

# SCHOLAR ARCHITECT 2021

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TRANSLATED BY Florina TUFESCU

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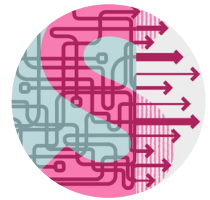
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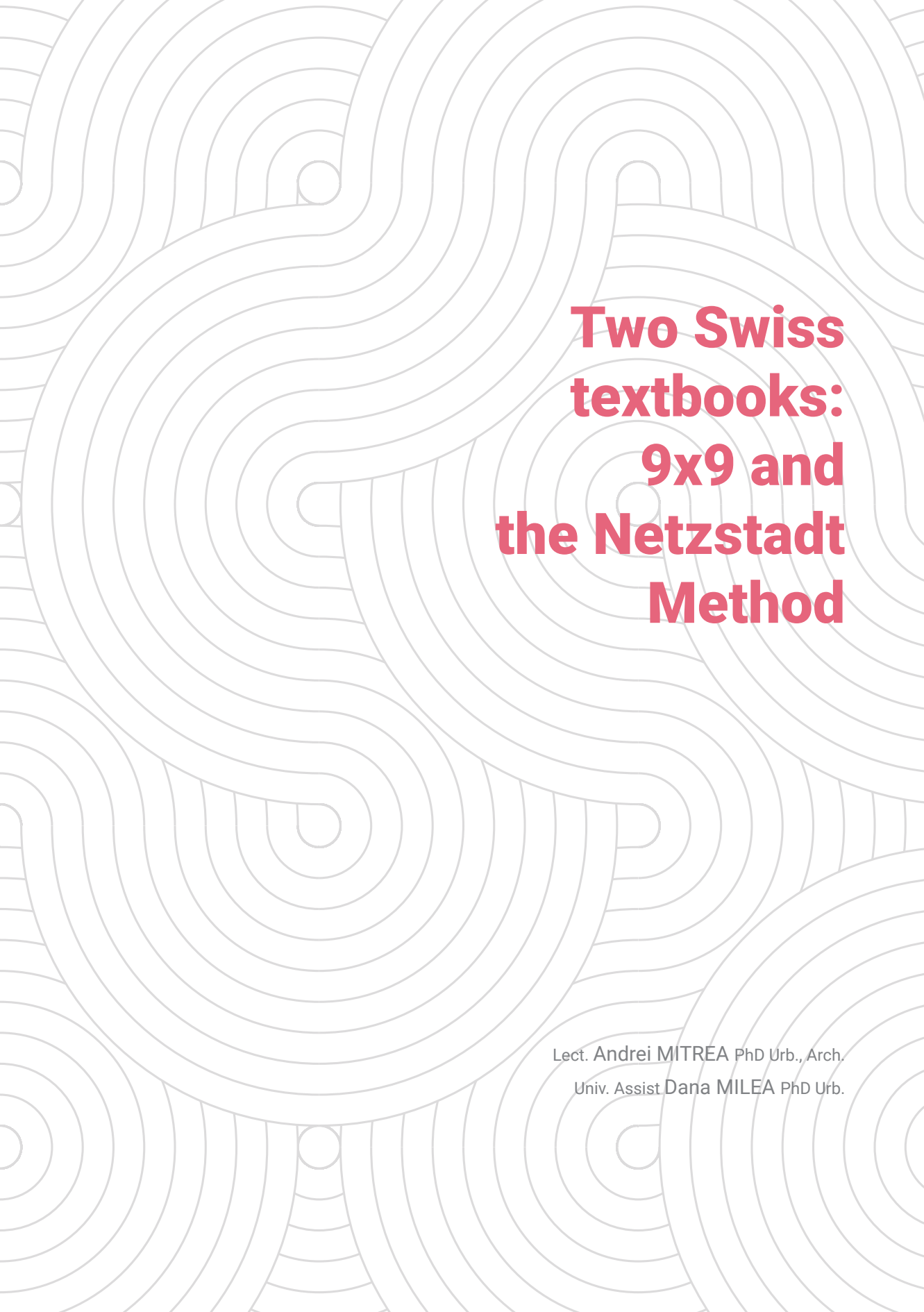
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Eidgenössische Technische  
Hochschule Zürich (ETH Zürich) is  
known as one of the best schools of  
architecture in the world. In the  
following pages we introduce two  
design textbooks created and tested  
here over the last three decades.



**Two Swiss  
textbooks:  
9x9 and  
the Netzstadt  
Method**

Lect. Andrei MITREA PhD Urb., Arch.  
Univ. Assist Dana MILEA PhD Urb.



The Netzstadt Method / *Die Netzstadtmethode*

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### **Chronology of the method (Oswald & Baccini, 2003b, p. 6f)**

The story of the project which gave birth to the Netzstadt Method<sup>1</sup> began in 1993, when Franz Oswald first met Peter Baccini to discuss a research project dedicated to urban development.

Their reasons for meeting could not have been more different. Oswald, an architect who had taught architectural design at the Swiss Federal Institute of Technology in Zürich<sup>2</sup> (ETH Zürich), had just taken over as chair of urban design, thus entering a completely new field. Baccini, a natural scientist with broad research experience, had by that point completed two vast studies on the “metabolism” of the canton of Aargau and the town of St. Gallen and he had concluded that Swiss municipalities had become energetically and financially dependent on their “global” hinterlands to an ever-increasing degree.

The two concluded from their discussion that urban design would have to be systematically oriented towards the functional conversion of cities since this was the only professionally acceptable alternative from the point of view of sustainable development.

Over the following year, the two launched a curriculum reform at ETH Zürich which proved to be far too ambitious; the interdisciplinary collaboration project was substantially reduced because of this. At the end of 1994, Oswald and Baccini also began a series of discussions which led to two fundamental rules of work: the first rule established the full equality of the collaborators and, by implication, the absence of a dominant discipline in the analysis of the urban phenomenon while the second rule imposed the joint design, testing and implementation of all the instruments developed during their collaboration.

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<sup>1</sup> *Netzstadtmethode*. [Authors' translation: the Networked City Method]. Authors' note: When perusing the official English version of the book, we have encountered quite a few translations that do not do the German version justice. Hence, we have introduced our own translations between square brackets, to make the text more legible.

<sup>2</sup> *Eidgenössische Technische Hochschule Zürich/ETH Zürich*.

The first project results emerged in 1998, when Oswald and Baccini published *Netzstadt. Transdisziplinäre Methoden zum Umbau urbaner Systeme. Ergebnisse aus dem ETH-Forschungsprojekt SYNOIKOS — Nachhaltigkeit und urbane Gestaltung im Raum Kreuzung Schweizer Mittelland* (Oswald & Baccini, 1998). The book is essentially dedicated to the creation of a common language between the two, but it also contains many of the research questions that are extensively explored in the book we are about to examine: *Netzstadt. Einführung in das Stadtentwerfen/Netzstadt: Designing the Urban* (Oswald & Baccini, 2003b).

The method as such was tested in the winter semester of 2001–2002 at ETH Zürich (Oswald & Baccini, 2003b, p. 187). Yet Franz Oswald retired in the spring of 2003 and the method seems to be missing from the present-day toolkit of urban design at ETH.

## A short description of the method

This research and design method requires substantial interdisciplinary work. Ideally, the work teams should include students specialised in architecture, urban design, natural sciences, and engineering. Here are the reasons:

“Design using the Netzstadt Method answers the following questions:

How do the four activities (“to nourish and recover,” “to clean,” “to reside [auth.n.: to live] and work,” “to transport and communicate”) manifest themselves morphologically and physiologically in three network elements, primarily related to the six territories (settlement, infrastructure, agriculture, forest, water, fallow land) and the four main resources (water, food, construction materials, energy)?

What effects do these characteristics have on urban quality, measured in terms of the five criteria (identification [auth.n.: identity], diversity, flexibility, degree of self-sufficiency, resource efficiency)?”

(Oswald & Baccini, 2003a, p. 182)

„Die Entwurfsarbeit mit der Netzstadtmethode beantwortet folgende Fragestellungen:

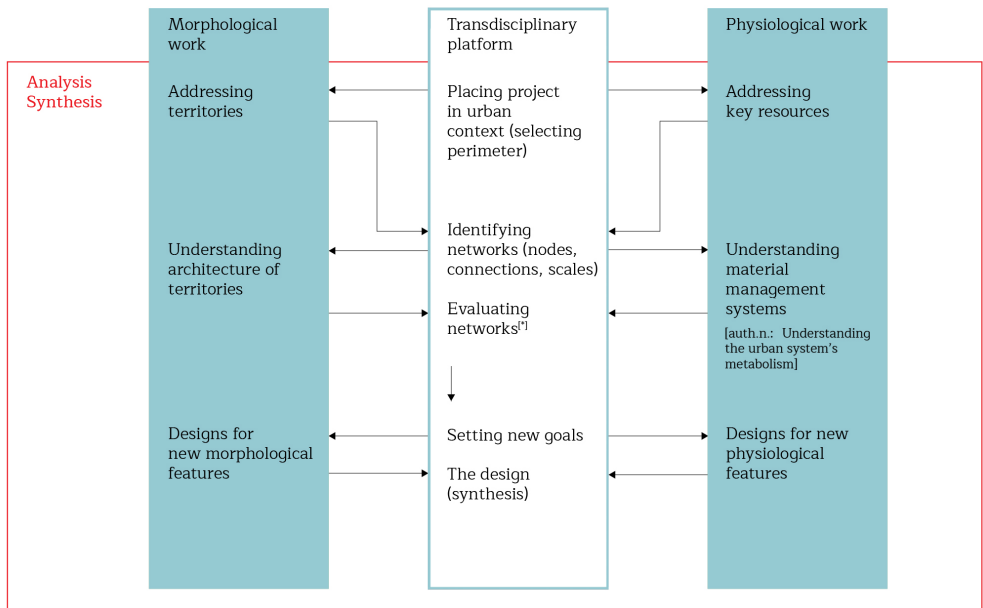
Wie manifestieren sich die vier Aktivitäten (Ernähren und Erholen, Reinigen, Wohnen und Arbeiten, Transportieren und Kommunizieren) morphologisch und physiologisch in drei Netzelementen [Knoten, Verbindungen, Skalen, n.n.], primär bezogen auf die sechs Territorien (Siedlung, Infrastruktur, Landwirtschaft, Wald, Wasser, Brache) und die vier Hauptressourcen (Wasser, Nahrungsmittel, Baumaterialien, Energie)?

