A virtuous example of digital reconstructive modelling

The lost architecture of Victor Horta

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Abstract

The research intends to highlight the process necessary to obtain the digital model of a now lost architecture, belonging to the Heritage that only resides in archival documents and historical studies of later periods. The primary role in defining this process is assumed by digital modelling as a knowledge and preservation tool at the service of Cultural Heritage. Discussing the main procedures concerning virtual reconstructions proposed in the international arena, concerning the London Charter (2009) and the Seville Charter (2012), the contribution illustrates the reconstructive digital modelling study conducted on a lost architecture by Victor Horta, the Maison du Peuple, demolished in 1964.

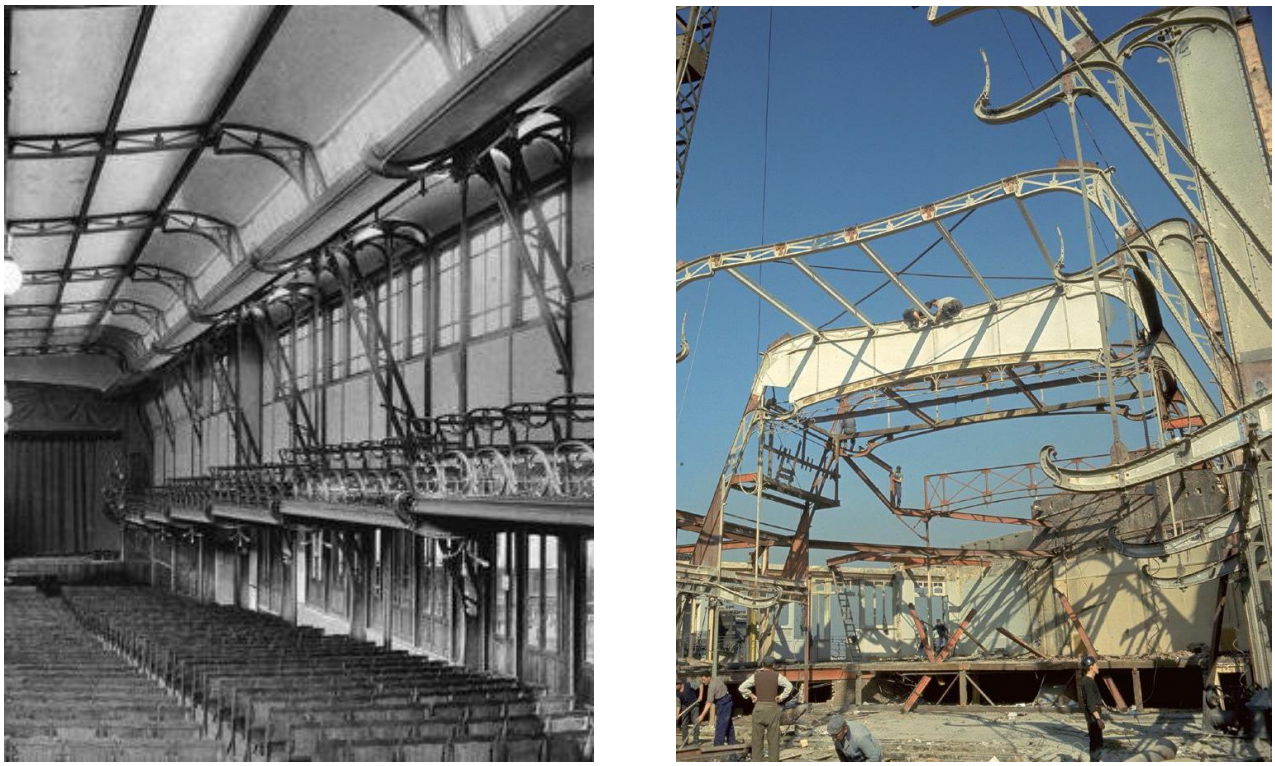
Introduction

This contribution reflects on the subject of digital reconstruction, which in recent years has refined its technologies, investigating the most suitable procedures for restoring data. Over the last few years, from 2015 to 2019, the case study identified has been rediscovered by the Belgian public through a collaboration between the Horta Museum, a UNESCO World Heritage Site, and the AliCe laboratory (Laboratoire d'Informatique pour la Conception et l'Image en Architecture) at the La Cambre-Horta Faculty of Architecture of the Université Libre de Bruxelles. This collaboration materialised in the last year with the digital restitution of the building, which was made usable through the museum site (Derycke and Provost, 2017). This fruition occurs thanks to the placement in the textured model of fixed positions, which allows the user to move between the exterior and the interior. In particular, in the latter, position navigators are placed in the main rooms of the building, allowing the user a 360° view of the selected space. In addition, each room has its information tag, containing a historical photograph and description. Finally, in 2021, this project was chosen as part of the ILUCIDARE[1] Awards, given as part of the European Heritage Awards, in support of the importance of the development of technologies to develop new solutions and stimulate social change towards Heritage. This latest initiative is part of the trends that emerged

