UDC 711

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THE URBAN TYPOLOGY MATRIX (1867–1918)

Abstract: *The study is going to describe those new methods in the field of urban morphology, which define the urban types in historic Hungary (1867-1918) via categorization of their diverse urban tissues and basic urban types. The new method has been developed by the author because there were no suitable methods for the morphological research of the towns in the former Austria-Hungary (1867-1918). The first part of the study presents the limitations and opportunities that justify the need to develop the method. The urban types can be determined by the urban morphology matrix and this defines a higher degree of typology, the urban typology. 70 towns were studied and 16 basic urban types and 9 final urban types were distinguished in the territory of historic Hungary.*
Keywords: *urban typology, methodology, urban matrix, 1867-1918, Central Europe.*

Introduction

The period between 1867 and 1918 is a complex era in European and especially in Central-European history, so its direct impact on urban tissue heterogeneity and structural complexity can be felt today.

Dramatic economic and historical changes followed the Compromise Agreement (*Ausgleich*, 1867) between the former Austrian Empire and the former Hungarian Kingdom. Progressive urban development started as a result of the agreement and the upcoming industrial revolution, which in the historical Hungary (1867-1918) occurred with a delay, the country could enter only the second wave of industrial revolution (1871-1914), however, it had partly worked off its disadvantage until the First World War; the urban evolution was determined by a new urban pattern, urban fabric, urban types and different town construction. New directions in the evolution of the urban fabric in the historic Hungary and in some parts of the Austrian Empire were influenced by economic changes and distinct functions within the settlements and by landscape features in moderation.

During research process, 80 towns at the territory of the former Austria-Hungary were studied (Fig. 1). The towns in the territory have a great variation in terms of geographical and hydrographical features and in terms of development; the selected samples demonstrate the most progressive development and can act as examples of determined feature combinations. The evolution of the towns in the historic Hungary (1867-1918) reflects the diversity of the country's geographical and hydrographic characteristics and the historical inclinations of the territory that prevented the formation of a unified urban structure and townscape typical of the whole territory. After 1920, as a result of First World War peace agreement, the Treaty of Trianon, the majority of the towns of the former historic Hungary remained outside the borders of the today's Hungary.

Typological studies of the towns in the research territory show clear results until the Austro-Hungarian compromise agreement (*Ausgleich* 1867): the towns in areas of low and high relief had easily distinguished townscape and urban structures. However, later the evolution of urban types became individuated due to multiplier effects of *Ausgleich* and the industrial revolution. The modern town emerged, but it was yet unspecified in its diversity according to urban fabric types and urban type.