Welche Auswirkungen haben diese Eigenschaften auf die urbane Qualität, gemessen an den fünf Kriterien (Identifikation, Diversität, Flexibilität, Versorgungsgrad, Ressourceneffizienz)?“

(Oswald & Baccini, 2003b, p. 182).

Before clarifying the terms in the previous quotes, let us examine more closely the general traits of the method (Fig. 1).





[\* auth.n.: Based on the five urban quality criteria: identity, diversity, flexibility, degree of self-sufficiency, and resource efficiency.]

Fig. 1. An overview of the Netzstadt Method. Source: adapted from Oswald & Baccini (2003a, p. 183).

We notice three columns: the left-hand column covers the morphological study, which includes a preliminary analysis of the territory under scrutiny, the understanding of its architecture (anatomy), as well as proposals for altering its morphological features. Symmetrically, the right-hand column covers the physiological study, which entails the uncovering and analysis of the key resources that determine the inner workings of that territory, an understanding of the metabolism that underpins the urban system, as well as the proposals for changing its physiological features.

Essentially, the two columns frame the method proper: in brief, it begins by situating the project in its context or, in other words, by establishing the observation perimeter and the project perimeter.

This is followed by the identification of the network that crosses the project perimeter, that is to say, by classifying nodes, the connections between nodes and the different territorial scales of the network. Once identified, the network is subsequently evaluated from the perspective of one or several criteria that determine urban qualities, i.e., identity, diversity, flexibility, degree of self-sufficiency, and resource efficiency.

The teams then formulate new objectives, meant to improve the urban qualities of the project perimeter, both from a morphological and a physiological perspective. Finally, the method concludes with the actual proposals of urban projects, anchored in a systematic, yet flexible analysis.

Procedurally, the Netzstadt Method is made up of five steps (Fig. 2):

1. The first step consists in reading and understanding the observation perimeter and the project perimeter. The work is done in four stages: the first step implies the morphological identification of the network nodes within the project perimeter and throughout its neighbourhood. The second stage consists of the description and physiological profiling of both the project perimeter and the observation perimeter. It is followed by the classification of the territories<sup>3</sup> that make up the project perimeter. The first step then concludes with the historical analysis of the project perimeter and of the observation perimeter, to the extent that such an analysis is possible (Oswald & Baccini, 2003b, pp. 198f).

2. The second step consists in identifying the network that crosses the project perimeter. More specifically, the nodes, the connections between them and the territorial scales at which they manifest themselves must be identified. Once identified, they must be described both morphologically and physiologically, viz. the morphological and physiological features of the network must be systematised. The following research questions are worth noting (Oswald & Baccini, 2003b, p. 208):

\_What do the nodes, connections, and different territorial scales of the network that crosses the project perimeter look like?

\_Which morphological features describe the network?

\_ Which physiological features does the network reveal?

3. The third step focuses on a first assessment of the urban qualities of the project perimeter. Essentially, a hierarchy of strong and weak points of the project perimeter is created and these, in turn, provide a basis for both the vision and the goals of the project. The third step, in its turn, is accompanied by four research questions (Oswald & Baccini, 2003b, p. 218f):

\_Which traits of the network (visibly) contribute to the urban qualities of the project perimeter?

\_Which strong points of the project perimeter are well-suited for development?

\_Which traits of the network are weak points of the project perimeter?

\_Which weak points inhibit future developments of the project perimeter?

4. The fourth step sets the objectives for development and formulates the strategy for achieving them. In other words, the fourth step is entirely focused on the transition from the present state of the project perimeter to its expected future state (designed or planned).

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<sup>3</sup> Territories are classified in Fig. 3 and in Fig. 4.

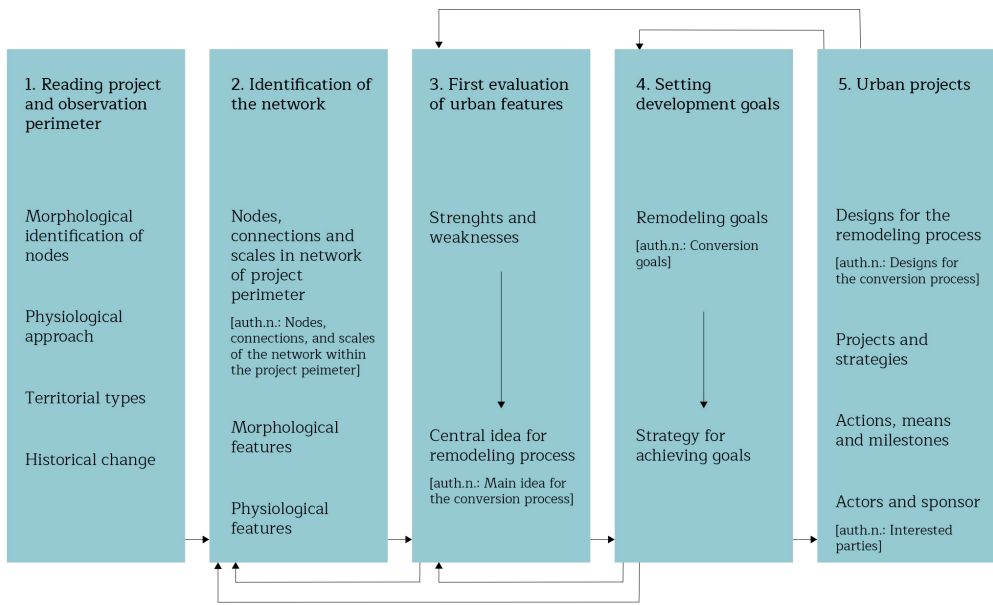


Fig. 2. The five steps of the Netzstadt Method. Source: adapted from Oswald & Baccini (2003a, p. 197).

Relying on common planning concepts, the fourth step explicitly formulates the project vision and goals by starting from the following research questions. They are closely linked to decision-making:<sup>4</sup>

\_Who sets the project objectives? In other words, who formulates the vision for the project?

\_Who decides the implementation strategy of the project and, implicitly, the strategy for reaching the set objectives? In other words, who defines the goal of the project?

5. The final step puts forward the actual urban projects, starting from the assessment of urban qualities conducted in the third step and from the vision formulated in the fourth step. Against this background, we encounter the following series of research questions:

\_What do urban projects look like for the project perimeter? How do they contribute to the application of the strategy?

\_What are the actions (or courses of action)<sup>5</sup>, the means, and deadlines for implementing the strategy?

\_Who are the parties involved in carrying out the projects and what are their mandates for implementing the strategy and for carrying out the actual urban projects?

<sup>4</sup> While conversion objectives must be clearly formulated in the design brief, the answer to the two questions will depend on the institution or the parties involved in carrying out the project. They must be formulated nonetheless, even if only at a basic level.

<sup>5</sup> In planning parlance, several actions aimed at fulfilling the same objective make up a “course of action”.

The feedback loops between the last four steps of the method are also visible in Fig. 2. We can easily notice that the assessment of urban qualities can be modified depending on the objectives set, the vision and purpose of the strategy, as well as on the actual urban projects. Furthermore, it also recalibrates the analysis of the morphological and physiological features of the project perimeter. This leads to a refining of the method, which gradually clarifies the final proposals of urban projects for the project perimeter.

Before going into more procedural details, we must define the method's limits. Hence:

„Die Netzstadtmethode an sich generiert keine Entwürfe. Sie unterstützt die Analyse und strukturiert die Entwurfsarbeit.

Die Netzstadtmethode entwickelt keine neuen Qualitätsziele für urbane Systeme. Dazu werden normative Kräfte benötigt, die sich kulturspezifisch gruppieren und durchsetzen. In demokratischen Gesellschaften werden die Qualitätsziele mit den Betroffenen in partizipativen Verfahren erarbeitet [...]. Die Netzstadtmethode hilft jedoch, die auf diese Weise erarbeiteten Ziele in einen Systemzusammenhang zu bringen.“

(Oswald & Baccini, 2003b, p. 182)

**“-The Netzstadt Method itself does not generate designs.** It supports analysis and structures the work of designing.

**-The Netzstadt Method does not develop new quality objectives** for urban systems. For this, normative powers are required, which are assembled and carried out specific to the culture in which they are located. In democratic societies the quality objectives are worked out in participatory procedures with those affected [auth.n.: by discussing and negotiating] [...]. However, the Netzstadt Method does help to bring the objectives worked out in this manner into a systemic context. [auth.n.: However, the Netzstadt Method does help in calibrating objectives against a wider context, both when drafting the strategy and when designing the projects proper.]”

(Oswald & Baccini, 2003a, p. 182)

## Definitions and explanations

We have seen the main terms used by the Netzstadt Method. It is now time to examine them more closely. We start with the definition of the method itself. Hence:

„[Die Netzstadtmethode ist die] Bezeichnung für ein Instrumentarium, um urbane Systeme, welche mit dem Netzstadtmodell charakterisiert werden, für die Gestaltung zu analysieren und im Entwurf zu unterstützen.“

(Oswald & Baccini, 2003b, p. 292)

“[Netzstadt Method is] a tool used to analyse urban systems characterized in terms of the Netzstadt Model, and to provide a basis for shaping these systems.”