[1] ILUCIDARE is a European-funded project promoting Heritage as a resource for innovation and international cooperation.

during the health emergency period, which saw the need to go outside the usual tracks, adapting alternative methods and languages to cross physical boundaries and enter citizens' homes (Lo Turco, Giovannini and Tomalini, 2021).

The case study



a *b*

Fig. 1. La Maison du Peuple, the state of the 'Salle des fetes' a) at its inauguration in 1891; b) at its demolition (© Paul Egor).

The Maison du Peuple building was designed by architect Victor Horta and commissioned by the Voruit cooperative as a place of representation and organisational hub from 1896-99. This association resulted from the spread of socialism and the first Ouvrier Belge party, which produced a radical reform of Belgian society at the end of the 19th century. Within a few years of its construction, the building became increasingly important, thanks to its ability to embody the socialist movement and its skilful use of industrial materials (glass and steel). This allowed the work to become one of the most representative of the author and the Art Nouveau architectural movement.

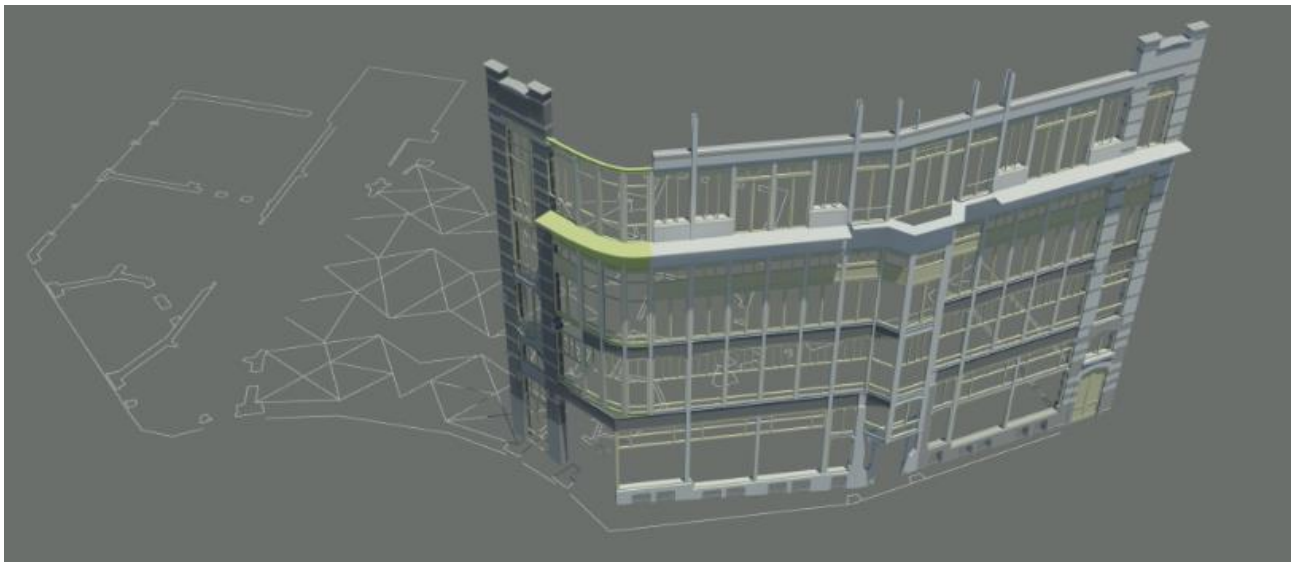
Despite its importance for more than a century, the wave of new urban development at the beginning of the 1960s led to the destruction of numerous buildings integrated into Brussels' architectural heritage. Chief among the buildings lost was the Maison du Peuple, with its demolition in January 1964 (Fig. 1). Despite the unfortunate situation, a group of opponents managed to obtain permission to preserve some elements of the building for future reconstruction. This reconstruction saw the start of numerous projects, which were never realised, except by reusing some of the surviving features in the Café Horta (Antwerp) and the Horta Station (Saint-Gilles) (Horta Museum, no date).

