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Drawings, Maps and *Maquettes. Plan-relief* Landscape Depiction

Over the XVIII Century, different representation techniques combined on a map, i.e. at the same time orthogonal projections and perspective view, try to simulate a three-dimensional image definitely useful for better understanding and recognizing a place. These representation techniques, even when employed in that time to make war or to state nation boundaries, depict landscape exploiting visual parameters, fixing on maps and drawings very bright colors, shades and tones of objects, coupled with their exact position on the land.
Within this framework, the *Plan-Relief*, which literally means "*Relief Map*", is a physical model of a place and can be considered as a case for a very detailed description of landscape and territory in order to get the utmost clarity.
Taking in consideration the background, the paper aims mostly to show and illustrate the techniques of landscape drawing and survey, how they had been applied in the several steps required for the design and realization of *Plans-Reliefs*, particularly focusing on the procedures for providing maps and elevation needed for building the physical model.
The analysis about techniques of representation employed in realizing *Plans-Reliefs* can further allow a comparison with landscape representation nowadays: in fact, after a long time it has been mostly grounded in metrical and geometrical parameters, landscape representation seems to turn again to a perceptual and pictorial criterion.

Keywords:
Ancient topographic techniques; Drawing techniques; *Plans-Reliefs*; Landscape representation

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This paper considers the techniques for surveying, drawing and representation of buildings and landscapes employed in the creation of *plans-reliefs*, those physical models of fortifications produced in France between the sixteenth and nineteenth centuries, the collection of which, enriched, in particular, during the reign of Louis XIV, is now housed in the Musée des *Plans-Reliefs* in Paris.
The paper will begin by framing the topic in the context of topographic and cartographic representation during the Age of Enlightenment, highlighting its main descriptive characteristics and, in particular, the need for three-dimensional depiction of a site's morphology. This will be followed by an analysis of the techniques and procedures used in the creation of plans-reliefs, with reference to a specific case study regarding the city and surrounding landscape of Toul, on which a wealth of documentation exists.
Finally, our concluding remarks will seek to account for the renewed interest in *plans-reliefs*, in the light of both new functions made possible by the digital reconstruction of some of these models and of a return to figurative methods, based on perceptive and pictorial parameters for description of geographical contexts, used in some contemporary landscape representation techniques.

TOPOGRAPHIC AND CARTOGRAPHIC REPRESENTATION TECHNIQUES IN FRANCE IN THE AGE OF ENLIGHTENMENT

The topographic techniques employed during the eighteenth century, particularly in France, documented sites with a high level of detail, focusing attention not only on morphological aspects but also on those of a perceptive nature; indeed, these techniques were applied both to metric and geometric description of natural or urban settings and to representation of the visible features of a landscape, the specific characteristics of its elements and the details of its components.
As the geographer Sturani wrote: "*Field surveying procedures* [...] *hinge on two requirements, which were central to the instrumental empiricism of the Enlightenment and became increasingly important up until the twentieth century. On one hand, topographic maps are based on measurement of linear distances and angular values using techniques and instruments which, during the eighteenth century, underwent significant refinement, emphasising the value of precision. On the other hand, they require direct observation of the landscape's forms, which is fundamental in creating a true and faithful representation*"[1].
The topographic representation from that period, then, features an interesting interweaving between geometry and imitation of nature and between cartography and art. Indeed, not by chance was the term "engineer-artist" coined to describe the students of the *École des Ponts et Chaussées* who, while trained to oversee the great transformation of France in a technical sense, left a testimony, in the form of a rich cartographic archive, to their considerable skill in describing the beauty of the landscape [2].
In the eighteenth century, therefore, increasingly large areas of European States underwent systematic surveying operations, both for military purposes and for implementation of large-scale public works, construction of roads and water management facilities, and exploitation of forests and mines.
While this set of operations appears to reflect that broader cultural project of learning about the physical and human world initiated by the Enlightenment, the maps necessary for land description are based, on one hand, on the geometry connected to instrumental measurements and, on the other, on employment of pictorial devices. Thus, the adoption of zenithal projection and of a scale is supplemented by a faithful and evocative representation of the landscape's forms, using perspective drawing, colours and shading. (figs.1, 2)
Internationally recognised Italian geographers who have conducted particularly detailed analysis of the transformation of landscape imaging through mapping, such as Lucio Gambi, first, followed by Franco Farinelli and Massimo Quaini [3], agree on the existence of a progressive change in representation, brought about by the introduction of an abstract criterion, independent of the physical characteristics of locations: indeed, in the nineteenth century, a new kind of map established itself, governed by the "external" parameter of measurement; external and unconnected, that is, to those perceptive and pictorial features that had constituted maps' distinctive character during the previous century.