(Oswald & Baccini, 2003a, p. 292)

The method is based on the Netzstadt Model:

„Das [Netzstadt-] Modell beschreibt ein urbanes System mit Hilfe der Netzmetapher als Gebilde aus Knoten und Verbindungen zwischen ihnen, das räumlich durch eine Grenze (Perimeter) gegenüber einem Hinterland differenziert und in Skalen mit unterschiedlichen Organisationsstufen gegliedert wird. Ein urbanes System wird durch vier Aktivitäten [Ernähren und Erholen, Reinigen, Wohnen und Arbeiten, Transportieren und Kommunizieren] generiert und auf sechs Territorien [Gewässer, Wald, Siedlung, Landwirtschaft, Infrastruktur und Brache] räumlich angeordnet.“

(Oswald & Baccini, 2003b, p. 292)

“This model uses the metaphor of a network (Netz) to describe an urban system as a structure of nodes and the connections between them, which is spatially differentiated from a hinterland by a border (perimeter) and subdivided into scales with different organisational levels. An urban system is generated by four activities [auth.n.: eating and recreation; cleaning; living and working; transport and communication] and spatially ordered into six territories [auth.n.: water, forest, settlements, agricultural land, infrastructure and fallow land].”

(Oswald & Baccini, 2003a, p. 292)

The Netzstadt Method and the Netzstadt Model both focus on the urban system,<sup>6</sup> defined as follows:

“The urban system is a large system made up of geogenic (emergent with the earth) [auth.n.: i.e., natural] and anthropogenic (emergent with humankind) [auth.n.: i.e., human-made] subsystems. It covers an area of tens of thousands of square kilometres and has a population density of hundreds of inhabitants per square kilometre. It is an all-encompassing, three-dimensional network with variegated social and physical links. A relatively high concentration of people, goods and information exists at the nodes of this network, and there are massive flows of persons, goods, and information between the nodes. Colonized agricultural and forestry ecosystems and waterways are integrated components of the system.”

(Oswald & Baccini, 2003a, p. 292)

„Das urbane System ist ein aus geogenen (erdgeschichtlich entstandenen) und anthropogenen (kulturell gestalteten) Subsystemen zusammengesetztes Großsystem auf einer Fläche von Hunderten bis Zehntausenden von Quadratkilometern und einer Dichte von Hunderten von Einwohnern pro Quadratkilometer. Es ist ein flächendeckendes dreidimensionales Netzwerk von vielfältigen sozialen und physischen Verknüpfungen. In den Knoten dieses Netzwerks bestehen relativ hohe Dichten von Menschen und Gütern. Zwischen diesen Knoten unterschiedlichen Dichten finden starke Flüsse von Personen, Gütern und Informationen statt. Die kolonisierten Ökosysteme der Land- und Forstwirtschaft und die Gewässer sind integrierte Teile dieses Systems.“

(Oswald & Baccini, 2003b, p. 292)

The network that forms the urban system is composed of nodes and connections, which appear at different territorial scales. More specifically, a node is:

“marked by a high density of people, goods and information. Nodes can be assigned to selected scale levels.”

(Oswald & Baccini, 2003a, p. 291)

„[Ein Knoten ist] ein Ort von gleichzeitig hoher Dichte an Personen, Gütern und Informationen. Knoten können ausgewählten Skalenstufen zugeordnet werden.“

(Oswald & Baccini, 2003b, p. 291)

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<sup>6</sup> It is worth noting here that Romanian legislation uses a slightly different definition of the urban system: “[The urban system is] a system of neighbouring municipalities that establish relationships of cooperation on economic, social and cultural matters as well as on territorial planning, environmental protection and on transport and utilities infrastructure while retaining their administrative autonomy” (point 15 in Annex 1 of Law 351/2001, on the Land Management Plan of the National Territory – Section IV: The network of localities, in the form consolidated by 31 Oct. 2021). At present, this definition only applies to the urban system formed by the municipalities of Brăila and Galați.

Similarly, a connection is defined as a:

„[Eine Verbindung ist ein] Fluss von Personen, Gütern und Informationen zwischen den Knoten. Verbindungen können ausgewählten Knoten und Skalenstufen zugeordnet werden.“

(Oswald & Baccini, 2003b, p. 292)

“Flow of people, goods and information between nodes. Connections can be assigned to specific nodes and scale levels.”

(Oswald & Baccini, 2003a, p. 292)

And finally, the territorial scale is:

„[Eine Skala/Skalengröße ist eine] politisch-ökonomische und administrativ definierte Organisationseinheit für die Zusammengehörigkeit von Personen, Territorien und Ressourcen. Die Skalengröße wird quantitativ definiert. Kleine Skalen sind niedrig, große sind hoch eingestufte Skalen. Hohe Skalen sind aus niedrigen aggregiert, und niedrige Skalen bilden die Grundeinheit von größeren.“

(Oswald & Baccini, 2003b, p. 292)

“[an] organizational unit defined in political-economic and administrative terms indicating the unity of persons, territories and resources. Scale size is defined quantitatively. Small scales are scales classified as low, large scales as high. High scales are aggregates of low ones, and low scales form the basic units of higher ones.”

(Oswald & Baccini, 2003a, p. 292)

Each territorial scale is separated by borders, which are also called “demarcations”. The Netzstadt Method works with five territorial scales: “house” [auth.n.: dwellings<sup>7</sup>], “local unit” [auth.n.: neighbourhoods<sup>8</sup>], communities<sup>9</sup>, regions<sup>10</sup> and, finally, the whole country<sup>11</sup>.

Thus, the house [auth.n.: dwelling] represents:

„Sie ist die kleinste Einheit für urbanes Leben in einem individuellen Haushalt und integrierter Teil eines Quartiers, das die Verbindung mit allen anderen Netzwerken des Gesamtsystems ermöglicht.“

(Oswald & Baccini, 2003b, p. 55)

“The smallest unit of urban life in an individual household and an integrated part of the local unit. It makes connections to other networks in the entire system possible.”

(Oswald & Baccini, 2003a, p. 55)

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7 *Wohnung.*

8 *Quartier.*

9 *Gemeinde.*

10 *Region.*

11 *Land/Nation.*

Turning now to the “local unit” [auth.n.: neighbourhood]:

“As the ‘local’ scale, it covers the basic needs of urban life, both physiologically and sociologically. The local unit’s [auth.n.: the neighbourhood’s] morphological quality enables inhabitants to identify with their neighborhood [auth.n.: enables inhabitants to identify with their surroundings].”

(Oswald & Baccini, 2003a, p. 55)

„Die „lokale Skala“, bietet die Grundversorgung des urbanen Lebens – sowohl physiologisch als auch soziologisch. Die morphologische Qualität des Quartiers erlaubt die erste Identifikation der Einwohner mit ihrer Nachbarschaft.“

(Oswald & Baccini, 2003b, p. 55)

Likewise, the community<sup>12</sup> means:

“the first tier of collectively organized educational, construction and social tasks, which are self-administered in sub-areas. In large communities, some of these tasks can be delegated to local units (districts, counties) [auth.n.: delegated to local administrations].”

(Oswald & Baccini, 2003a, p. 55)

„Die kommunale Stufe ist die erste Stufe der gemeinschaftlich organisierten und in Teilbereichen selbst verwalteten Aufgaben im Bau-, Bildungs- und Sozialbereich. Im Falle sehr großer Kommunen können Teile dieser Aufgaben auch an Quartiere (Kreise, Bezirke) delegiert werden.“

(Oswald & Baccini, 2003b, p. 55)

At a higher level, we have the region

“The region is composed of several communities requiring central coordination of educational, social, resource management and transportation. It is able to carry these out as a politically and economically independent unit. Examples of regions are federal states, Départements, cantons, etc.”

(Oswald & Baccini, 2003a, p. 55)

„Die Region umfasst mehrere Kommunen, für die größere Aufgaben im Bildungs-, Sozial-, Ressourcen- und Verkehrsbereich zentral gelöst werden. Sie ist in der Lage, diese Aufgaben in politischer und ökonomischer Souveränität zu lösen. Beispiele für Regionen sind Bundesländer, Departemente, Kantone etc., aber auch Regionen der Europäischen Union nach dem Maastricht Vertrag von 1993.“

(Oswald & Baccini, 2003b, p. 55)

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<sup>12</sup> Or, sometimes, the municipality.



Finally, we have the definition of the country:<sup>13</sup>

„Das Land ist ein Regionenverbund, welcher sich über eine Verfassung den Status eines souveränen Staates gibt.“

(Oswald & Baccini, 2003b, p. 55)

“The country is a confederation of regions whose constitution gives it the status of a sovereign state.”

(Oswald & Baccini, 2003a, p. 55)

Returning to the four activity types, they are:

„[Aktivitäten sind] alle Handlungen des Menschen, die dazu dienen, seine Bedürfnisse zu befriedigen. In der Netzstadtmethode wird mit vier Grundbedürfnissen gearbeitet: Ernähren und Erholen, Reinigen, Wohnen und Arbeiten, Transportieren und Kommunizieren.“

(Oswald & Baccini, 2003b, p. 291)

“All actions by human beings that serve to satisfy their needs. The Netzstadt Method focuses on four basic needs: eating and recreation, hygiene, residing [auth. n.: living] and working, transportation and communication.”