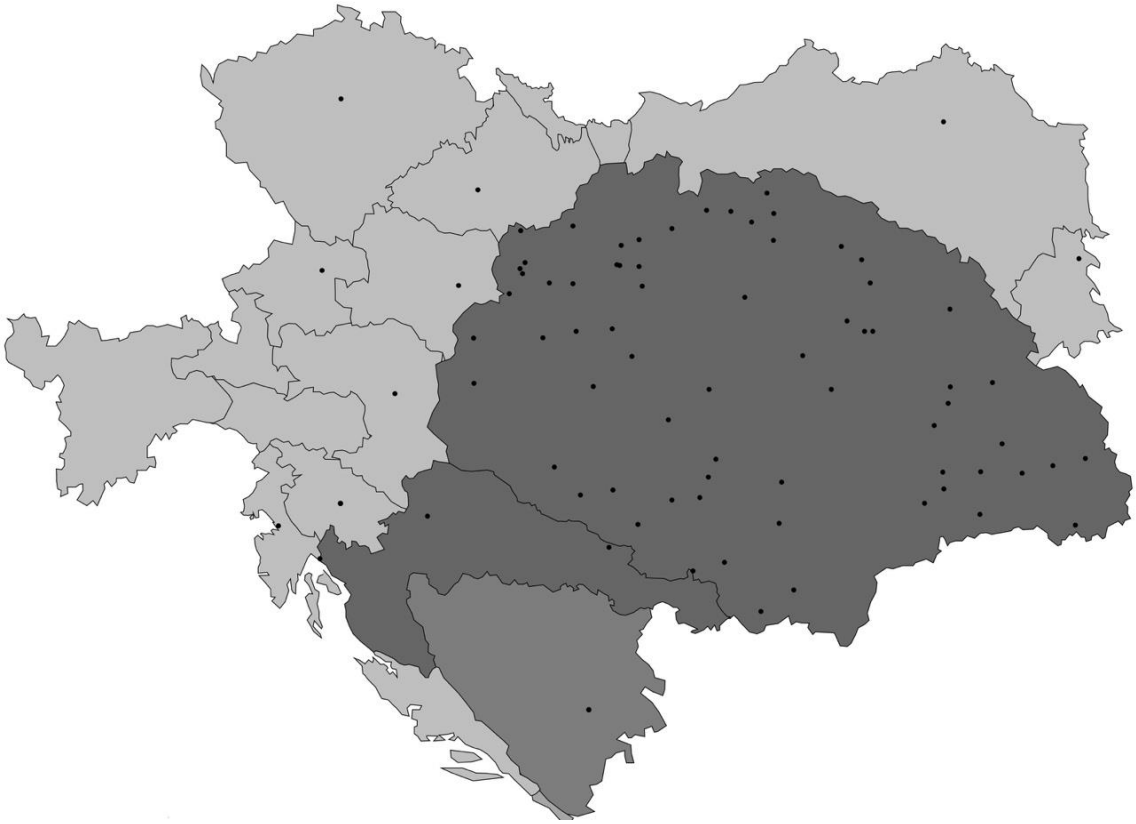


Figure 1. Austria-Hungary (light grey: Austrian Empire, dark grey: Historic Hungary, mid-grey: Bosnia-Herzegovina). Studied towns are marked by black circles. Drawing by the Author

Methodology

This study is aimed at finding the urban types in the territory of the historic Hungary between 1867 and 1918.

Being conscious of the nature of the town's heterogeneous tissue, which hardly allows the creation of a unified system that would accurately determine the town as an entity, thus making it possible to create a typological system that can define a settlement and group towns by matrix of variables in the territory, I made a decision to incorporate within the study an analysis of urban fabrics and their correlation to prove that via functional circumscription of urban fabrics the classification of heterogeneous urban fabric/typological system can be formed.

The study and the final urban taxonomy (urban typology matrix) is based on the following methodology:

The analyses of urban structural changes follow the historical stratification (Fig. 2) of the urban fabrics, their evolution over time form the 1850s (the considered evolutional milestone is 1867) till the late 1920s. The outline of the areas where significant transformation took place in the period of the Austria-Hungary was obtained by the layering of these maps. The historical stratification as a phenomenon is a reflection on Conzen's definition: "a spatially varied mixture of different period types and styles in the townscape acquired through the accumulation and selective replacement of forms" (Conzen, 2004, p. 247).

The examination of the progressive urbanization of the intensively growing towns in the historic Hungary (between 1867 and 1918) as a part of the Austro-Hungarian Empire required a new type of typology, that is partially based on morphological analysis. The methodological focus includes the Conzenian urban morphology (English school) and the Caniggian approach (Italian school) due to establishing an applicable typology for the studied towns. The basics of the urban fabric typology are the urban fabric/tissue (Caniggia-Maffei, 2001/1979) or plan-unit (Conzen, 2004) itself, as a diverse combination of streets, urban blocks, parcels and building,

additional (green, open) spaces; the morphological regions (areas of homogeneous urban forms) and the morphological periods (Conzen, 1988) as urban manifestations of social and cultural history. The integrated methodology, besides the urban forms, has to take into account those historical events that had an influence over shaping the built environment. The integrated morphological method is used in the analysis and taxonomy of the urban fabric types (1867-1918).

