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## *The culture-forming aspects of revitalization – the case of extension of the Sarphatistraat Offices building in Amsterdam*

### *Introduction*

When Cicero used the term “cultura animi”<sup>1</sup> for the first time in his work *Disputationes Tusculanae* he distinguished two significant aspects of culture stating that: “To you it is that we owe the origin of cities; you it was who called together the dispersed race of men into social life” [1]. It is then culture that generates both cities and societies. In that context cities should be considered to be public spaces with characteristic values of cultural heritage where the phenomena and events, creating a separate

sphere of life and activities of groups of people, take place. In contemporary cities such activities universally include all kinds of artistic performances and the buildings of cultural value most often include theaters, cinemas, and entertainment venues. It should be remembered, however, that apart from mass culture such buildings as museums, art galleries or libraries also exist in the city culture space. Such an extended list of the buildings of cultural value in the city does not include all possible examples. For instance the building of Sarphatistraat Offices in Amsterdam designed by Steven Holl and built in 1996–2000 defies certain patterns.

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<sup>1</sup> Cultura animi – Latin for cultivation of the mind.

### *Sarphatistraat Offices*

The building of Sarphatistraat Offices is an addition to the renovated 19<sup>th</sup>-century building of former Federal Warehouse of Medical Supplies located in downtown Amsterdam. The extension of the four-story U-shaped brick building included adding a huge pavilion located by the Singel Gracht canal adjacent to one of the outbuildings (Fig. 1). As requested by the investor – Public Housing Corporation, a firm managing real estate – the existing part was designed as offices and the newly-designed addition as a multi-functional space with a conference room that could be used for weddings, meetings and other events (Fig. 2). A 48-car parking garage was designed in the underground section. A new promenade was designed in the public space around the building along the canal with benches and a row of trees [4].

The investment can be then considered to be a revitalization of a post-industrial space which lost its original function and purpose. No revitalization is limited only to

renovating the building fabric but it also has additional sociological effects. The building which was designed to meet the needs of the local community positively affects the integration and activation of small groups of people connected with their place of residence, serving the society-forming role. Participating in local cultural events creates a sense of cultural and environmental identity. Thus that specific investment caused repercussions in culture.

The innovative function of Sarphatistraat Offices is also visible in the original architectural form. The American architect, Steven Holl<sup>2</sup>, who is the author of the project, in his own description of the design published on the official website of his design office – Steven Holl Archi-

<sup>2</sup> Steven Holl, b. in 1947, graduate of the University of Washington, then continued architectural studies in Rome in 1970. In 1976, he joined the Architectural Association School of Architecture in London. At that time he established his architecture design office in New York. In 1981, he started to teach at Columbia University.



Fig. 1. Saarphatistraat Offices, view from the Singel Gracht canal.  
Arch. Steven Holl. Source: [3]

Il. 1. Saarphatistraat Office, widok od strony kanału Singel Gracht.  
Arch. Steven Holl. Źródło [3]

tects – mentions the associations with the Menger Sponge, one of the most famous fractal objects [4].

Indeed, the free composition of the functional and spatial design of the building resembles the structure of a sponge due to the layout of the rooms and the wall perforation system visible both in the plans and sections of the building. That impression is intensified by its copper cladding which is also perforated both on external walls and the reveals perpendicular to them, which makes the openings look like they penetrate into the building. The elements of the perforated cladding were also used in the interior design, covering lighting and ventilation installations. The self-similarity between window openings of various sizes and the mechanical ventilation as well as the three-dimensional design of details evoke associations with the Menger Sponge – one of the most important clas-



Fig. 2 Interior of the added multi-functional room in Saarphatistraat Offices. Source: [3]

Il. 2. Wnętrze dobudowanej sali wielofunkcyjnej Saarphatistraat Office. Źródło [3]

sic fractal objects. However, there is more to it than free associations as the Menger Sponge, whose walls are the Sierpinski Carpets, is a set of a highly regular structure based on a precise construction algorithm and the dimensions as well as the layout of the openings are connected by mathematical relations.

### *The Sierpiński Carpet and the Menger Sponge*

The construction of the object called the Sierpiński Carpet was first presented by the Polish mathematician – Waclaw Sierpiński in 1916 in his work titled *Sur une courbe cantorienne qui contient une image biunivoque et continue de toute courbe donnée*. According to the simplified descriptive definition the construction of that set is determined by the following procedure: it begins with a square (called the initiator) which is divided into 9 congruent subsquares, of which the central subsquare is removed. The same procedure of dividing and removing the central subsquare is then applied recursively to the remaining 8 subsquares (called the generator.)  $N$ -steps in the construction result in a set whose area is 0. The Sierpiński Carpet is a fractal object whose construction method is de-

termined by the recurrence relation, its fractal dimension is a fractional number and it is  $d = \log 8 / \log 3 = 1.892789$  and its characteristic feature is self-similarity [2].