(Oswald & Baccini, 2003a, p. 291)

Going into a bit more detail:

„Die Aktivität Ernähren umfasst alle Territorien, Prozesse und Güter, die notwendig sind, um feste und flüssige Nahrungsmittel herzustellen, zu verteilen und zu konsumieren. Zu ihr gehören die landwirtschaftliche Produktion, die Aufarbeitung der Nahrungsmittel (industriell, gewerblich) und die Zubereitung im Haushalt. Der Konsum der Nahrungsmittel schließt auch die Stoffwechselprodukte des Menschen (Atemluft, Fäkalien und Urin) mit ein. Die Aktivität Erholen beinhaltet hier vor allem die mit der täglichen Freizeitgestaltung verbundenen Prozesse und Güter auf allen Territorien, man denke an sportliche Betätigung jeglicher Art.“

(Oswald & Baccini, 2003b, p. 60)

“Eating as an activity encompasses all territories, processes and goods needed to produce, distribute and consume solid and liquid foods. It includes agricultural production, food processing (industrial, commercial) and food preparation in the household. Food consumption also covers the products of human metabolism (exhaled air, faeces and urine). Recreation (recovery) as an activity is linked to the processes, goods and territories used for daily leisure-time activities, e.g., sports of all kinds.”

(Oswald & Baccini, 2003a, p. 60)

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<sup>13</sup> In the Romanian case, this would apply to counties, as development regions do not have legal status.

Then comes the definition of cleaning:

“Cleaning pertains to all processes and goods necessary to maintain human health and to protect the environment from damaging waste materials. It entails washing the body and clothes, as well as cleaning residential and working spaces, streets, etc. It covers all processes in which wastes (exhaust air, wastewater, solid and sludge wastes) are treated, including sewage and waste incinerator plants.”

(Oswald & Baccini, 2003a, p. 60)

„Dieser Bereich umfasst alle Territorien, Prozesse und Güter, die notwendig sind, um die Gesundheit des Menschen zu erhalten und die Umwelt vor schädlichen Abfällen zu schützen. Dazu gehören das Waschen von Körper und Kleidungsstücken, das Reinigen der Wohn- und Arbeitsräume, der Straßen etc. Eingeschlossen sind sämtliche Prozesse zur Behandlung von „Abgütern“ (Abluft, Abwasser, feste und schlammförmige Abfälle), also auch Kläranlagen und Müllverbrennungsanlagen.“

(Oswald & Baccini, 2003b, p. 60)

Likewise, living and working:

“pertain to territories, processes and goods used for construction and operation of residential and working facilities (e.g. cement production, furniture manufacture, oil burners for central heating, electric power for lighting).”

(Oswald & Baccini, 2003a, p. 60)

„Hier sind alle Territorien, Prozesse und Güter zusammengefasst, die zum Bau von Wohn- und Arbeitsanlagen und deren Betrieb verwendet werden (z.B. Zementherstellung, Möbelfabrikation, Ölbrenner für die Zentralheizung, elektrischer Strom für die Beleuchtung).“

(Oswald & Baccini, 2003b, p. 60)

And finally, transport and communication:

“This field encompasses all territories, processes and goods used to transport people and to exchange information. It covers street and cable construction as well as the operation of schools and administrations. Goods such as cars, locomotives, telephones and computers are also included [auth. n.: in this category].”

(Oswald & Baccini, 2003a, p. 61)

„Dieser Bereich umfasst alle Territorien, Prozesse und Güter, welche zum Transport von Menschen und Materiale und zum Austausch von Informationen eingesetzt werden. Dazu gehören Prozesse wie Straßen- und Kabelbau, Schule und Verwaltung oder Güter wie Automobil, Lokomotive, Telefon und Computer.“

(Oswald & Baccini, 2003b, p. 61)

The four types of activities unfold in different territories. More specifically, the Netzstadt Method uses six types of territories:

“[The types of territory are] the morphological basic elements in the architecture of urban systems. They provide living spaces and are the resources of all activities. The Netzstadt Method distinguishes between six types of territories: water, forest, settlement, agriculture, infrastructure and fallow land.”

(Oswald & Baccini, 2003a, p. 293)

„[Territorientypen] sind die morphologischen Basiselemente in der Architektur urbaner Systeme, bieten Lebensplätze und sind die Ressourcen aller Aktivitäten. In der Netzstadtmethode werden sechs Territorientypen unterschieden: Gewässer, Wald, Siedlung, Landwirtschaft, Infrastruktur und Brache.“

(Oswald & Baccini, 2003b, p. 293)

It is worth noting that the architecture of territory is defined as:

“Structural ordering of territorial types [auth.n.: settlements, infrastructure, agricultural land, forests, water and fallow land within the selected perimeter].”

(Oswald & Baccini, 2003a, p. 292)

„[Die Architektur des Territoriums ist die] gestalterische Ordnung der Territorientypen innerhalb des ausgewählten Perimeters.“

(Oswald & Baccini, 2003b, p. 292)

We now come to the five assessment criteria of urban qualities: the identity<sup>14</sup> of urban systems, their diversity<sup>15</sup>, flexibility<sup>16</sup>, degree of self-sufficiency<sup>17</sup> and their resource efficiency<sup>18</sup>.

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14 *Identifikation/Identität.*

15 *Diversität.*

16 *Flexibilität.*

17 *Versorgungsgrad.*

18 *Ressourceneffizienz.*

The identity of an urban system is described as follows:

“Identification [auth.n.: identity] refers to the identifying [auth.n.: particular] characteristics of an urban system, communicated by various media. These characteristics create orientation and order within space and time and are therefore essential for urban existence.

Identification [auth.n.: identity], in this sense, is a gauge of the urban system’s ability to provide people (inhabitants and guests) with unmistakable images (icons) of its essential features, to which residents can relate and which create a sense of home, security, appeal, well-being and creative inspiration.”

(Oswald & Baccini, 2003a, p. 52)

„Es sind medial vermittelte Erkennungsmerkmale[,] im Sinne von Orientierung und Ordnung im Raum und in der Zeit, die für das urbane Zusammenleben notwendig sind.

Identifikation [Identität] ist in diesem Sinne ein Maß für die Kapazität eines urbanen Systems, den Menschen (Einwohnern und Gästen) unverwechselbare Bilder (Ikonen) seiner wesentlichen Eigenschaften zu geben, in denen sie sich [wiederfinden] (und [das] Heimatgefühl, Geborgenheit, Anziehungskraft, Wohlbefinden oder ein schöpferisches Stimulans erzeugen) und mit denen sie sich von anderen unterscheiden.“

(Oswald & Baccini, 2003b, p. 52)

Turning now to diversity:

“Diversity describes the different ways a certain function in an urban system can be performed, e.g., the different ways people can be fed and transported, a house built or a consumer product manufactured.”

(Oswald & Baccini, 2003a, p. 52)

„Sie bezeichnet die Zahl von unterschiedlichen Möglichkeiten, eine bestimmte Funktion in einem urbanen System zu erfüllen, etwa die Möglichkeiten, eine Person zu transportieren, zu ernähren, ein Haus zu bauen oder ein Konsumgut zu erzeugen.“

(Oswald & Baccini, 2003b, p. 52)

Then there is flexibility:

“Flexibility (synonyms: potential to change, adaptability)

Flexibility describes the system’s ability to handle internal and external change in two ways:

„[Flexibilität (syn. Veränderungspotenziale, Anpassungsfähigkeit)] bezeichnet die Eigenschaft eines Systems, auf Veränderungen im Äußeren und im Inneren in zwei Richtungen zu reagieren:

- Dass sich das System nicht verändert (Homöostasis, Pufferkapazitäten);
- Dass sich das System erneuert oder verbessert (Evolution, Innovationspotenziale).“

– the system does not change (homeostasis, buffer capacity);

– the system is renewed or improved (evolution, potential for innovation).”

(Oswald & Baccini, 2003a, p. 52)

(Oswald & Baccini, 2003b, p. 52)

Concerning the degree of self-sufficiency:

“This describes the relationship between available regional resources and the resources that the region requires to meet its needs.”

„[Der Versorgungsgrad] bezeichnet das Verhältnis zwischen den regionalen Ressourcen und den insgesamt notwendigen Ressourcen der Region zur Deckung ihres Bedarfes.“

(Oswald & Baccini, 2003a, p. 52)

(Oswald & Baccini, 2003b, p. 52f.)

And finally, on resource efficiency:

“In a nutshell, resource efficiency denotes the relationship between the quantity of a resource utilized and the quantity that is available.”

„In einer Formel gefasst, bedeutet Ressourceneffizienz das Verhältnis zwischen Nutzmenge einer Ressource und ihre Primärmenge.“

(Oswald & Baccini, 2003a, p. 53)

(Oswald & Baccini, 2003b, p. 53)

In other words, resource efficiency describes the relationship between the necessary consumption of resources for a human activity, such as transport of people, food production or housing, and the related monetary and energy costs, including the use of land. In other words, the more efficiently an urban system uses its resources, the “stronger” it will be.<sup>19</sup>

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<sup>19</sup> Resource efficiency can be increased through technical means, through improvements in production and transport systems, as well as through changing people’s behaviour (Oswald & Baccini, 2003b, p. 53).

The final two concepts that need defining are also the most general: the morphology and physiology of the territory. Thus, the morphology of a given territory is:

“Literally the theory of form. In this context it refers to the territory. In morphological terms, territories are the basic elements of urban systems. The morphology of the territory investigates the formal features that continually develop in urban systems through geogenic and anthropogenic influences. Their development is referred to as morphogenesis and their transformation as metamorphosis.”

(Oswald & Baccini, 2003a, p. 292)

„Wörtlich die Lehre von Form, [Morphologie] bezieht sich hier auf das Territorium. Territorien sind morphologisch die Basiselemente urbaner Systeme. Die Morphologie des Territoriums untersucht die formalen Eigenschaften, die durch ge- und anthropogene Einflüsse in urbanen Systemen fortwährend neu entstehen. Deren Entstehung wird Morphogenese und deren Veränderung Metamorphose genannt.“

(Oswald & Baccini, 2003b, p. 292)

In turn, the physiology of a territory is:

“The theory of life processes which are comprehensible using physical and chemical methods. In the Netzstadt Method, the term refers to the physiological processes (material and energy flows) in urban systems.”