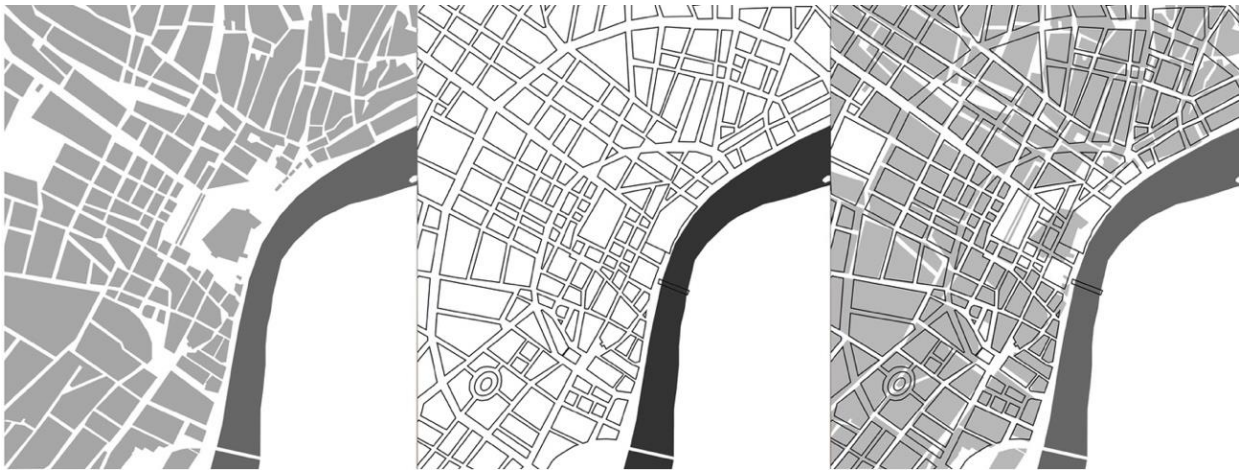


Figure 2. Historical layering. Identification of the changes in the urban structure: the urban structure of the inner town of Szeged, Hungary, before the regulation as seen in the first sketch and after the regulation – sketch in the middle, based on the maps: OSZK TM 11 012, OSZK TM 332, OSZK TM 11 067. Drawing by the Author

In the urban typology matrix, apart from the urban tissue types (1867-1918), the basic urban types should be distinguished, since these types possess unique urban fabric dominance, based on their characteristics (basic types do not reflect individual cases; their classification is given according to similar/identical and urban fabric types and combinations, taking into account the structural evolution as well). A higher level of urban typology addresses the complex urban types, whose cases were created through the combination of basic types and urban fabric types. The urban typology can be determined by the whole-part (town-urban tissue) and part-whole (urban tissue-town) methodology: the town is determined by urban tissue combinations and inner-town relationships or the urban tissue types can be distinguished by urban analysis (restriction of the town into urban forms).

Urban typology matrix: (1.) Combination of various historical urban tissues and urban tissues (1867-1918) constitute the suppositional basic urban types. (2.) The combined urban type can be created by a combination of suppositional basic urban types, or (3.) the combined type could be determined by a combination of suppositional basic urban type (types) and urban tissue types (these type or types could be historical or 1867-1918 types, their mutual characteristic is that these characteristics do not determine basic types).

In the urban typology matrix, the combinations of basic types (marked by numbers) and urban tissues between 1867 and 1918 (marked by letters) form a line as in the case of the result of a mathematical matrix. The relevant elements of the combination are the elements (properties) that are characteristic of the final urban typology group, which build the matrix line. The matrix takes into account the 41 different urban tissue types and the 16 basic urban types, but in the matrix, the zero (0) is equivalent to the variables that do not characterize the urban type group. The final urban typology, like the urban tissue typology, does not take into account minor (insignificant) differences but focuses on dominant characteristics.

Measurement and analysis

The characteristic urban tissue types between 1867 and 1918 were determined and defined by the analysis of 70 towns in the area of historic Hungary (1867-1918) by the integrated method. The types focus on the general urban tissue taxonomy, thus ignoring the minor incoherence which does not change the urban tissue classification. The description complies with the unified criteria: written analysis and visual interpretation through the application of patterns and schemas. The descriptive section summarizes the variations of built environment, green spaces and water features and their relationship with buildings and streets, terrain, road geometry and structure, nature of the connections in the town.

41 different 1867-1918 urban tissue types were specified (main types and subtypes together), the urban tissue types are indicated by capital letters as main categories, the subdivision is indicated by a combination of capital and small letters (Fig. 3), due to the effective application of such combinations in the further research. The urban tissue types (1867-1918) cover the urban agglomeration from the suburbs to the central core, also including the green areas (inner yards, courtyards, patios) in the classification.

Figure 3. Urban tissue types (1867-1918)

The taxonomy of the basic urban types was based on the unique and clear urban tissue combinations and urban structures. The specified 16 different basic types (Fig. 4) are marked by numbers, the base of the further classification was given via determination of these types, since the basic urban types, as the name indicates, acted as fundaments of the combined urban types and the final urban type classification. The suppositional urban types did not necessarily keep the original, pre-compromise urban fabric, thus regulations, entire transformation, or expansion could act as a determinative of classification.