Fig. 1 - *Le Baylage du Greyzivaudan et Trieves*, Jean de Beins, Grenoble, 1619 [in *Segni e sogni della terra*, cit., p.91]

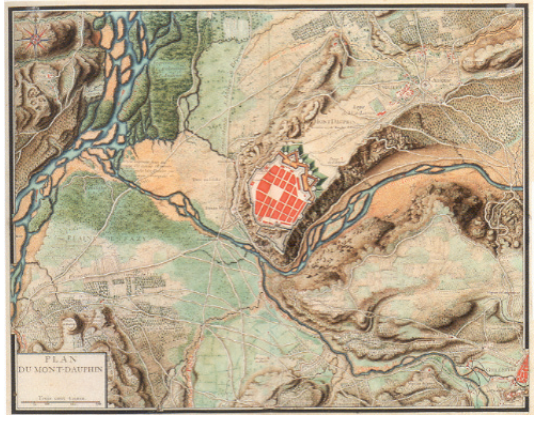

Fig. 2 - *Plan of Mont-Dauphin*, 1700 [in *Segni e sogni della terra*. (2001). cit., p.123]

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In any case, as early as the eighteenth century, in mapping used for both military and civilian purposes, representation techniques were describing the landscape using visual parameters, including the colours, shades and tones of the objects represented as well as their position within the environment. Combined use of representation forms - using both orthogonal projections and perspective view in the same drawing, for instance - also contributes to simulating three-dimensional representations, thus aiding better comprehension and recognisability of surveyed locations. However, "*plans perspectifs*" (perspective plans) and "*vues cavalières*" (isometric views) favour a single viewpoint, which renders them of little use for military purposes. At the same time, use of measurable drawings, such as plans, sections or elevations, provide only a partial representation of locations.

THE *PLAN-RELIEF*: A THREE-DIMENSIONAL REPRESENTATION OF THE TERRITORY

A *plan-relief*, literally meaning "relief map", being a physical model of a site, fully meets the need for three-dimensional representation that eighteenth-century maps attempted to achieve through pictorial devices and has long been a solution adopted where a meticulous description of the environment and landscape is necessary in order to achieve maximum precision and clarity of detail.
The *plan-relief* has its roots in a European tradition which, as early as the sixteenth century, used *maquettes* of fortified towns for strategic purposes [4]. (figs. 3, 4)
Indeed, already employed in France since the fifteenth century, its substantial increase in use was due to Louvois, Louis XIV's Minister of War, who considered it a genuine *portrait en relief* of a city and its surrounding landscape.
Directly linked to the fortification works of a site to be defended, the *plan-relief* provided a global view of a town and its countryside up to maximum artillery range, permitting accurate evaluation of uneven terrain, a crucial aspect of the defence of strongholds. It had multiple uses, allowing the King and his General Staff to identify defects and weaknesses in the realm's fortifications, plan improvements to their military defences and also prepare for siege operations [5]. The *plan-relief*, being a form of representation in three dimensions, was, therefore, far more effective than contemporary maps, since it permitted an immediate interpretation of a site from multiple viewpoints.
The collection of these models was highly prized due to the quality of their execution and the adoption of a scale common to almost the entirety of the *maquettes*, namely 1foot per 100 toises, approximately equivalent to a scale of 1:600. The King's engineers created *plans-reliefs* both of French sites on the kingdom's borders and of foreign territories taken from the enemy, and were supported in their work by teams of draughtsmen, geographers and carpenters.
During the reign of Louis XIV, the *maquettes* were housed in Fontainebleau, Versailles or Saint-Germain-en-Laye and, as previously mentioned, could only be viewed by the King and his General Staff. In the eighteenth century, the collection was transferred to the Louvre, almost acquiring the status of art, where it remained until 1774 when it was relocated to the Hôtel des Invalides, now home to the Musée des Plans-Reliefs.
Despite its transfer, the collection and the production of scale models continued into the following century, under the supervision of the Galerie des Plans-Reliefs, where engineer-geographers worked alongside artist-topographers and supporting figures who were required to have a knowledge of mathematics and geometry, considerable manual skill and the ability to draw *au trait* and *au lavis*. The engineer-geographers and artist-topographers were tasked with conducting the necessary field surveys and, on their return to the gallery, constructing the *plans-reliefs* themselves, assisted by the artist-topographers and by carpenters and model makers.