(Oswald & Baccini, 2003a, p. 292)

„[Die Physiologie ist] die Lehre von Lebensvorgängen, die mit physikalischen und chemischen Methoden erfassbar sind. In der Netzstadtmethode bezeichnet der Begriff die Lehre von den Stoffwechselprozessen (Materie- und Energieflüsse) in urbanen Systemen.“

(Oswald & Baccini, 2003b, p. 292)

Two supplementary concepts emerge in connection to the physiology of a territory, namely the metabolism of urban systems and its study:

“[The] physiology of urban systems refers to all physiological processes (transport and transformation of material and energy) in anthropogenic [auth.n.: man-made] ecosystems.”

(Oswald & Baccini, 2003a, p. 293)

„[Der Stoffwechsel urbaner Systeme] umfasst sämtliche physiologischen Vorgänge (Transport und Transformationen von Materie und Energie) in anthropogenen Ökosystemen.“

(Oswald & Baccini, 2003b, p. 293)

The term “material flow analysis” designates:

„[Die Stoffflußanalyse ist die] Methode zur Erfassung der Materie- und Energieflüsse sowie der Energielager in einem gegebenen Raum in einem definierten Zeitabschnitt.“

(Oswald & Baccini, 2003b, p. 293)

“A method for the recording of material and energy flow as well as energy storage in a given space over a defined time period.”

(Oswald & Baccini, 2003a, p. 293)

Finally, analysing the metabolism of urban systems leads to the creation of “material management systems” [auth.n.: material budgeting systems]. These are:

„[Die Stoffhaushaltssysteme sind] die mit Hilfe der Stoffflußanalyse entwickelten Systeme. Diese zeigen die relevanten Prozesse und Güter- und Stoffflüsse für einen vorbestimmten Ausschnitt des Stoffwechsels (qualitative Aussage) und die Größen der Flüsse und Lager (quantitative Aussage).“

(Oswald & Baccini, 2003b, p. 293)

“Systems developed using material flow analysis. They show the relevant processes and flows of materials and goods for a predetermined segment of the physiology (qualitative expression) and the size of the flows and storage (quantitative expression).”

(Oswald & Baccini, 2003a, p. 293)

## Morphological and physiological indicators

This section constitutes the technical part of the Netzstadt Method and provides the calculation basis for both morphological and physiological analyses. Unfortunately, however, a few of the calculation formulae are not fully explained within the text. For this reason, we have kept only the description of the indicators. We intend to verify the correctness of the formulae sometime in the future<sup>20</sup>. Nonetheless, the descriptions are sufficiently rich to be used in creating one’s own indicators.

Hence, we have divided the indicators into two categories: we will first discuss the morphological measures and subsequently the physiological ones.

### Morphological indicators

The Netzstadt Method uses four morphological indicators: building density<sup>21</sup>, fragmentation<sup>22</sup>, granulation<sup>23</sup> and accessibility<sup>24</sup>. All the morphological indicators can be graphically represented. However, measuring them is not always simple. Thus, density and fragmentation can be measured directly, while granulation and accessibility can only be measured indirectly (Oswald & Baccini, 2003b, p. 132).

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<sup>20</sup> Nevertheless, we have always referenced the pages where the calculations appear.

<sup>21</sup> *Baudichte*.

<sup>22</sup> *Zerstückelung*.

<sup>23</sup> *Körnung*.

<sup>24</sup> *Erschließung*.

## ***Density***

Of all morphological indicators, building density is the most intuitive.<sup>25</sup>  
Thus:

“The building density index [...] shows the ratio between the gross floor space realized (GFS) with respect to sealed surface and the node field selected specific to the scale [auth.n.: the node field selected at a particular scale].

The building density index can be applied to all types of buildings and scales.”

(Oswald & Baccini, 2003a, p. 132)

„Der Baudichteindex [...] zeigt das Verhältnis zwischen realisierten Bruttogeschossfläche (BGF) respektive versiegelter Oberfläche und dem skalenspezifisch gewählten Knotenfeld.

Der Baudichteindex kann für alle Gebäudetypen und Skalen angewendet werden.“

(Oswald & Baccini, 2003b, p. 132)

Furthermore:

“In order to increase resource efficiency in land use, a minimum building density must be observed. In other words, the efficiency of land use may not fall below a certain threshold.”

(Oswald & Baccini, 2003a, p. 136)

„Um Ressourceneffizienz in der Bodennutzung zu erhöhen, ist eine Mindestbaudichte einzuhalten. Mit anderen Worten darf eine Effizienzschwelle der Bodenbesetzung nicht unterschritten werden.“

(Oswald & Baccini, 2003b, p. 136)

Obviously, this degree of efficiency must be established separately for each observation perimeter.

## ***Fragmentation***

The second morphological indicator is fragmentation:<sup>26</sup>

“The objective of the shredding [auth.n.: fragmentation] index is to estimate the appropriate degree of coherence of [auth.n.: across] selected fields. [...] It proceeds from the following hypothesis:

– The higher the threshold for overcoming a border, the more indirect the connection and exchange between adjacent fields.”

(Oswald & Baccini, 2003a, p. 138)

„Ziel des Zerstückelungsindex ist es, den angemessenen Grad für Kohärenz oder Zusammenhalt gewählter Felder abzuschätzen [...]. Dabei wird von der folgenden Hypothese ausgegangen:

Je höher die Schwelle zur Überwindung einer Grenze ist, desto indirekter sind Verbindung und Austausch zwischen benachbarten Feldern.“

(Oswald & Baccini, 2003b, p. 138)

<sup>25</sup> The formulae for density and for its derived indicators are given in Oswald & Baccini (2003b, p. 144f).

<sup>26</sup> The formulae for fragmentation and for its derived indicators are given in Oswald & Baccini (2003b, p. 146f).



This is followed by an example:

„Sichtbare und nicht sichtbare Schwellen zerteilen vielgestaltig die Erdoberfläche. Zu ihnen zählen Verkehrsverbindungen, Leitungen aller Art, An- und Abflugschneisen[,] sowie politisch-administrative Grenzlinien mit Bauzonen- und Parzellengrenzen. Der extensive Ausbau der Infrastruktur seit den 1950er Jahren hat hochgradig zu Gebietszerstückelung geführt. Dadurch kann sich das Paradox ergeben, dass durch den hohen Teilungsgrad und die schlechte Anordnung und Formgebung von Verbindungen die freie Bewegung, Kommunikation und der Austausch für alle Lebewesen behindert oder sogar unterbunden werden. In solchen Fällen werden Verbindungen zu Barrieren und stark einschränkenden Faktoren, etwa in der Förderung oder Erhaltung der Vielfalt.

Der Grad des Widerstands oder Zusammenhalts, lässt sich durch die Berechnung der Wahrscheinlichkeit von Begegnungen oder Kontaktbehinderungen innerhalb des Untersuchungsgebiets ermitteln. Auf diese Weise kann auch festgestellt werden, ob eine bestimmte Parzellierung zu klein- oder großmaßstäblich gewählt ist und daher die erwünschte Kommunikation und die Austauschbewegungen innerhalb des gewählten Feldes entweder ein- oder ausschließt. Die Zuordnung der Skala, politisch-rechtliche Konventionen und die physisch-plastische Form der Grenzen sind für die Bewertung des Zerstückelungsindex wichtige Merkmale.“

(Oswald & Baccini, 2003b, p. 138)

“Visible and invisible thresholds divide the surface of the earth in many different ways. They include traffic connections, pipes and wires of all kinds, flight paths, and political-administrative boundaries with building zones and allotment boundaries. The extensive expansion of infrastructure since the 1950s has led to a high degree of shredding [auth.n.: fragmentation] in some areas. This may produce the paradox that connections have hindered or even thwarted free movement, communication, and exchange for all living beings through their high degree of division and poor organization and shapes. In such cases, connections become barriers and severely restricting factors, especially as regards the encouragement or conservation of biodiversity.

The degree of resistance or coherence can be determined by calculating the probability of encounters or prevented contacts within the area under study. This can also determine whether the scale selected for a system of allotment is too small or too large and therefore includes or excludes the communication and exchange movements desired within the selected field. The assignment of scales, political-legal conventions and the physical-plastic shape of the boundaries are important features to be considered in estimating the shredding [auth.n.: fragmentation] index.”

(Oswald & Baccini, 2003a, p. 138)

## **Granulation**

The third morphological indicator is granulation:<sup>27</sup>

„Das Ziel des Körnungsindex ist gestalterischer Natur. Dabei gilt es, den angemessenen Grad der Durchlässigkeit für das ausgewählte Feld in seinem territorialen Kontext zu finden. Durchlässigkeit bezieht sich auf Bewegungen von Personen und nicht menschlichen Lebewesen, Licht (Sonnenenergie), Luft und Schall. Sie ist eine kulturell stark vorgeprägte Größe und wird von Gewohnheiten, sehr unterschiedlichen Vorstellungen von Privatsphäre, Sicherheit und Komfort[,] sowie von reglementierenden Normen geprägt. Durchlässigkeit trägt unverkennbar zur Lebensqualität und zum Gedächtniswert eines Ortes bei.

“The objective of the granulation index is of a shaping nature [auth.n: related to the design process]. The point is to find the appropriate degree of permeability for the selected field in its territorial context. Permeability refers to movements of persons and non-human living beings, light (solar energy), air and sound. It is a variable that is largely culturally predetermined and is marked by habits, different conceptions of the private sphere, security, and comfort, as well as by standards to bring such movements under control. Permeability contributes unmistakably to quality of life and to the memory value of a place.

