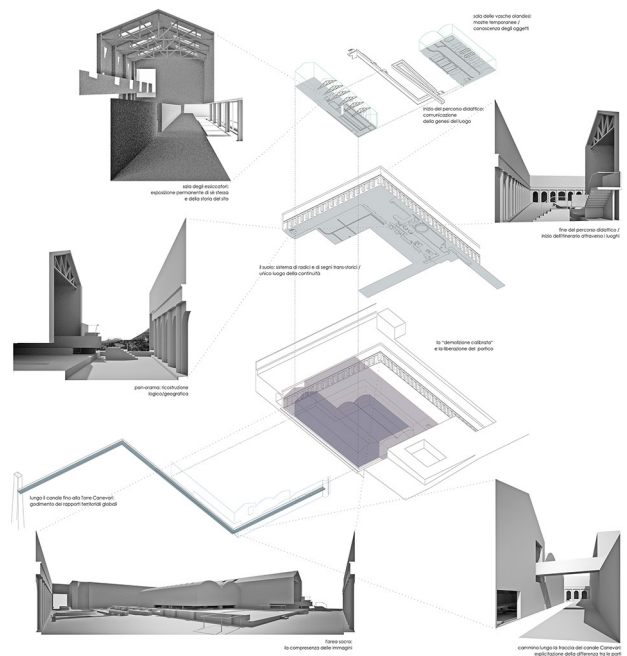
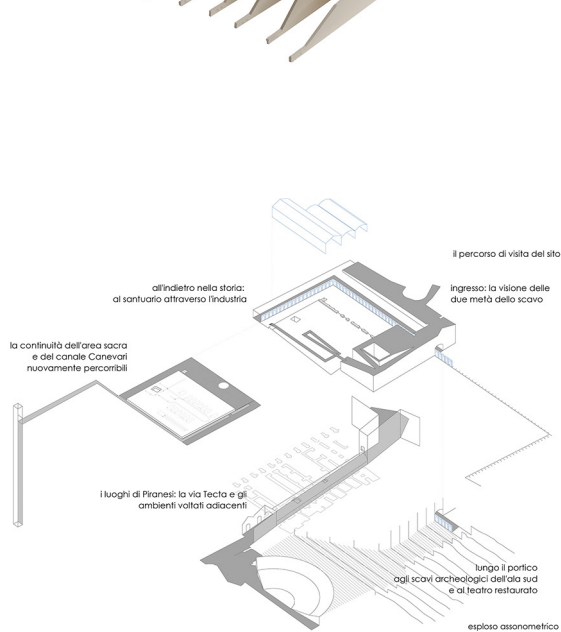
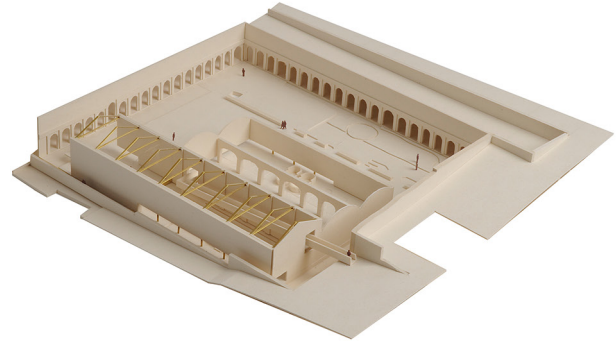
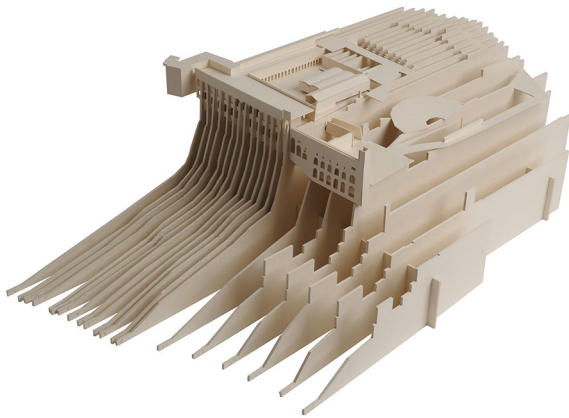


Fig. 6. AM3 Associated Architects. Winner of the competition for the redevelopment of the Sanctuary of Hercules in Tivoli. Scale model and renderings.