While the intricate vicissitudes of the past have led to the cancellation of the entire building, today it is indispensable for its virtual reconstruction. This process must be based on the analysis of the historical documentation, which is fragmented - due to the loss of the final drawings - and rich in particular experiences - such as the documents related to its demolition. In conclusion, it is essential to reflect on the sources used to support the hypotheses formulated, making them explicit, through the concepts of "scientific transparency" and "historical rigour"[2], to understand how to achieve a correct digital reconstruction (Campofiorito and Santagati, 2020).

The process for its reconstruction

The process used to investigate the building is based on the collection of sources, though: the consultation of digital documentary archives (on the design and management of the building); the interpretative analysis of the architectural drawings; the photographs and images regarding the different phases of construction (from the construction site to the dismantling of the entire building). Through the consultation of these documents, it was possible to rework the sources to restore them to geometric form critically. One of the most well-known software used in two-dimensional processing, AutoCAD, was used to carry out this restitution. The redesign process focused on the restitution in two-dimensional (dwg) drawings of the first floor and its main façade, two of the most relevant Mongiana representations identified through the analysis of the sources (Fig. 2a). Their geometric reconstruction made it possible, on the one hand, to understand the dimensions and proportions of the entire building (global approach) and, on the other hand, to identify its component elements (local components). This analysis led to a system based on the modelling of individual key elements in the 3D modelling phase, whose repetition, rotation and reflection made it possible to determine the building in its entirety and complexity (Fig. 2b-c).

[2] Two principles were initially contained in the fourth section on Documentation within the London Charter (2009), later developed within the eight principles in the Seville Charter (2012). (Brusaporci and Trizio, 2013).



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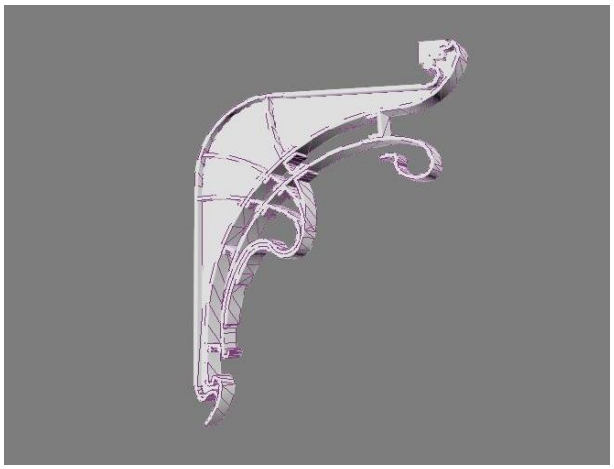