Fig. 3 - Plan-Relief of Saint-Tropez, 1716 [in Warmoes, I. (1997). *Le Musée des Plans-Reliefs*. cit. p. 51]

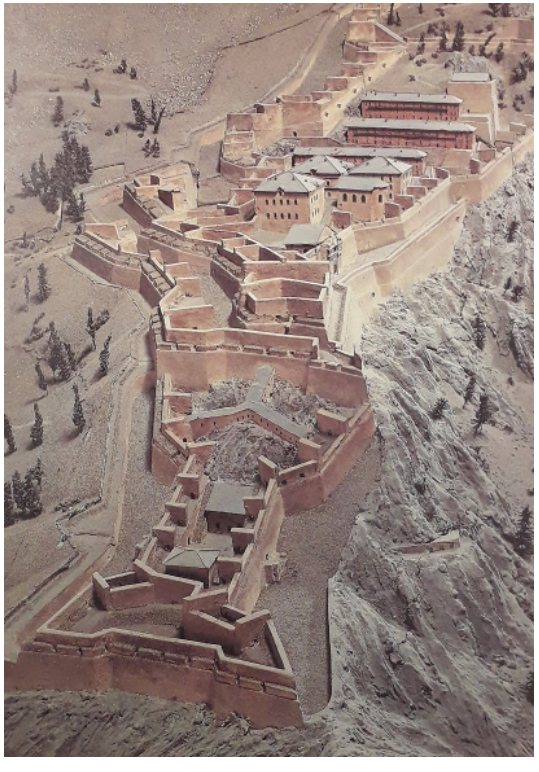

Fig. 4 - Plan-Relief of Fenestrelle, 1803 [in *Casabella* 533, cit., p.49]

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In 1813, a topographic brigade of the Military Engineers, specially formed within the *Dépôt des fortifications*, was entrusted with the task of conducting the site surveys, while construction of the *maquettes* remained the primary responsibility of the Galerie des Plans-reliefs. However, during the latter half of the nineteenth century, the interest and activity of the *Service géographique de l'armée* gradually shifted towards the production of topographic maps, thus marking the end of that era.
In this regard, Massimo Quaini observes that the main reason for the abandonment of topographic scale models was the emergence "o*f a modern viewpoint that favoured small scale over the large scale and tendency towards gigantism typical of models. At a small scale, the amount of information that can be shown on a map is undoubtedly greater than that of a scale model*" [6]. This change in technical-scientific paradigm came in addition, however, to an alteration in the "art of war". Indeed, as Massimo Scolari notes, "*The military perspective of the fortresses reproduced in seventeenth-century French plans en relief were rendered superfluous by the contour plan method adopted in 1756 and generalised by Captain Clere, Napoleon's topographer: the orthogonal landscape took revenge on the oblique objectivity of the fortification models. The speed of movements demanded an increasingly precise description of the territory, reflected in its cartographic representation*" [7].
In the last 30 years, these particular models have been the object of interest and research, especially in relation to historical and geographical studies. Indeed, *plans-reliefs*, due to the quality of their execution, constitute a source of information on urban planning and the landscape history during a period preceding the great transformations resulting from the industrial revolution. They have also been studied due to their use, together topographic maps, in military campaigns. Finally, they have attracted the attention of geographers in relation to the evolution of topographic and cartographic land description techniques.
This paper seeks to highlight, *in primis*, their distinctive characteristic as a method for representing towns and landscapes; indeed, while possessing similar features to those of the maps of their day, they also constitute an advance on them due to the effective three-dimensional representation they achieved.