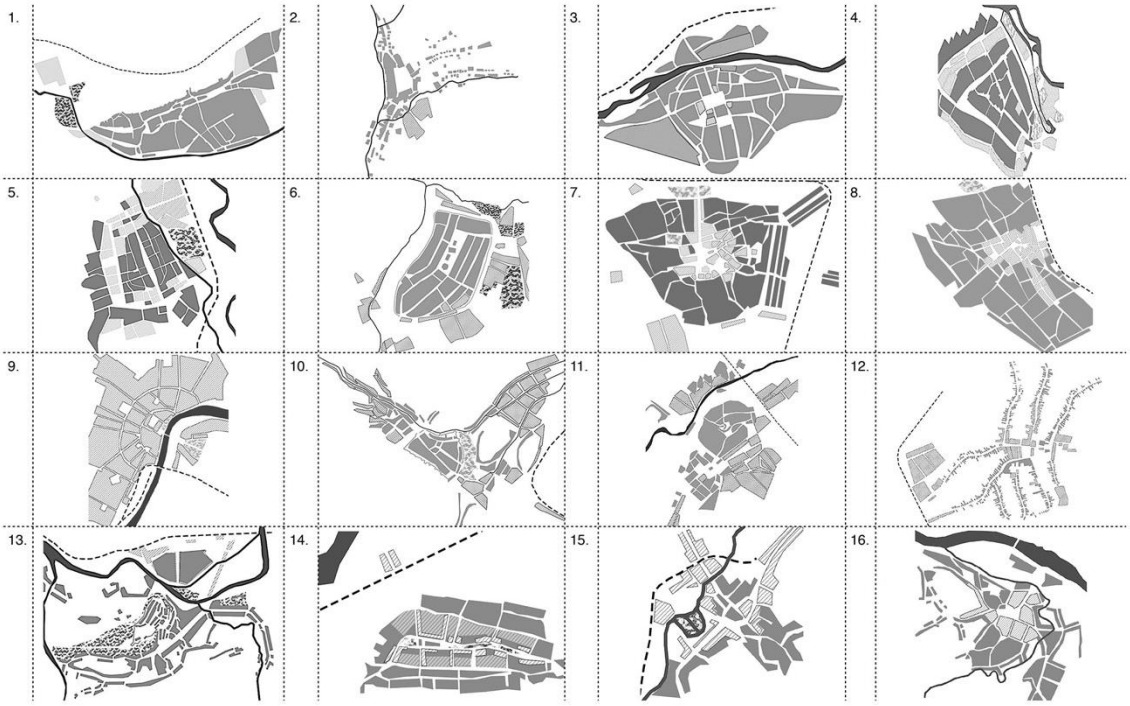


Figure 4. Basic urban types

The townscape analyses (Fig. 5) are supplementing and encompassing the urban tissue typology as they highlight the urban planning and architectural tendencies in the period between 1867 and 1918 and their strong connection between each other. During the research period, a certain degree of universalization began, which mingled with the local character/elements and the newly built environment, to which contributed architects who were working in the territory of the Austro-Hungarian Empire and the urban regulation challenges of modernizing towns.

Figure 5. Zagreb at the beginning of the 20th century and in 2016
(archive photograph and photo taken by the Author)

Typological parallels, i.e. parallel types of the territory, refer to the unifying (urban) planning principles of the era and to the structural transformations dictated by the process of urbanization and urban embellishment actions.

The fundamental criteria for urban type determination are the inner-urban combinations and location of urban tissue combinations and green spaces composition.

The purpose of the urban type taxonomy is to create thematic subgroups, which reflect the identity via creating urban characters, the urban tissue types (1867-1918) and basic types. The classification considers the selected remarks:

1. The classification takes into account the towns in the basic and combined urban type category in order to give a wide and full image about the final urban type groups.

2. The classification is based on the level and nature of urban transformation, and on the relationship of the changes between the original urban tissue and structure.

3. The classification does not take into consideration the urban tissue types (1867-1918) on the periphery (urban tissue types created by an industrial area, barracks, villas, public buildings like hospitals, asylums, etc.), since these do not have identity creating influence, while most of the towns own such an identity. Also having in mind that in some cases the industrial areas were integrated into the urban fabric of the wider central area, or the development of the town was oriented towards to the industrial area, such integration was made into the town fabric. At the end of the 19th century, this tendency led to the limitation of the industrial character within the border of the town (Industrial Law: 1885. Act. XVII).

4. The classification only considers the urban tissue types (1867-1918) with the combination of the basic urban types since the basic urban types are representatives of the pre-compromise urban structure and urban tissue combinations.