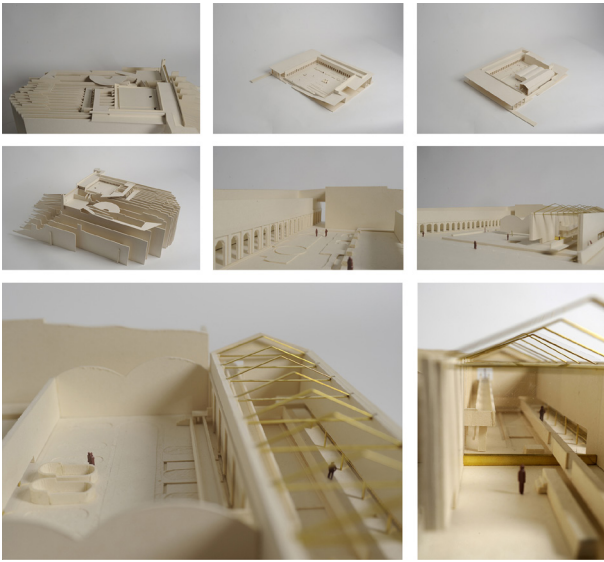


Fig. 7. AM3 Associated Architects. Competition for the redevelopment of the Sanctuary of Hercules Winner in Tivoli. Photo of the scale model.

level of scientific accuracy due to the lack of topographical updating, which produced representations of the city that slavishly replicated its ancient 16<sup>th</sup> century layout, completely ignoring the important urban transformations that had taken place, particularly between the end of the 16<sup>th</sup> century and the following century. Combined with the continued use of the oblique projection method and the frequent absence of graphic scales, this propensity to copy gave an inaccurate geometric configuration of the city's layout and did not allow for a reliable reading of the urban fabric [La Duca 1975].

In 1777, at the request of the Senate of Palermo, the first large plan of the city represented in orthogonal projections and completed through direct survey by the royal engineer Nicola Anito was printed. The *Pianta geometrica e novella secondo lo stato presente della città di Palermo capitale del Regno di Sicilia con l'antico Palermo giacente in essa, e co' borghi molo e campagna* was designed by Francesco Maria Emanuele e Gaetani, Marquis of Villabianca and engraved by Giuseppe Garofalo. Following the four-sided scheme dictated by the orthogonal axes of

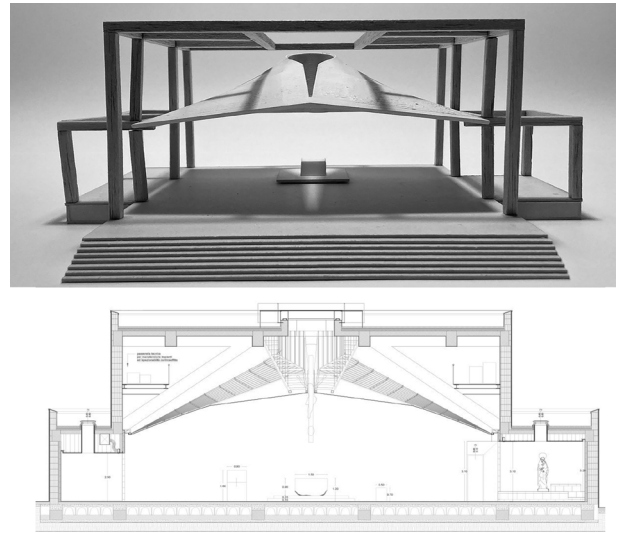


Fig. 8. AM3 Associated Architects. Scale model and section of the church of the Cuore Immacolato di Maria, Agrigento.

the Cassaro and Via Maqueda, Villabianca placed, to the left and right of the 'topographical field', references to the notable places and buildings of the Albergheria, Kalsa, Capo and Loggia districts.

Despite the 'geometric' character of the representation, the general image still reflects a prevalent celebratory function, typical of Sicilian cartography produced between the 17<sup>th</sup> and 18<sup>th</sup> centuries, underlined by the presence of decorative trappings such as drapes, cartouches and coats of arms that did not allow for a complete depiction of the areas outside the urban centre [La Duca 1975]. Using the same copper plates, in 1791 Villabianca's plan was updated according to a new survey that showed the interventions carried out in the meantime, including the construction of Villa Giulia and the Botanical Garden, the extension of Via Maqueda, the opening of the perpendicular Via Stabile and the rectification of the 'stradone di campagna', which corresponds to the current Corso Scinà.

The break with the iconic language that had characterised 18<sup>th</sup> century cartographic production took place in 1818 with the production of the *Pianta della Città di Palermo*



Fig. 9. Plan of Palermo drawn in 1822 by FG.C.B. De Behrend (La Duca 1975, Table 17).

e suoi contorni (Map of the City of Palermo and its Surroundings), made by Gaetano Lossiex and engraved by Tommaso Lomastro. The plan moves away from previous achievements, definitively abandoning decorativism in favour of greater precision and schematism.