Fig. 5 - Watercolor for the Plan-Relief of Fort-l'Écluse [in Warmoes, I. (1997). *Le Musée des Plans-Reliefs*. cit. p. 19]

Fig. 6 - Plan of Toul, mid-19th century, 1/10000. Twenty tables pattern for the Plan-Relief of Toul. [Relevés préparatoires du plan-relief de Toul. Paris, musée des Plans-Reliefs, Archives]

Fig. 7 - Plan of Toul, [1847]-1848. *Service du Génie. Canevas des 4 bandes du lever nivelé de la Place de Toul et de ses environs à l'echelle du 1/2000*. [Relevés préparatoires du plan-relief de Toul. Paris, musée des Plans-Reliefs, Archives]

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PLANS-RELIEF SURVEYING TECHNIQUES AND PRODUCTION PROCEDURES

The techniques for land surveying and depiction employed during the preliminary phase of production of *plans-reliefs* are manifold, and we will therefore focus, firstly, on the methodology applied to drafting of the map and ground profiles of buildings and, secondly, on use of the drawings required for construction of the physical model.
The dossiers of preparatory documents conserved at the Musée des Plans-Reliefs, including those relating solely to *maquettes* produced in the nineteenth century, are extremely useful in understanding the various stages and the multitude of skills involved in the construction process.
Site description was normally entrusted to the topographic brigade of the Military Engineers which, in any case, was responsible for conducting land surveying and graphic rendering for contour lines at a scale of 1:20000. The work of detailed surveying was completed by the artist-topographers who, finally, on their return to the Galerie des Plans-Reliefs where the scale models themselves were constructed, also had the task of rescaling the survey drawings to 1:600 in order to obtain detailed maps (*épures*) [8].
Épures, despite their two-dimensional representation of the landscape and built elements, were preparatory drawings capable of providing the highly detailed information necessary for the subsequent stages of production. Indeed, their form was irregular and, like a puzzle, they "re-constructed" on paper the physical characteristics of a territory together with its man-made transformations.
The drawings produced during the survey campaign by the artist-topographers of the Galerie des Plans-Reliefs were filed in *cahiers de développement*, where it is possible to find plate drawings as well as detailed reports on the type of crops, buildings, rural dwellings, fencing, etc. The plates are normally composed of a planimetric excerpt of one or more blocks and the corresponding façade of each building and contain a wealth of annotations on the nature of the construction materials used (walls, roofs, roads and paths). The drawings of the façades were normally done at the same scale as the planimetric drawings, namely 1:600.
The artist-topographers also made drawings and watercolours in order to render the environment, the colours of the landscape and the geological features (fig. 5). Both for surveying and for planning of the *maquette*, reference was also made to previous documentation such as topographic maps, perspective views, hand-drawn or engraved plans and cartographic materials in general relating to the town and landscape to be represented by the *plan-relief*.
For the preparatory drawings, building lengths were measured in paces and heights "by sight", and these were then recorded proportionally on the sheets of paper. The same method was adopted for doors and windows which, in turn, were represented proportionally, while their number and position corresponded to reality. Taking into account the scale of representation, the drawing of doors and windows was simplified, as is often indicated on the covers of the *Cahiers de développement*.

Fig. 8 - Calque comprenant toutes les maisons de la 2eme Bande du lever de Toul. 1/2000. 1848-1849. [Relevés préparatoires du plan-relief de Toul. Paris, musée des Plans-Reliefs, Archives]