5. The edge towns/satellite towns (could be also worker suburbs) do not have an identity-creating feature, as those were established at the border of the town or areas beyond the railway lines or in the vicinity of the industrial area. The classification does not ignore these settlements but considers them as an additional attribute, which has no direct impact on the types (in 1867-1918 urban tissue types table is taken as a separate urban tissue type with consideration of its variations).

6. The combined types are going to be defined as an integral part of the final urban typology, according to the urban typology matrix.

7. Towns have to be assorted according to the nature of the transformation. Towns where the structural changes were absent, or almost absent, and the 1867-1918 urban transformation forces were manifested in the form of a single building or a group of representative buildings integrated into the original urban tissue, form the first urban type group.

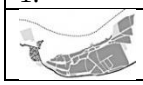
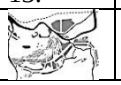
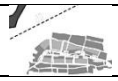
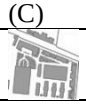
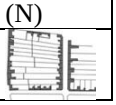
8. Transitional groups are possible: some towns have no strong position in the group since the general urban types are formed by dominant (identity creating) attributes and the complex character of the towns gives the opportunity for classification in a larger scale.

Urban typology – the result of the urban typology matrix

Based on the urban matrix combinations, we can distinguish 9 definitive urban type groups, which have unique characteristics. The typology can be applied not only for the 70 studied cities but also for other cities in Central Europe if their urban tissue typology has been already determined. The 9 final urban types are divided into subgroups in some cases, which differ at the level of urban tissue types. The type 1, the group of stagnant cities (a) and the group of partially stagnant cities (b1, b2), is distinguished by the tenth element [(Ib)a and (L) city tissue type] of the row. However, the two types of urban tissue are dominant in the towns whose very level, their determining character of an urban type is indisputable.

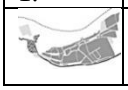
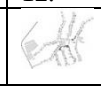
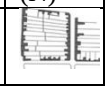
1.a. Stagnant towns, with potential infill into the urban tissue or into un-built areas (barracks, industrial buildings and work-houses, public buildings as hospitals, asylums and so on). There are no drastic urban transformations, although minor street regulations (street straightening) are possible.

a.

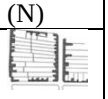
1.	2.	3.	6.	11.	12.	13.	14.	(C)	(M)	(N)
										

b1. and b2. Semi-stagnant towns, with potential infill into the urban tissue or into un-built areas (barracks, industrial buildings and work-houses, public buildings as hospitals, asylums and so on). There are modest urban transformations, although minor street regulations (street straightening) are possible.

b1.

1.	2.	3.	6.	11.	12.	13.	14.	(C)	(Ib)a	(M)	(N)
											

b2.

1.	2.	3.	6.	11.	12.	13.	14.	(C)	(L)	(M)	(N)
											

2. Regulated towns, with extended urban tissue transformation in the central areas, with infill into un-built areas (barracks, industrial buildings and work-houses, public buildings as hospitals, asylums and alike) and regulated street network (street straightening). The urban transformation is focused on the central areas, especially on the main square (former market square) and surroundings, mostly the regulations did not follow rearrangement of the plots or followed just in limited territories (the original structure of the plots remained). A radial road between the railway station and the town core is possible, but it is not a requirement. As a result of the regulation, the springs were also regulated/covered and marshlands desiccated to gain construction sites. Two subtypes:

a.

7.	8.	15.	(C)	(Ja)	(Jb)	(Jc)	(Je)	(N)
								

b.

8.	(C)	(Ic)	(Ie)	(Jb)	(Je)	(N)
						

3. Towns with linear urban development lines and morphological periods' manifestation.

a	Medieval tissue	(C)	(E)	(F)	Housing on slopes	b	Medieval tissue	(C)	(H)	(Ia)a	(Ja-Jb)	Housing on slopes
												

4. Towns with more ring and radial roads (total or partial transformation). The urban type is characterized by regular simple tissue (the grid is created by intersections of radial roads and rings), radial roads and inner and outer ring roads. Real ring roads not only have representative function but they were constructed to satisfy the demands of the transport increasing in number and infrastructural changes. The river determines the development direction and creates a unique cohesion between the built environment and the riverbank, a rare example among the studied towns where the riverside host representative buildings.

9.	(C)	(E)	(G)	(H)	(Id-Ie-If)	(Jb)a	(Jc-Jd)	(Jg-Jh)	(N)
									

5. Towns with a radial road or/and a ring road, whose core underwent structural and architectural transformation. The ring road is not as regular as in case of the 4th group, it could be a full circle or a partly constructed road, in case of the development, it can be constructed at the place of the demolished defence walls or in such a territory where there were no town walls; the radial road connects the town core with the railway station in most of the cases.