Körnung ist ein anthropogenes oder geogenes Merkmal, das durch die zählbare Menge von Materialbrocken oder Körnern unterschiedlichen Zuschnitts ein bestimmtes Feld füllt und gliedert. Im gleichen Feld können in Funktion von Zuschnitt, Menge und Anordnung der Körner unterschiedliche Muster entstehen. Das spezifische Körnungsmuster zeigt sich in der Siebkurve oder im Mischverhältnis zum gegebenen Materialgemenge. Im gewählten Feld gibt es zwischen dem Grad der Durchlässigkeit und dem Mischungsverhältnis des gegebenen Materialgemenges einen direkten, aber rechnerisch schwer fassbaren Zusammenhang. Dieser Zusammenhang kann jedoch in Grafiken hinreichend genau dargestellt werden, sodass sie als Vergleichsinstrumente anstelle von Berechnungen verwendet werden können. Dabei gilt die folgende Hypothese:

Granulation is an anthropogenic or geogenic feature that fills and classifies a certain field in terms of the countable number of fragments of material, or grains, of different shape and size. In the same field, different patterns may emerge in the function of the shape and size, number, and arrangement of grains.

Je höher Raumfüllungsgrad und Mischverhältnis sind, desto geringer ist die Durchlässigkeit und umgekehrt.“

(Oswald & Baccini, 2003b, p. 140)

The specific granulation pattern is apparent in the grain-size distribution curve or in the mixing ratio of the given aggregation of material.

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<sup>27</sup> The formulae for granulation and for its derived indicators are given in Oswald & Baccini (2003b, p. 148f).

In the selected field, there is a direct relationship between the degree of permeability and the mixing ratio of the given aggregation of material, but this relationship is difficult to formulate mathematically. However, it can be portrayed graphically with sufficient accuracy to use it as a comparative tool in the place of calculations. Here, the following hypothesis holds:

– The higher the degree of occupied space and the mixing ratio, the lower the permeability and vice versa.”

(Oswald & Baccini, 2003a, p. 140)

### ***Accessibility***

The fourth and final morphological indicator is accessibility:<sup>28</sup>

“The objective of the accessibility index is the appropriate degree of accessibility of places. Accessibility is differentiated into access to and access from. The interfaces used to determine the degree of accessibility in the network are those capable of linking the selected places across all scales. This linking is a characteristic that gives the selected place a relative advantage of location, makes it accessible for diverse modalities of mobility, and, if desired, creates the prerequisites for differentiating between paths to and paths from. Connections that are mere intersections without constituting interfaces across all scales are simply transit lines.”

(Oswald & Baccini, 2003a, p. 142)

„Das Ziel des Erschließungsindex ist der angemessene Grad der Zugänglichkeit von Orten. Zugänglichkeit wird in Hin- und Rückweg differenziert. Im Netz dienen diejenigen Schnittstellen zu Ermittlung des Zugänglichkeitsgrades, welche in der Lage sind, die gewählten Orte Skalen übergreifend zu verknüpfen. Diese Verknüpfung ist eine Eigenschaft, die dem gewählten Ort eine relative Standortgunst gibt, ihn für diverse Modalitäten der Mobilität zugänglich macht und die Voraussetzung dazu schafft, dass Hin- und Rückwege, falls erwünscht, differenziert werden können. Verbindungen, die keine Skalen übergreifende Schnittstellen, aber Kreuzungen bilden, sind einfach nur Transitlinien.“

(Oswald & Baccini, 2003b, p. 142)

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<sup>28</sup> The formulae for accessibility and for its derived indicators are given in Oswald & Baccini (2003b, p. 150f).

This definition is again followed by an example:

“The local density of connections is less significant for the accessibility of a place than the performance of linking interfaces. The accessibility index describes distribution systems and interfaces between different scales. Thus, a mailbox is an interface for postal distribution from the highest scale to the lowest, and vice versa. The accessibility index refers to the points of linkage that make up a distribution system for people, goods, and information. The degree of accessibility of a selected place is primarily determined by the opportunities for making contact across scales, from the place or to the place, quickly or slowly. Thus, it is relatively high when the selected place is on the path of different scales, but links them across scales and can be reached, back and forth, at varying rates of speed. This means that the number and temporally measured distance between the interfaces across the scales determine the degree of accessibility.”

(Oswald & Baccini, 2003a, p. 142)

„Maßgebend für die Zugänglichkeit eines Ortes ist die Leistung verknüpfender Schnittstellen, weniger die örtliche Dichte von Verbindungen. Der Erschließungsindex beschreibt Verteilungssysteme und Schnittstellen unterschiedlicher Skalen. So ist ein Briefkasten eine Schnittstelle für die Postverteilung von hohen bis zu niedrigen Skalen und umgekehrt. Der Erschließungsindex bezieht sich auf die verknüpften Punkte, die ein Verteilungssystem für Personen, Güter und Informationen ausmachen. Der Grad der Zugänglichkeit eines gewählten Ortes wird maßgebend durch die Kontaktmöglichkeiten bestimmt, die von ihm aus oder zu ihm hin Skalen übergreifend, rasch oder langsam hergestellt werden können. Er ist also relativ hoch, wenn der gewählte Ort auf dem Weg unterschiedlichen Skalen, aber übergreifend verknüpft und in unterschiedlich raschen Geschwindigkeiten erreicht werden kann. Das bedeutet, dass Anzahl und zeitlich gemessene Entfernung der Skalen übergreifenden Schnittstellen den Grad der Zugänglichkeit bestimmen.“

(Oswald & Baccini, 2003b, p. 142)

By way of a conclusion:

„Zusammenfassend lässt sich festhalten, dass der Grad der Zugänglichkeit eines gewählten Ortes durch die Anzahl der Skalen übergreifend verknüpften Schnittstellen, die Skalenzuordnung und die zeitlich gemessene Entfernung ermittelt werden kann. Auf der Basis von vereinbarten Grenzwerten können über-, unter- oder angemessen erschlossene Gebiete ermittelt werden. Die statistische Auswertung ist dabei aufwendig und rechnerisch problematisch. Bei der Einordnung des Zugänglichkeitsgrades kann die folgende Hypothese helfen:

Je höher und vielfältiger das Angebot an Skalen übergreifenden Verknüpfungen für Hin- und Rückkontakte zum gewählten Ort ist, desto höher ist sein Grad der Zugänglichkeit und umgekehrt.“

(Oswald & Baccini, 2003b, p. 142)

“In summary, it can be established [auth.n.: we assume] that the degree of accessibility of a selected place can be determined by the number of linked interfaces across scales, the assignment of scales and the distance measured in time. On the basis of [auth.n.: Based on] agreed threshold values, it is possible to determine areas that are accessible to an excessive, insufficient or appropriate degree. The statistical assessment of these values is complicated and mathematically problematic. In assigning the degree of accessibility, the following hypothesis may be helpful:

The higher and more varied the supply of links across scales for contacts to and from the selected place, the higher its degree of accessibility, and vice versa.”

(Oswald & Baccini, 2003a, p. 142)

## Physiological indicators

In addition to the four morphological indicators, the Netzstadt Method also uses a set of six physiological indicators: density of inhabitants<sup>29</sup>, density of workplaces<sup>30</sup>, density of services provided to the population<sup>31</sup>, density of institutions<sup>32</sup>, workforce (flows)<sup>33</sup> and student (flows)<sup>34</sup>. In principle, this set could be completed by two additional indicators, which are, however, difficult to establish: shopper flows<sup>35</sup> and information flows<sup>36</sup>.

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29 *Einwohnerdichte.*

30 *Arbeitsplatzdichte.*

31 *Dienstleistungsdichte.*

32 *Institutionendichte.*

33 *Arbeitende (Flüsse).*

34 *Studierende (Flüsse).*

35 *Käufer (Flüsse).*

36 *Informationen (Flüsse in Bits und Bytes).*

### ***Density of inhabitants***

This is the ratio between the number of inhabitants and the surface, normally measured in square kilometres:

“Urban nodes show a greatly increased density of inhabitants compared to total area. High densities of buildings, which serve only as containers for workers or robots, do not constitute an urban node.”

(Oswald & Baccini, 2003a, p. 173)

„Urbane Knoten zeigen eine gegenüber der Gesamtfläche stark erhöhte Einwohnerdichte. Hohe Dichten von Gebäuden, welche nur als Hülle von Arbeitende oder Roboter dienen, rechtfertigen noch keinen urbanen Knoten.“

(Oswald & Baccini, 2003b, p. 173)

### ***Density of workplaces***

In turn, the specific density of workplaces:

“gives the ratio of workplaces to the number of inhabitants in the node who are in the workforce.

A node gains importance within an urban network when its specific density of workplaces is greater than that of the adjacent node. If the density is equal to 1, the net flow of workforce is equal to zero. However, this density says nothing about the actual flows of people [...]. In theory it is possible that all inhabitants in the workforce work outside their node and all workplaces in their node are occupied by people who live elsewhere. The specific density of workplaces of a node thus weights only its economic potential (limited to the number of workplaces, not to the economic net product of these workplaces), measured in terms of its population in the workforce.”

(Oswald & Baccini, 2003a, p. 176)

„[Die spezifische] Arbeitsplatzdichte gibt das Verhältnis der Arbeitsplätze im Vergleich zur Anzahl erwerbstätiger Einwohner im Knoten wieder.