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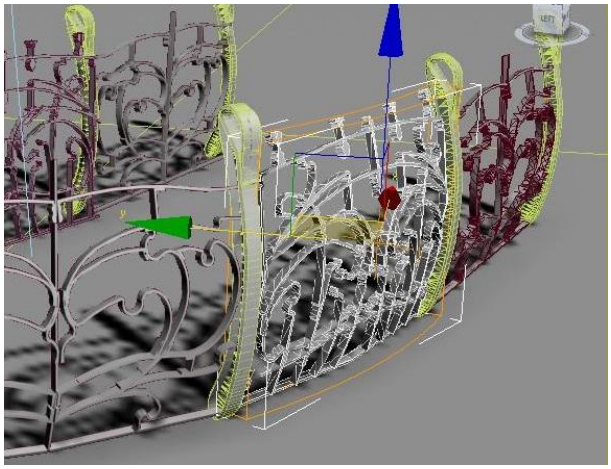

c

Fig. 2. a) The ViewPort of the modelling phase from the two-dimensional reference drawings; b) and c) ViewPort of the modelling of individual key building elements (© Paul Egor).

Thus, the digital model becomes the result of an interdisciplinary investigation, and it is therefore essential to attribute a level of Reliability (Ambrosio, 2022) to the three-dimensional elements modelled. This level of Reliability was defined based on the different sources used for its reconstruction, and each was associated with a colour (Fig. 3 a-b-c-d). This type of representation attempts to make explicit, schematically and immediately, the paradata, i.e. all those process-related data sets, in this case, specific to the definition of the modelling of three-dimensional elements. In addition, due to the many different sources, discrepancies emerged, so it was decided to consider the photographic material as the most representative and most appropriate for the definition of modelling.