Ten years later, in 1926, Karl Menger, an Austrian mathematician in his work titled *Allgemeine Räume und Cartesische Räume*. I presented for the first time the construction of a three-dimensional analog of the Sierpiński Carpet. That object was called the Menger Sponge and the construction of that set results from the application of the following procedure: the initial set (called the initiator) is a cube whose each face ( $a$ ) is divided into 27 congruent cubes which are adjacent to one another (whose walls are  $a/3$ ) whose sum is the set of the initiator. In the first step of the construction the cube in the very center,

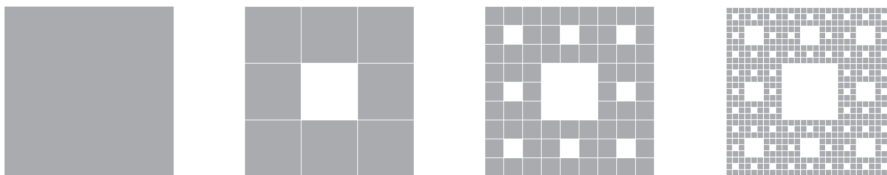


Fig. 3. The Sierpiński Carpet. The first four steps of construction. Prepared by P. Furmanek

Il. 3. Dywan Sierpińskiego. Cztery pierwsze kroki konstrukcji. Oprac. P. Furmanek

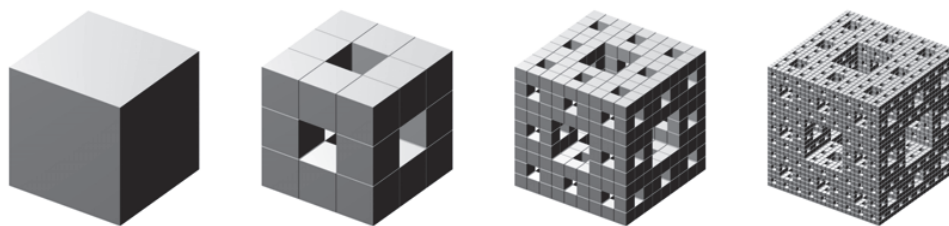


Fig. 4. The Menger Sponge. The first four steps of construction. Prepared by P. Furmanek

Il. 4. Gąbka Mengera. Cztery pierwsze kroki konstrukcji. Oprac. P. Furmanek

which is not adjacent to any of the side walls of the initiator, and six cubes which are adjacent to that cube are removed. In total seven cubes are removed in the first step of the construction of the generator. N-repetitions of the procedure to the remaining twenty cubes results in the construction of the Menger Sponge whose volume approaches zero for n number of steps which approaches

infinity<sup>3</sup>. The Menger Sponge is a fractal that just like the Sierpinski Carpet results from the recurrence procedure, fractal dimension is a fractional number and it is  $= \log_{20}/\log_3 = 2.726833$ , and the self-similarity is imprinted in the construction process [2].

<sup>3</sup> Generating the Menger Sponge is also possible in the iterated function system as affine transformations and recurrence of that pattern.

### *The Menger Sponge as a source of inspiration in developing the form of Sarphistraat Offices*

The analysis of the form of Sarphistraat Offices demonstrates a fairly big inconsistency between the building designed by Steven Holl and the mathematical model of the Menger Sponge. This is evident in the inadequate proportions of the whole building, random and irregular placement of window and door openings as well as no mathematical constant proportions between the sizes of the openings in the façades.

However, that building should be considered inspired by the theory of fractals, which is admitted by its very designer Steven Holl. In his project of Sarphatistraat Offices Steven Holl mentions as a source of inspiration not only fractals but also music and specifically Morton Feldman's *Patterns in a Chromatic Field* for cello and piano [2]. The associations with the works by Piet Mondrian, a Dutch artist, co-founder of the De Stijl group, the founder of abstract Neo-Plasticism in painting also seem correct. All these factors testify to Steven Holl's broad interests and his great creative potential but they do not allow one to include the building of Sarphatistraat Offices in the category of fractal architecture designs in the precise meaning of the word.

It is, however, difficult to determine if the strict application of the mathematical model of the Menger Sponge



Fig. 5. Fragment of the Menger Sponge as an alternative version of the addition to Sarphatistraat Offices.

Prepared by P. Furmanek on the basis of Fig. 1

Il. 5. Fragment gąbki Mengera jako alternatywna wersja rozbudowy Sarphatistraat Office.

Oprac. P. Furmanek na podstawie il. 1

would be a better solution. The included Figure 5 is a theoretical, visual simulation of such a situation, however, it seems that such a solution features a static composition of the façades, which adversely affects the architectural values of the building.

*Translated by  
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### *References*

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***Kulturotwórcze aspekty rewitalizacji na przykładzie rozbudowy budynku Sarphatistraat Offices w Amsterdamie***

Wśród wielu aspektów kultury należy wymienić funkcje miastotwórczą i rolę socjotwórczą. Zaprojektowana przez amerykańskiego architekta Stevena Holla rozbudowa budynku Sarphatistraat Offices dzięki nietypowej funkcji integruje lokalną społeczność. W ten sposób rewitalizacja przestrzeni śródmiejskiej pełni rolę kulturotwórczą. Dodatkowym

walorem budynku jest nowatorska forma inspirowana gąbką Mengera – jednym z bardziej znanych obiektów fraktalnych. W artykule porównano formy zrealizowanego projektu i teoretycznej symulacji wizualnej z wykorzystaniem modelu matematycznego fraktala.

**Key words:** culture, revitalisation, Menger Sponge

**Słowa kluczowe:** kultura, rewitalizacja, gąbka Mengera