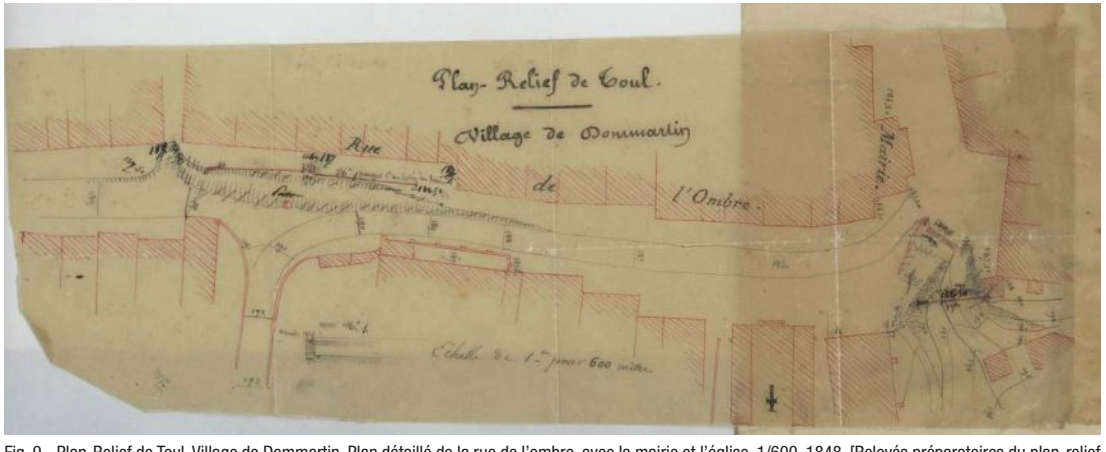

Fig. 9 - Plan-Relief de Toul. Village de Dommartin. Plan détaillé de la rue de l'ombre, avec la mairie et l'église. 1/600. 1848. [Relevés préparatoires du plan-relief de Toul. Paris, musée des Plans-Reliefs, Archives]

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The whole set of the various types of preparatory drawings described thus far was used by the "model makers" of the Galerie who, together with the carpenters, had the task of constructing all the elements that would cover the entire scale model [9]. Due to their notable size, the *plans-reliefs* were made in several pieces, in a format that permitted the model makers to work simultaneously without obstructing one another.
As described in a report from 1857 [10], drafted by Leymonnerie, one of the last 'artist-topographers', the carpenters constructed the 'cross' resulting from the survey, which, thanks to an often highly complex system of cross-pieces, made it possible to assemble the boards and, above all, keep them together. The model makers worked under the supervision of the artist-topographers, provided by the dimensional drawings with the information necessary to shape each part. For each of these parts, profiles were made from linden wood to represent the gradients of the land, based on the information supplied by the contour lines. These profiles were then laid diagonally at 15-cm intervals, after which a second serious of profiles was laid. Thus, each part of the *maquette* was covered by a wooden mesh, which rendered the forms indicated by the land survey, and were then further refined using moulded *papier-mâché*.
The ground surface was decorated with a dusting (*saupoudrage*) of fine sand laid on a bed of glue. Finely chopped coloured silks simulated the coverings of the fields, meadows and green spaces while trees were made from thin silk filaments wrapped around brass wire and, finally, water was recreated using oil paints.
The various architectural elements of towns, villages and hamlets were created using small blocks of linden, cut and covered with printed or painted paper to imitate the textures of the different building materials. Cutters were used to make the door openings, and the pieces cut out in this way were then reapplied to the model. The same method was used for chimneys and windows.
In order to faithfully render the details, roof tiles were differentiated from slates, and bricks from stones. The most important monuments, together with churches and palaces, were constructed on a slightly larger scale, partly for more effective communication but also because these constituted reference points useful to the army and, most of all, its artillerymen. The details also included hedges, low walls, drawbridges and flying buttresses of cathedrals.
The individual parts of the *maquette* were subsequently put together like a puzzle, using battens fixed together with mortise and tenon joints, and laid on a wooden base provided to support the entire *plan-relief*. To prevent the joints between the various pieces from being too visible, their edges were made to coincide with elements of the represented landscape, such as roads, waterways or field boundaries [11].

A CASE STUDY: THE *PLAN-RELIEF* OF TOUL

For some *maquettes* produced in the nineteenth century, the Musée des Plans-Reliefs has made the dossiers of preparatory documents available in digital format, and these are very useful in reconstructing the preliminary stages of a model's production. One of these dossiers, relating to the *plan-relief* of Toul, is particularly well documented and therefore suitable for illustrating the process from topographic surveying to the stages of preparation of the *maquette.*