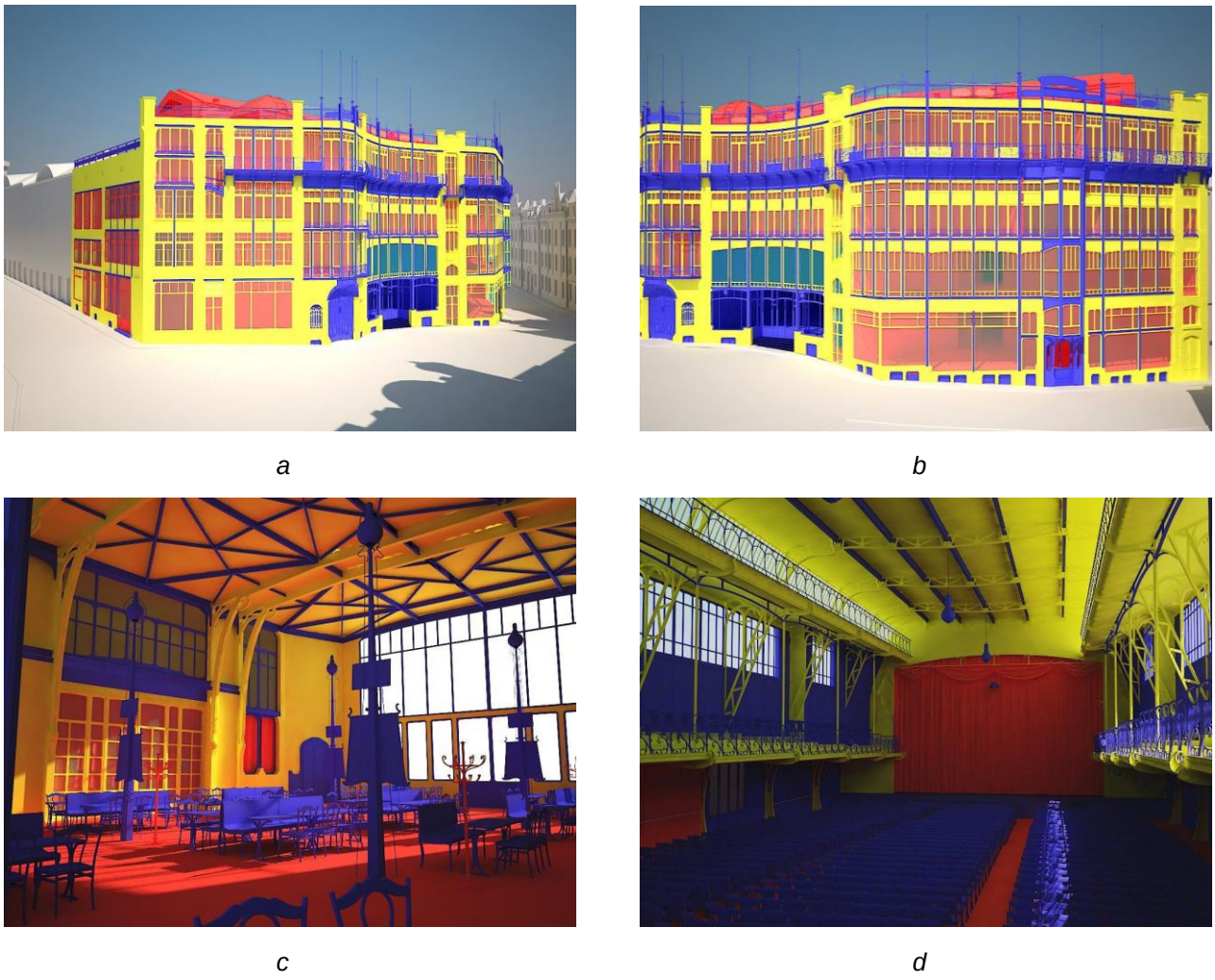

Fig. 3. The visualisation of the degree of Reliability of the model by defining three categories, derived from the different types of sources: i) in blue, the elements created through the study of photographs at a high level of detail; ii) in red, the photographs at a low level of detail; in yellow, the two-dimensional technical drawings. a) and b) the main façade; c) the 'Salle de café'; d) the 'Salle des fetes' (© Paul Egor).

The digital model

Three-dimensional modelling was tackled within the 3Ds Max software, chosen for its high editing and customisation capacity, thanks to the loading and availability of plugins made by third parties. All the modelled elements were analysed from a geometric point of view, searching for an optimisation of the polygons and vertices of the surfaces that constitute them (low poly). Particular attention was paid to the metal elements that characterise and define the structure of the work, both outside and inside. In the interior, attention was focused on two main volumes, which represent the layout of the smaller spaces, the party room located on the top floor and the coffee room on the ground floor. In these rooms, greater attention was paid to the layout and realisation of the interior furnishings so that the three-dimensional model could be used to draw views from the photographs of the time (Fig. 4).