Nineteenth-century cartography, on the other hand, pursuing the goal of scientific objectivity could not concede anything to ornament and allegory [Pagnano 2007] and for these characteristics Lossiex's map represented a model for the cartographic production of the following two decades. However, only a few years later, in 1822, what Rosario La Duca called 'a revival' was printed, a plan of Palermo that represented a sort of revival of the 18<sup>th</sup> century map of the Marquis of Villabianca. The map entitled *Pianta geometrica secondo lo stato presente della città di Palermo (Geometrical map according to the present state of the city of Palermo)*, consisting of four separate sheets (fig. 9), was drawn by Lieutenant Colonel F.G.C.B. De Behrend, who expanded its contents in 1825 by adding what he had missed on his first reading and inserting new data.

De Behrend re-proposes, bringing it up to date, the scheme and ornamentation adopted by the Marquis of Villabianca by inserting, along the outer edges of the four sheets, "out of the picture", more than 1300 references with descriptions of the Churches, Palaces and main objects and the names of the Squares, Streets, Alleys and Courtyards of the four quarters that formed the ancient city: St. Cristina, St. Ninfa, St. Agatha, St. Oliva, today respectively the Royal Palace, Monte di Pietà, the Courts and Castellammare. Despite the fact that De Behrend's plan represents a reversal of the 19<sup>th</sup> century tendencies to modernise

ancient cartography, it was decided to use it in education as a basis for studying the form and structure of the historic city and for analysing the urban transformations that occurred over time.

The entire didactic process was conceived through a series of strategic steps, mainly characterised by cognitive and applicative modes. Beginning with the redrawing of the De Behrend map, a study model was constructed to understand the shape of the city.

The teaching activity therefore took place in several stages, including knowledge of the cartography, redrawing, field visits and construction of the physical model.

The model is constructed in pieces that apparently seem to have no logical structure in their composition; in reality they correspond to the number of visits made with the students who, through direct observation, got to know buildings, streets, alleys and courtyards, which they had previously drawn, only to discover them or, very often, not to find them. Each piece of the model thus corresponds to a walk, becoming the story of an experience (fig. 10).

Knowledge of the plan of Palermo of 1822 was explained to the students starting from the assumption that "every representation, even the apparently flattest one, always communicates something else, beyond the things presented and the obvious information, since the same way of transcribing interprets and loads the things drawn with meaning, with the meaning we attribute to them" [Pagnano 2007, pp. 88, 89].

The role of the model in the work with the students was substantial for the knowledge of the morphology of Palermo in the early 19<sup>th</sup> century; the map, once redrawn and interpreted, is 'elevated' with the model in an optical/tactile dimension (fig. 11).

The extrusion of the polylines of the CAD drawing, and thus the construction of a digital model, would have been an operation that, on its own, would not have achieved the objective of reading the overall shape of Palermo's historic centre.

It is evident that the construction of a model made with a 3D printer presupposes the construction of a three-dimensional digital drawing. But what 'physical' experience, of true optical-tactile knowledge, would the students have had without the aid of the inspections and the construction of a physical model? What subsequent perception would they have had of the overall shape of the city linked to the memory of having experienced it in some way? Would the digital experience alone, delegated to the viewing of

Fig. 10. View of the model (photograph by A. Garozzo).

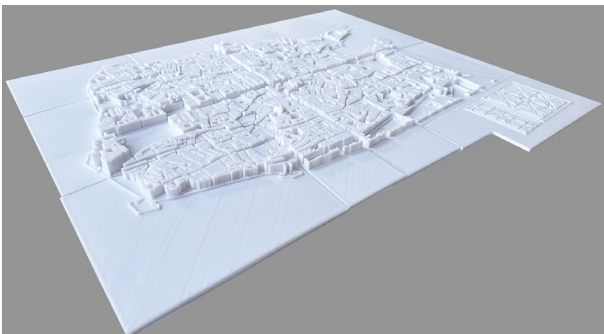






Fig. 11. Scale model superimposed on the redrawing of the map of 1822 (graphic elaboration by A. Garozzo).



Fig. 12. Details of the scale model (graphic elaboration by A. Garozzo).

a screen, have been enough to know and tell a brief fragment of the history of a complex city?

The realisation of the model was intended, in this sense, as a construction of knowledge, remembrance and memory of the design of a city that was also, to relate it to its present-day consistency.

The static nature of the plastic model, opposed to the dynamic fruition of the 3D model, fixes the design of the urban form and its spatial contents composed of an intriguing system of alleys and courtyards, of streets and squares and the relationships with the coast and the sea (fig. 12).