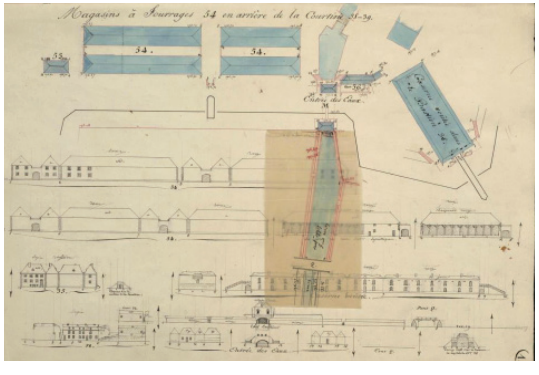

Fig. 10 - Plan-Relief de Toul. Magasins à Fourrages. 1/600. 1848. [Relevés préparatoires du plan-relief de Toul. Paris, musée des Plans-Reliefs, Archives]

Fig. 11 - Service du Génie. Plan d'ensemble indiquant le numérotage des ilots des maisons de la Ville de Toul. 1/2000. 1848. [Relevés préparatoires du plan-relief de Toul. Paris, musée des Plans-Reliefs, Archives]

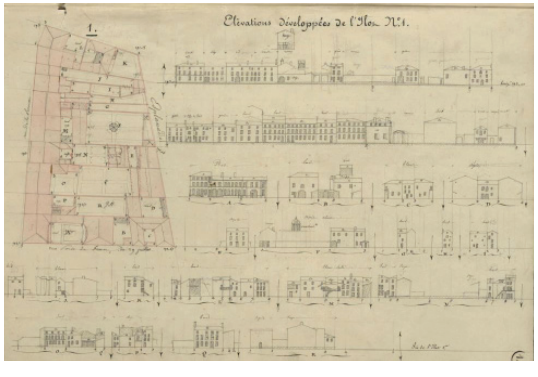

Fig. 12 - Elévations développée de l'Ilot n.1. 1848. [Relevés préparatoires du plan-relief de Toul. Paris, musée des Plans-Reliefs, Archives]

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The design work for this model, documented by the Galerie des Plans-Reliefs, began in 1846 only to be suspended in October 1849. It was then resumed nearly ten years later and finalised in May 1861.
A map of Toul from the mid-nineteenth century (fig. 6) shows its preliminary design plan in twenty plates.
In 1947-1948, the "measured" description of the Toul site was carried out by the topographic brigade of the Military Engineers which was responsible for conducting land surveying and graphic rendering for contour lines (fig. 7). The *canevas* [12] describes the topographic survey of the city and its surroundings at a small scale (1:10,000 as indicated by the graphic scale in the figure), and refers, both for finer details and for a description of the "nature of the crops", to subsequent maps (*calques*) at a scale of 1:2000 and to the "development plans" (*plans des développements*).
The latter - coordinated by the artist-topographer Leymonnerie - are based, as previously mentioned, on written descriptions, graphic annotations and "surveys by sight" (fig. 8).
The maps use the symbolic codes of topographical description, adopted since the start of the century to "*simplify and standardise the signs and conventions used in topographical maps, plans and drawings*" [13], while the preparatory drawings for the *plans des développements* are highly detailed.
The survey of the area of land to which the model relates is subdivided into four strips, and each element is associated with the corresponding strip (fig. 9). The drawings, in plan and elevation view, represent all the elements that must then be reproduced in the model: roofs and façades (the latter are represented by very well-executed and proportionate line sketches). The individual drawings "photograph" the current condition of a very complex productive and residential landscape, including bridges, aqueducts, fodder stores, stables, etc. (fig. 10).
As far as the actual "urban survey" of Toul is concerned, the preparatory document to which the *plans des développements* refer consists of an overall map indicating the numbering of the city's land parcels at a scale of 1:2000 (fig. 11). The figure 12 reproduces the detail of the group of buildings denominated *Ilot I*, easily recognisable on the previous ground plan by its number and proximity to the *Esplanade*. Finally, some drawings, at times, include additional measurements taken during the survey campaign (fig.13).
A key document in the progression from two-dimensional to three-dimensional representation is the *épure*, a dimensioned ground plan of the whole, at model scale, which included contour lines. It consists of 20 sheets, corresponding to the total number of component parts of the *plan-relief*. In the case of the city and territory of Toul, these are divided into a single map for the urban centre and a series of drawings depicting the surrounding landscape, split, according to the above-mentioned criteria, so that the model makers could work simultaneously without obstructing one another (figs. 14, 15).
The documentation contained in the preparatory dossiers enable us to follow the plan for the *plan-relief* of Toul up to this point. Construction of the scale model itself was performed by Edouard Boitard and Clément Fils. Its overall dimensions are 6.66 x 5.83 m, and the materials used are wood, paper, silk, metal and paint (fig. 16).