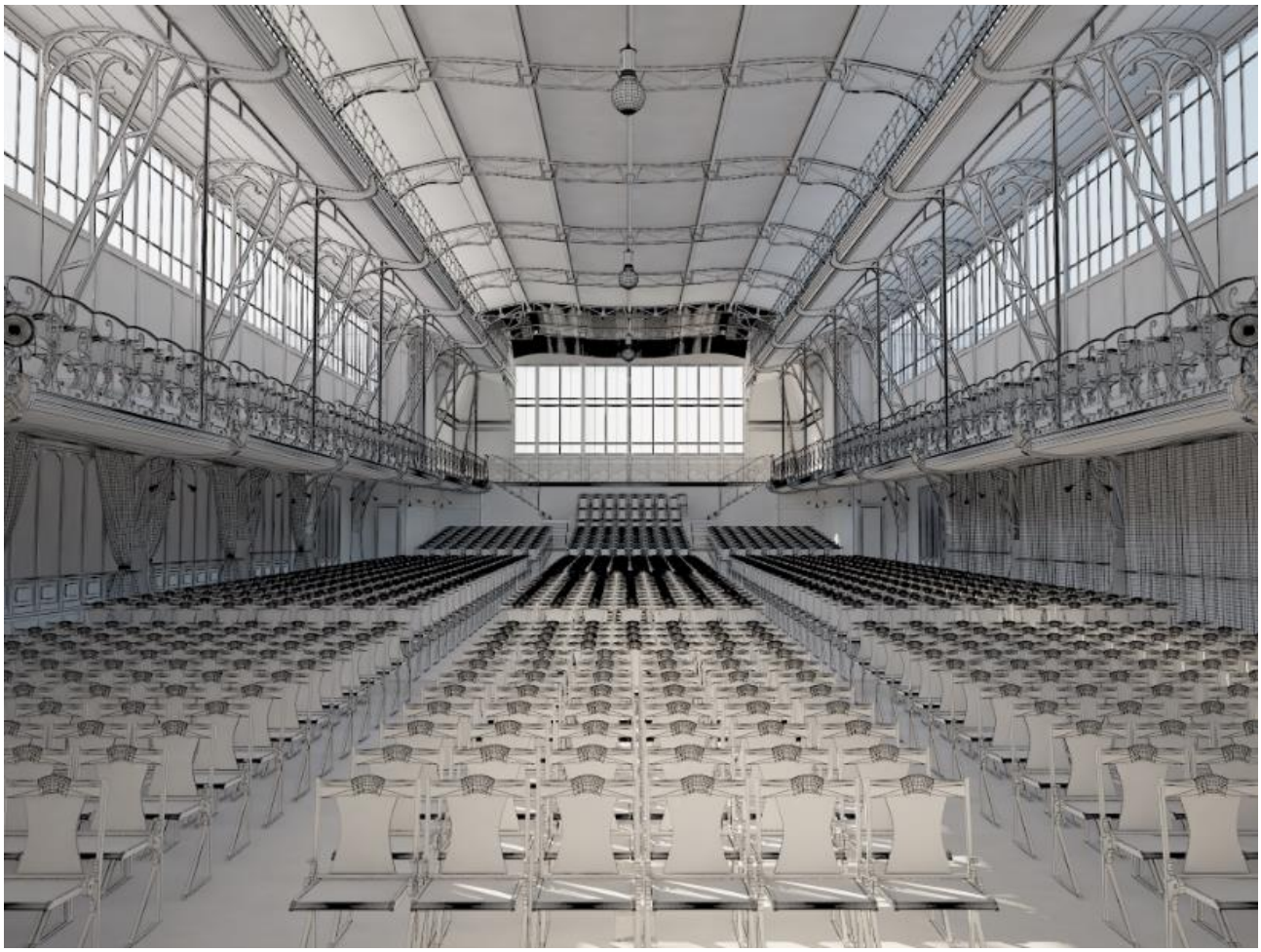

Fig. 4. Wireframe view of the 'Salle des fetes' from the stage. (© Paul Egor).

Conclusions and future developments

The virtual reconstruction of the Maison du Peuple aims to emphasise the potential of digital representation to reconnect the present and the past over time (Campofiorito and Santagati, 2020). More specifically, the contribution aims to highlight the process that led to the three-dimensional modelling of the work. This process is based on four main phases: i) source retrieval and classification, ii) two-dimensional restitution, iii) three-dimensional modelling, and iv) data discretisation to understand the work in its totality and its respective singularities (Fig. 5). It is clear that in the face of the new digital technologies, which use the third dimension to restore architectures that no longer exist, it is necessary to identify a collective approach capable of achieving the desired result in terms of transparency, clarity and correctness of the process used (paradigms).

In conclusion, the three-dimensional model obtained is nothing more than the basis for guaranteeing and developing a better enjoyment of the Asset, which can range from the simple exploration of the digital replica (as in the case of the Belgian project for the Horta Museum) to the prototyping of immersive techniques such as Virtual Reality or interactive mechanisms such as gamification techniques. It is no coincidence that in recent years, the need to be able to benefit from an asset is becoming increasingly predominant, especially after the emergency health period we have just experienced. This has allowed digital reconstructive modelling to emerge as one of the main tools for remotely and interactively visiting Goods that are no longer accessible. It is therefore essential to consider one of the future objectives of the following research to develop different outputs of the 3D model, making them explorable and interrogable, and enriching them

with other cultural content. The multiplicity of outputs justifies their possibility of disseminating different knowledge and addressing an increasingly heterogeneous group (Lo Turco, Giovannini and Tomalini, 2021).