## Conclusions

The construction of the *maquette*, linked to the action of surveying a cartography in the context of a didactic experience, is an act of understanding that takes on, together with redesigning, a formative value. Its perceptive dimension allows a slow observation, an attentive gaze capable of 'entering' the interstices of the form of the city in a vision in which the whole and the part are always in simultaneous relation. This apparently static dimension, referred to the physicality of the model, reverses the theme of dynamism

in the three-dimensional graphic model. The latter is in fact explorable and navigable through the support of the screen or advanced technological instruments in which the investigating subject can, from a still position, scrutinise the object in its details. In the 'reading' of the model, on the other hand, dynamism is entrusted to the subject himself who, moving, "looks, observes and sees" [7].

In the triad 'looking-observing-seeing', in fact, lies the secret of those who do not want to be surprised when faced with the phenomena of reality, which investigated and analysed becomes the heritage of our knowledge. Watching implies educating the senses to the multiplicity and difference of forms, observing grasps the reasons for differences by revealing their rules, seeing traces meanings and values. The 'stillness' of the model refers to the slowness and 'calmness' of observation, a reading procedure induced by the fixity of the *maquette*.

On this theme, the words of Gaetano Cuccia are enlightening: "He who proceeds slowly deliberately distracts his attention, with an oriented intention, from particular points, to focus his gaze, his hearing, his senses all to grasp a nuance, a small vibration, to make an unpredictable, but patiently sought-after connection, to try out another possibility. Slowness is also a way of being present to the world and perfectly present to oneself, attentive to what one sees or hears, to the nuances, to the details, isolated in their small complexity, seemingly unrelated to one another and then quickly recomposed into a single reality. Slowness

is a virtue that aids the ability to compose, the will to grasp the unitary form of an articulated reality, whatever it may be; it is the desire to glimpse a structure behind the simple appearance of things" [Cuccia 2007, pp. 11-13].

The Palermitan scholar, always with great intellectual refinement, again writes about slowness, quoting Milan Kundera who, in his book entitled *La lentezza (Slowness)*, tells of the protagonist and her lover, that "by slowing down the pace of their night, dividing it into distinct and separate parts, she has managed to transform the brief span of time they have been given into a marvellous architecture, into a form", since, he continues, "giving form to a duration is the need for beauty, but also the need for memory" [Kundera 1995, p. 38], a concept of structure that has never been better expressed, since form itself can be defined as a complex and unitary structure in which the parts –neither juxtaposed nor contiguous– are subject to a law capable of determining the meaning of the parts themselves [Arnheim 1994].

Unlike many hyper-realistic virtual reconstructions, the three-dimensional print of the city represented by De Behrend, eschews the ambition of being a simulacrum of the nineteenth-century *forma urbis Panormi*. Rather, through its physical consistency, it transmits to the observer a subjective vision that opens the way to new interpretations and represents an opportunity, in a time of bulimic assimilation of images, for a profound learning of the form and structure of the city of Palermo.

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### Notes

[1] The model of Pompeii, made of cork, wood and paper on a scale of 1:100, was inaugurated in 1879. It was designed by the Neapolitan archaeologist Giuseppe Fiorelli, director of the excavations at Pompeii and the Naples Museum, who entrusted Felice Padiglione with its realisation. It was later commissioned to Nicola Roncicchi in 1908 and took on its final appearance. During the course of the 20<sup>th</sup> century, it was moved several times between Naples and Pompeii, sometimes even divided into several parts, mainly to protect it from damage

caused by the two world wars. In 1950 it was finally placed in the National Archaeological Museum in Naples.

[2] For more information on the *Le Corbusier project* see <<https://www.citedelarchitecture.fr/fr/>> (accessed 10 April 2024).

[3] The model is understood as both a 'device' and a 'system of thought': in Latin *instrumentum* (instrument), just as Heidegger defines 'technique'

as both a means to an end and as man's actual activity.

[4] AM3 Architetti Associati was established in 2011 by architects Marco Alesi, Cristina Cali and Alberto Cusumano <<http://www.am3studio.it/index.asp>> (accessed 10 April 2024).

[5] The term 'compose' is used slavishly following the etymology of the word: *compòrre*, contracted from the Latin *compònere* –p.p. *compòsitus* comp. –*com=cum* together and *pònere*, place, locate. To put together and mix various things to make one; otherwise and more communem. To form; referring to literary or musical things. To write of one's own conception; in things of art, Modelling, Drawing

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of one's own imagination.

[6] Alice Franchina and Francesca Mazzola, architects, are the authors of the physical model and design. Between two-dimensional representations, sketches and the construction of the model, they verified the design ideas in a synchronic representative process. The lack of material quality and executive refinement of the model, unnecessary because they were not absolutely necessary, left room for the formation of the project, delegating the development of the design process to the physical model.

[7] Reference is made to Le Corbusier's famous double triad from Carnet T70 of 1963. "The key is this: look, observe, see, imagine, invent, create".

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