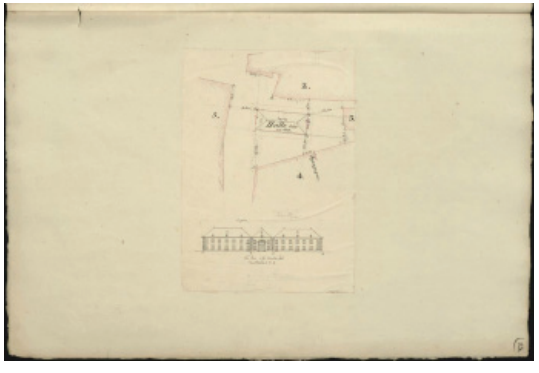

Fig. 13 - Plan et élévations développées de la Halle bâtie en 1823 au centre des ilots 2, 3, 4 et 5. 1848. [Relevés préparatoires du plan-relief de Toul. Paris, musée des Plans-Reliefs, Archives]

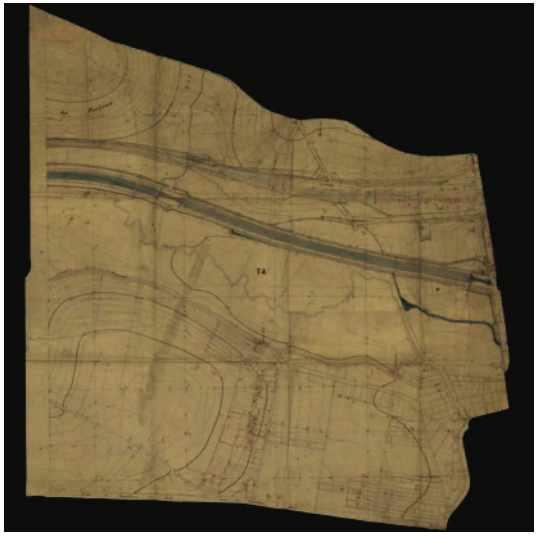

Fig. 14 - Épure. Plan de la Ville de Toul intra-muros. 1846. [Relevés préparatoires du plan-relief de Toul. Paris, musée des Plans-Reliefs, Archives]

Fig. 15 - Épure 14. Canal, voie ferrée, moulins bas. 1846. [Relevés préparatoires du plan-relief de Toul. Paris, musée des Plans-Reliefs, Archives]

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As far as this paper is concerned, however, the substantial documentation consisting of maps, survey plans, drawings, annotations and sketches made it possible to examine in greater detail the key role played by graphic and topographic representation techniques during the stages of preparation for construction of the *plan-relief*.

CONCLUSIONS

While, as previously stated, the parable of the *plans-reliefs* has long since ended, these particular models continue, to this day, to attract attention in relation to processes for communication and for representation of cities and landscapes, thus continuing, to some degree, their vocation for effective description.
In recent years, we have witnessed an updating of these models, as in the case of the project *Des Plans-Reliefs a Google Earth* which produced digitised 3D models of eight of the *plans-reliefs* and integrated them into the Google Earth platform, an experiment conducted as part of the "*La France en relief*" exhibition at the Grand Palais, Paris, in 2012 [14]. In this project, the digital models, created through a combination of photography and laser scanning, were designed for maximum accessibility to the public, also through the possibility of interactive exploration. At the same time, indirectly, the surveying stages also documented the process of disassembly and reassembly of the scale models, thus revealing their structure and permitting an understanding of how they were put together (fig. 17).
Another significant experience was the digitisation of the *plan-relief* of Toul, performed by the University of Nancy's MAP-Gamsau Laboratory as part of the project *Modèles et simulations pour l'Architecture et le Patrimoine*, with the aim of associating a technological approach with methodological reflections in the service of the study of cultural heritage [15].
However, probably the most interesting aspect that emerges from the study of this old form of representation of cities, territories and landscapes lies in its detailed description of the elements and in the currency that seems to return, thanks to this digital technology, due not only to its application, as we have seen, in three-dimensional modelling but also to its possible use in cartography itself.
Indeed, after a long period characterised by maps and models tied principally to "abstract" metric and geometric parameters, we are now returning to use of perceptive and pictorial parameters for description of geographical contexts even at small scale (fig. 18) [16].
An example of this is provided by the *Plan Oblique Relief Europe* interactive web map, which is based on a digital technique for three-dimensional rendering of a ground plan.
There is no doubt that, through such systems, the legacy of the eighteenth-century map, which used both zenithal representation and perspective view in the same format, re-emerges, thus meeting the need to anchor the image to a scaled base. However, these systems also appear to be a reference - conscious or otherwise - to *plans-reliefs* which constitute a progression from those maps, utilising three-dimensionality to achieve a more true-to-life representation as well as offering multiple viewpoints.
The landscape's forms rendered realistically, through use of perceptive parameters and 3D modelling, provide, now as in the past, a better comprehension of the context with the advantage of dynamic access.