7.	(C)	(Ed)	(Ia)	(Id-Ie)	(Ja)	(Jc-Jd)	(Je)	Jg(a)	(N)
									

6. Towns with a radial road or/and a ring road, whose core kept its original urban tissue and built environment, minor changes and infill are possible. The ring road is not as regular as in case of the 4th group, it could be a full circle or a partly constructed road, in case of the development, it can be constructed at the place of the demolished defence walls or in such a territory where there were no town walls; the radial road connects the town core with the railway station in most of the cases. The structure remained almost the same, street regulations are not remarkable in the simple tissue, but additional new districts emerged in the period.

5.	(C)	(Ia)b	(Ib)a	(Jb)	(Jc)	(Jg)a	(M)	(N)
								

7. Towns with a radial road or/and a ring road, the town core partly saved its original urban tissue and built environment. The group is a mix of the 5th and 6th group since these towns kept the original structure (structural changes possible in the centre), but a high percentage of the built environment changed. The presence of a ring and a radial road is not the case of all towns in the group. The ring roads could have unfinished structure and full circle, the radial roads function as direct contact between the railway station and the urban core).

3.	(C)	(Ed)	(Hb)	(Ia)	(Ic– If)	(Ja)	(Jb)	(Jc)	(Jg)a	(Jd)	(M)	(N)
												

8. Multi-nuclei towns without ring and radial roads, determinative forces are the river and the fortress. The reason of the multiplied nuclei can be different: the nearby settlements created the image of patchwork urban tissue, in other cases the towns originally had double nuclei, since the area of the fortress limited the link between the settlements on the right and left banks. In other towns the multi-nuclei structure could be seen, but the transition between the sections is smoother and gives rise to the multi-ethnic structure of the town.

3.	(C)	(Ed)	(Hb)	(Ia)	(Ic– If)	(Ja)	(Jb)	(Jc)	(Jg)a	(Jd)	(M)	(N)
												

9. Encompassed town.

10.	(K)
	

Conclusion

In the period after 1867, the urban planning is characterized by a certain degree of unity, which results in similar new urban tissue patterns; via urban tissue combinations, regardless of the topographic character of the environment, new urban types were determined, so the urban types are no longer limited to the pre-1867 basic types.The progressive urban development of the second part of the 19th century was the manifestation and consequence of the industrialization and the new socio-economical and political status. Due to the demographic growth boosted by the industrial revolution the towns faced the need of spatial expansion and urban regulations.

The main findings of the research are the taxonomic designation of the urban tissue types and urban types (1867-1918) in Central-Europe.

The urban tissue analyses of the towns are based not only on urban forms, but also point out the urban tissue characteristics on the basis of supporting archival documents and historical analysis, and indicate the urban type as well. The urban typology of the towns in historic Hungary (1867-1918) was determined by the integrated morphological method and by the urban typology matrix. Through the research it has been shown that urban typology is possible to be made, despite the accepted urban morphological statements (Meggyesi, 2009), according to which the typology is impossible to make due to the high variety of forms and their combinations.

The established urban typology distinguishes basic types, combined types and the final urban typology, which classifies the seventy towns into nine categories. The final urban taxonomy integrates both the basic urban types and combined types into the typology, and the determination of the combined types interspersed into the final typology. The final urban typology distinguishes nine different major types and three subtypes, which are specified by descriptive names: 1. Stagnant towns, with potential of infill into the urban tissue or into un-built areas. 1/a and b. Semi-stagnant towns, with potential of infill into the urban tissue or into un-built areas. 2. Regulated towns, with extended urban tissue transformation in the central areas, with infill into un-built areas: type a) and b). 3. Towns with linear urban development lines and morphological periods' manifestation. 4. Towns with predominance of ring and radial roads (total or partial transformation). 5. Towns with a radial road or/and a ring road, whose core underwent structural and architectural transformation. 6. Towns with a radial road or/and a ring road, whose core kept its original urban tissue and built environment, with minor changes and infill being possible. 7. Towns with a radial road or/and a ring road, whose core partly saved its original urban tissue and built environment. 8. Multi-nuclei towns without ring or radial roads, whose determinative forces are the river and the fortress. 9. Encompassed town.

Variety of forms and their combinations makes the urban typology undoubtedly difficult to establish as it was claimed by the accepted urban morphological statements, but by defining the appropriate test conditions and properties the urban typology became possible to make.

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