Ein Knoten gewinnt innerhalb eines urbanen Netzes an Gewicht, wenn seine spezifische Arbeitsplatzdichte grösser ist als jene der benachbarten Knoten. Ist die Dichte gleich eins, so ist der Nettofluss der Arbeitenden gleich null. Diese Dichte sagt aber nichts über die tatsächlichen Personenflüsse aus [...]. Theoretisch ist es möglich, dass sämtliche erwerbstätigen Einwohner außerhalb ihres Knotens arbeiten und sämtliche Arbeitsplätze in ihrem Knoten durch Auswärtige belegt werden. Die spezifische Arbeitsplatzdichte eines Knotens gewichtet also nur ein wirtschaftliches Potenzial (begrenzt auf die Arbeitsplatzzahl, nicht auf die ökonomische Wertschöpfung), gemessen an seiner erwerbstätigen Bevölkerung.“

(Oswald & Baccini, 2003b, p. 176)

## Density of services offered to the population

It designates:

„[Die Dienstleistungsdichte] bezeichnet das Verhältnis von Erwerbstätigen im tertiären Wirtschaftssektor „Dienstleistungen“[,] im Vergleich zu dem im Knoten insgesamt Erwerbstätigen.

Ein Knoten zeichnet sich im urbanen Netz auch dadurch aus, dass er gegenüber seinen Nachbarn einen höheren Grad an Dienstleistungen erbringt. [...] Die volkswirtschaftliche Erfahrung zeigt, dass die Wertschöpfung in Dienstleistungsunternehmen durchschnittlich höher liegt als in den primären und sekundären Sektoren. Insofern ist dieser Indikator auch ein Gradmesser für das wirtschaftliche Potenzial des Knotens.“

(Oswald & Baccini, 2003b, p. 176)

“the ratio of people working in the tertiary ‘service’ sector of the economy to the total number of people working in the node.

A node is also distinguished in the urban network by the fact that it furnishes a higher degree of services than its neighbours. [...] Economic experience shows that the average net product in service companies is higher than in the primary and secondary sectors. In this respect, this indicator also shows the economic potential of the node.”

(Oswald & Baccini, 2003a, p. 176)

## Density of institutions

When discussing density of institutions:

„Ein urbaner Knoten zeichnet sich durch die Anzahl von Institutionen aus (öffentliche und private), die den Gütertausch (inkl. Dienstleistungen aller Art) ermöglichen. Die Zahl dieser Institutionen wird im Verhältnis zur Einwohnerzahl im Knoten betrachtet. Dieses Verhältnis wird als „Institutionendichte“ bezeichnet. Institutionen sind oder können sein:

- Märkte
- Kino, Museen, Theater
- Schulen
- Spitäler
- Sportvereine
- Verkehrsbetriebe.“

(Oswald & Baccini, 2003b, p. 177)

“An urban node is also distinguished by the number of institutions (public and private) that facilitate the exchange of goods (including services of all kinds). The number of these institutions is observed in relation to the number of inhabitants in the node. This ratio is designated as ‘density of institutions’. Institutions are or can be:

- markets
- cinemas, museums, theatres
- schools
- hospitals
- sports clubs
- transport systems.”

(Oswald & Baccini, 2003a, p. 177)

## ***Workforce flows***

Workforce flows<sup>37</sup> are part of commuter flows. Thus:

“The ratio of incoming commuters in the workforce to outgoing commuters in the workforce is calculated.”

(Oswald & Baccini, 2003a, p. 177)

„Die arbeitenden Einpendler werden in Relation zu arbeitenden Auspendlern gesetzt.“

(Oswald & Baccini, 2003b, p. 177)

## ***Student flows***

In their turn, student flows are also part of the broader commuting phenomenon:

“The ratio of incoming commuters ‘in training’ to outgoing commuters ‘in training’ is calculated.

The daily dynamics of the flows of people to and from a node are demonstrated by movements to the places of work and learning, as well as to the places that supply private households. The weight of a node in the urban network is given by the ratio of incoming to outgoing commuters. The greater this ratio, the more important the node.”

(Oswald & Baccini, 2003a, p. 177)

„Die „auszubildenden“ Einpendler werden in Relation zu „auszubildenden“ Auspendlern gesetzt.

Die tägliche Dynamik der Personenflüsse zu und weg von einem Knoten zeigt sich aus den Bewegungen zu den Arbeits- und Ausbildungsplätzen, sowie zu den Orten für die Versorgung der Privathaushalte. Das Gewicht eines Knotens im urbanen Netz ergibt sich aus dem Verhältnis zwischen Ein- und Auspendlern. Je grösser dieses ist, desto gewichtiger ist der Knoten.“

(Oswald & Baccini, 2003b, p. 177)

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37 The (civilian) workforce “includes all persons who are regularly involved in an income-generating economic or public-interest activity, in any of the sectors of the national economy, based on a work contract or independently (as freelancers), to obtain income in the form of salaries, barter, etc.

The categories included are:

\_Employees who work in one of the sectors of the national economy in the public sector (for wholly state-owned and public-interest entities) and for mixed, private, cooperative entities and non-governmental organisations;

\_Owners (directors of private companies) who employ salaried staff to conduct their business;

\_Freelancers;

\_Unpaid family caregivers.

The employed civilian population does not include military staff and the people affiliated to them (Ministry of National Defence, Ministry of Internal Affairs, Romanian Intelligence Service staff and military recruits), detainees, and staff of the political and public-interest organisations.” For additional information, see: <https://bit.ly/3iNewfE>.



## The method in detail

We have seen that the Netzstadt Method follows five steps:

1. Understanding the observation perimeter and the project perimeter.
2. Identifying the network that crosses the project perimeter.
3. Conducting a preliminary assessment of the urban qualities that describe the project perimeter.
4. Formulating the vision and goals of the project, in other words, setting the objectives and formulating the implementation strategy.
5. Proposing the actual urban projects and assigning responsibilities and deadlines for each one.

It is worth remembering here that the method only serves for the analysis and, implicitly, for the substantiation of urban projects, thereby having nothing to say about urban design as such.

### **The first step: understanding the observation perimeter and the project perimeter**

Coming back to the first step, The Netzstadt Method differentiates between the project and its context or, in other words, between the project perimeter and the observation perimeter, by relying almost exclusively on the examination and careful interpretation of a given territory. Thus, work teams select a relevant area of the regional or, less frequently, of the national network of municipalities, to understand the essential traits of the selected area and to describe the interactions of the project perimeter with the observation perimeter (Oswald & Baccini, 2003b, p. 66).

Pragmatically, the first step is prompted by a series of research questions, explicitly formulated in the design brief (Oswald & Baccini, 2003b, p. 193). For example:

\_Which of the five urban qualities<sup>38</sup> of the project perimeter must be improved?

\_Which of the strategies dedicated to urban development can lead to visible improvements in the identified urban qualities over the following two generations?

\_What do the urban projects aimed at implementing the strategy look like?

In other words:

\_What is the identity, diversity, flexibility, degree of self-sufficiency or resource efficiency that the project perimeter may possess or attain over two generations from now, when considering present conditions and their development possibilities?

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38 I.e. identity, diversity, flexibility, degree of self-sufficiency and resource efficiency.

Once formulated, this research question applies to the observation perimeter, as well as to the project perimeter. In other words, the exercise in argumentation begins here. Investigations focus gradually, starting from the regional scale and concluding at the local scale. Thus, analyses performed at the initial stage still have a general character. In brief, the work teams must follow the steps outlined below (Oswald & Baccini, 2003b, p. 199):

1. Identifying the nodes of both the observation perimeter and the project perimeter morphologically, by starting from the mapping of the settlements and infrastructures.<sup>39</sup>
2. Performing a preliminary physiological analysis of both the observation perimeter and the project perimeter.
3. Classifying and providing a synthetic description of the territories that make up the observation and the project perimeters, from a topographical, statistical, and topological perspective.
4. Illustrating the historical evolution of the identified nodes or, in other words, performing a diachronic analysis of the evolution of the urban system under study.

Using the definitions from the previous section, nodes are places with a (comparatively) high density of people, goods, and information. Thus, nodes represent (relative) concentrations of the built environment.<sup>40</sup> As a matter of fact, nodes result from the superposition of two types of territory: settlements and infrastructures. Hence, the first two analytical principles are:

**(PO1) Nodes are areas where increased densities of the built environment appear. They result from the superposition of two types of territory: settlements and infrastructures.**

**(PO2) Nodes are first identified on the regional scale and subsequently detailed at the local scale.<sup>41</sup>**

Pragmatically, the identification of nodes starts with mapping transport infrastructures and energy infrastructure, where appropriate. Transport infrastructures are divided into road and rail transport. Once divided, they are classified according to their importance. Thus, rail transport is divided into high-speed, regional and, where applicable, local (metropolitan) rail. Similarly, roads are divided into motorways, expressways, national, county, and local roads as well as into different street categories.<sup>42</sup>

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39 Since this is only a preliminary identification of nodes, the mapping of all six types of territories is not necessary at this stage.

40 Obviously, only if the increased density of buildings and developed land normally indicates higher concentrations of people, goods, and information. Although there are exceptions to this rule, it is sufficiently valid for studio work.

41 The second principle results from the efficiency of the exercise: once identified on the regional scale, the nodes only need to be detailed at the local scale.

42 In Romania, the classification of roads is given in Government Order 43/1997 on the legal regime of roads.

Following the classification of communication channels, the regional nodes must be identified. We will thus trace the large concentrations across the built environment, as they appear on satellite or aerial images. The contours of the nodes are drawn on distinctive elements within the landscape, on administrative boundaries or property boundaries, when these are known. They can already be used in identifying conflicting areas between higher-level communication channels and the local urban fabric, which we will call “conflicts of scale”. Conflicts of scale usually provide opportunities for urban project proposals.

Once the regional nodes are sufficiently well-defined, we can pass on to the classification of territories within nodes and their vicinity, by using the six previously mentioned categories: the built environment, the technical and public infrastructure, agricultural fields, forests<sup>43</sup>, bodies of water and fallow land<sup>44</sup>.