Fig. 16 - Plan-Relief de Toul. CRAI, Nancy

Fig. 17 - Photographic technique employed in digitizing the maquettes for the exbition La France en relief. 2012

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Fig. 18 - Plan-oblique, Relief map rendered with WebGL Plan-oblique projection shading

NOTES

[1] Eng. trans. Sturani, M.L. (2010). Tra misura e arte. La rappresentazione topografica del paesaggio nel tardo Settecento e primo Ottocento. In Messina, S. & Ramacciotti, V. (Ed.), *Metamorfosi dei lumi 5. Il Paesaggio* (pp. 101-111). Alessandria: Dell'Orso.

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[3] See on the topic: Gambi, L. (1973). *Una geografia per la storia.* Torino: Einaudi; Farinelli, F. (1992). *I segni del mondo. Immagine cartografica e discorso geografico in età moderna*. Firenze: La Nuova Italia; Quaini, M. (1991). *Per una archeologia dello sguardo topografico.* Casabella 575-576 (1) 13-17.

[4] Scolari, M. (1988). L'idea di modello. *Eidos*, 2 (2), 16-39.

[5] See Warmoes, I. (1997). *Le Musée des Plans-Reliefs. Maquettes historiques de villes fortifiées*. Paris : Éditions du patrimoine.

[6] Eng. trans. Quaini, M. (1987). Le forme della terra. *Rassegna* 32 (4) 63-73.

[7] Eng. trans. Scolari, M. (2005). La costruzione dell'invisibile. Occultamento e camouflage nella guerra moderna. In Scolari, M. *Il disegno obliquo. Una storia dell'antiprospettiva* (pp. 307-333). Venezia: Marsilio.

[8] *Épure*, definition : « Représentation linéaire à une échelle donnée, d'une figure à trois dimensions par ses projections (en élévation, en plan, de profil ou en coupe), permettant de situer dans l'espace la figure ainsi représentée. » See Centre National de Ressources Textuelles et Lexicales https://www.cnrtl.fr/definition/%C3%A9pure

[9] Warmoes, I. (1997). *Le Musée des Plans-Reliefs*. Cit.

[10] Fortier, B. & Prost, P. (1987). Il museo dei Plans-Reliefs a Parigi. *Casabella* 533(2) 44-53.

[11] See *Techniques de fabrication des Plans-Reliefs* in the webpage of the Musée des Plans- Reliefs http://www.museedesplansreliefs.culture.fr/le-musee/presentation-de-la-collection/technique-de-fabrication-des-plans-reliefs.

[12] *Canevas*, definition: «Planimétrique déterminé par des opérations de mesures sur le terrain, matérialisé de façon durable par des bornes ou des repères, et suffisamment dense pour étayer le Réseau. See *Lexique topographique* https://aftopo.org/FR/LEXIQUE/Canevas-planimetrique-7-42.

[13] *Quaini, M. (1991). Per una archeologia dello sguardo topografico. Cit.*

[14] https://vimeo.com/49676258 https://www.google.com/intl/en/culturalinstitute/about/francerelief/.

[15] http://www.gamsau.map.cnrs.fr/?p=1191.

[16] http://www.cartography.oregonstate.edu/tiles/PlanObliqueEurope/.

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