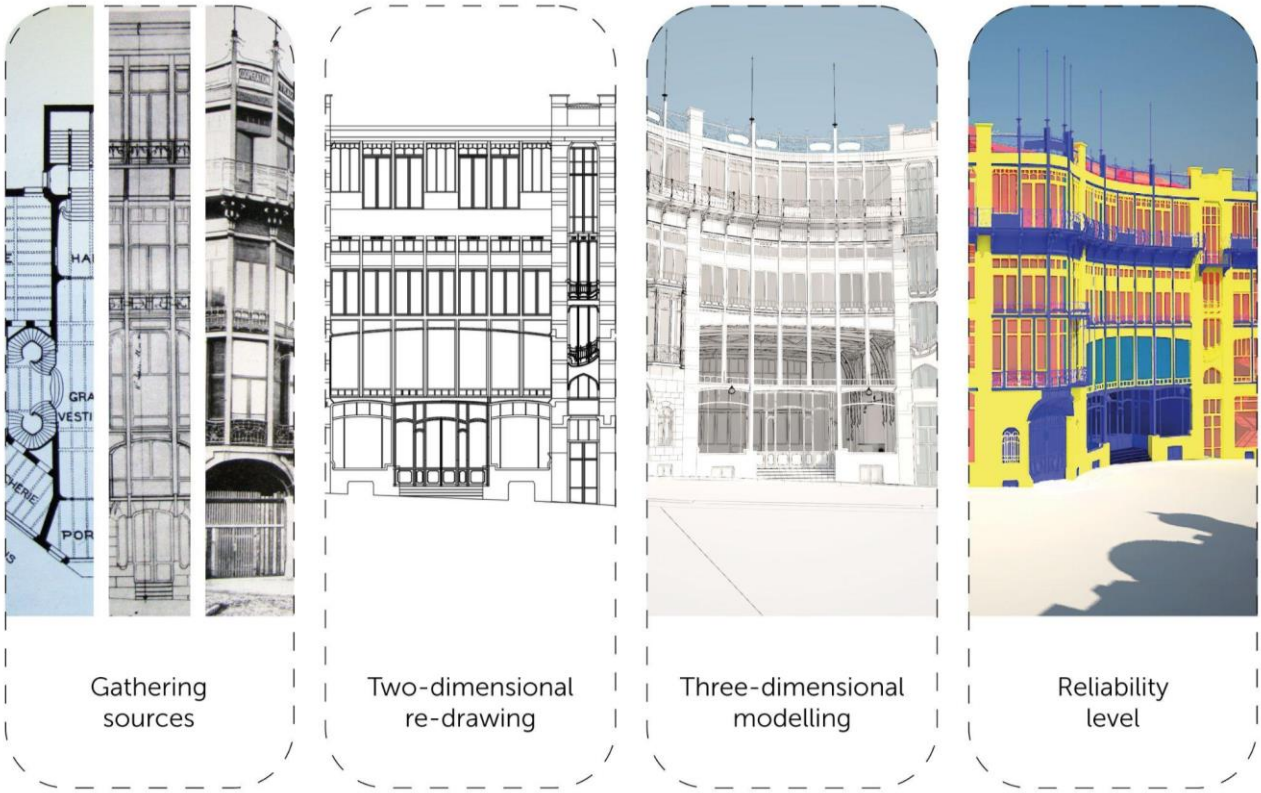

Fig. 5. The main steps in defining the process that led to the reconstruction of Victor Horta's work (© Paul Egor).

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