Once they have been identified, the contours of the regional nodes are transposed to the scale of the municipality, for detailing and possible corrections. After fixing these contours, local nodes must be identified and inscribed within the contour of the regional nodes. They likewise result from superposing the high-density built environment onto the different street categories. In contrast to regional node contours, those of local nodes are predominantly traced on the boundary lines of properties and thus require an up-to-date cadastral plan.

The identification and classification of nodes is followed by a series of morphological and, subsequently, physiological analyses of the observation and project perimeters. The morphological analysis uses the following set of indicators, defined in the “Morphological indicators” section: density of buildings and developed land, fragmentation, granulation and accessibility. Keep in mind, however, that all morphological indicators can be graphically represented but their measurement is not always simple. Thus, density of buildings and fragmentation can be measured directly, while granulation and accessibility can only be calculated indirectly (Oswald & Baccini, 2003b, p. 132).

In turn, the physiological analysis of the observation and project perimeters uses the following set of indicators, defined in the “Physiological indicators” section: density of inhabitants, density of workplaces, density of services offered to the population, density of institutions, workforce flows and student flows. Unlike morphological indicators, physiological indicators work with thresholds, which must be defined for the entire observation perimeter.

After completing both the morphological and the physiological study, the teams map the territory types that make up each node of the project perimeter. This generates the territorial typology of the project perimeter.

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43 Including free-access green areas.

44 Obviously, an increased focus requires greater accuracy, both in drawing nodes and in classifying territories. Thus, the settlements are now converted into “built environment”.

It is worth noting that we can identify and classify nodes and construct a territorial typology from a historical perspective as well if sufficient information is available. This is then called “diachronic analysis”.

The effort invested in performing a diachronic analysis is fully justified, since it clearly shows the evolution of the different types of territory and the dynamics of nodes over time. Hence, we arrive at our third principle:

**(P03) A diachronic (historical) analysis shows the evolution of nodes over time and the changes in land use determined by the change in the four activity types (eating and recreation; cleaning; living and working; transport and communication).**

A well-conducted historical analysis clearly shows the use of land for the four activity types. We can now see, for example, decreases in the proportion of agricultural fields or forests, to the benefit of communication channels or of the built environment.

Fig. 3 shows that the exercise we have performed so far can be transposed on any territorial scale, without losing any relevance.

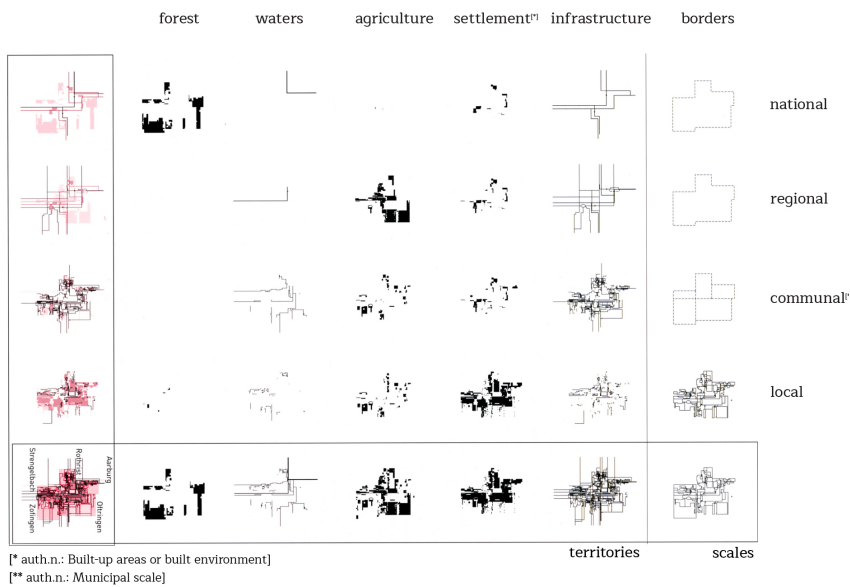


Fig. 3. Territorial typology at different scales Source: adapted from Oswald & Baccini (2003a, p. 129).

## The second step: characterising the network within the project perimeter

The second step is an examination of the network. In other words, teams must identify the nodes of the network, connections between them and the territorial scales at which they manifest themselves. More specifically, the urban system includes:

\_Nodes, connections, limits, and different territorial scales, which must be classified and systematised.

\_Four types of activity: eating and recreation; cleaning; living and working; transport and communication.

\_Four key resources: water, food, building materials and energy. The resources sustain the four activity types named above.

\_Six types of territory: settlements, infrastructures, agricultural land, forests, water, and fallow land.

The urban system is subsequently assessed based on the five urban qualities:<sup>45</sup> identity, diversity, flexibility, degree of self-sufficiency and resource efficiency. Evaluating these qualities is very important, since urban projects are explicitly dedicated to their improvement.

Taken together, all the above points constitute the components of the Netzstadt Model, as they appear in Fig. 4.

Essentially, the second step starts from three research questions (Oswald & Baccini, 2003b, p. 208):

1. What do the nodes, connections and territorial scales in the project perimeter look like?
2. Which morphological features are typical of the network?
3. Which physiological features does the network reveal?

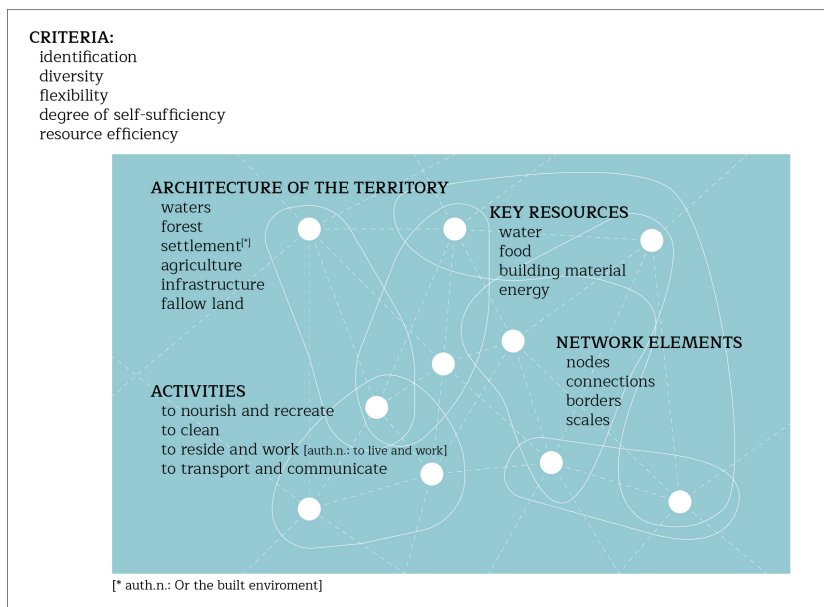


Fig. 4. The elements making up the Netzstadt Model. Source: adapted from Oswald & Baccini (2003a, p. 188).

<sup>45</sup> Or a selection of these.

In addition, it has two main aims: firstly, to associate the relevant territorial scales to the network within the project perimeter and, secondly, to describe its morphological and physiological features from the perspective of the five urban qualities, i.e., identity, diversity, flexibility, degree of self-sufficiency and resource efficiency.<sup>46</sup>

In other words:

“On the basis of [auth.n.: Based on] the results obtained in step 1, the network elements (nodes, connections, scales) are initially examined morphologically. The node figures delineated in step 1 are drawn on the topographically larger scale of the project perimeter, and the diagrams are prepared for an investigation based on morphological and physiological indicators [...].

On the basis of [auth.n.: Based on] these results, we now zoom in on the project perimeter, examining it in more depth. The examination of the physiological indicators and the interplay of different scales enables the researcher to generate a classification of the network elements that does justice to each scale. In order to comprehend this interplay, there must be a methodological alternation between the three scale levels. Here, the second or middle scale level forms the focus of the investigation, since it is composed of lower scale levels, just as it is a component of higher ones. Thus, the communal scale constitutes a subset of the regional scale, and the local scales are subsets of the communal scale.

At the beginning of step 2, the researchers must decide which of the five urban characteristics they will give top priority when describing the identified network of the project perimeter. This decision is based on the findings of the examination of the starting position.”

(Oswald & Baccini, 2003a, p. 208)

„Die Netzelemente (Knoten, Verbindungen, Skalen) werden auf der Grundlage der Ergebnisse aus Schritt 1 wiederum zuerst morphologisch angesprochen. Die im Schritt 1 gewonnenen Knotenfiguren werden im topographisch größeren Maßstab des Projektperimeters gezeichnet, die Grafiken für die Untersuchung mit morphologischen und physiologischen Indikatoren bereitgestellt [...].

Ausgehend von diesen Ergebnissen, wird jetzt der Projektperimeter herangezogen und vertieft untersucht.

Aus der Betrachtung der physiologischen Indikatoren und des Zusammenspiels unterschiedlicher Skalen ergibt sich die skalengerechte Zuordnung der Netzelemente. Um dieses Zusammenspiel zu erfassen, wird methodisch zwischen den Skalenstufen hin- und hergewechselt. Dabei steht die zweite, die mittlere Skalenstufe[,] im Brennpunkt der Untersuchung, weil sie aus niedrigeren Skalenstufen zusammengesetzt und zugleich Bestandteil von höheren ist. So ist die kommunale Skala Teilmenge der regionalen, und lokale Skalen sind Teilmengen kommunaler Skalen.

Welche der fünf urbanen Qualitäten vorrangig am identifizierten Netz des Projektperimeters beschrieben wird, ist am Anfang von Schritt 2 zu entscheiden. Diese Entscheidung stützt sich auf den Befund, wie er in der Ausgangslage festgehalten ist.“

(Oswald & Baccini, 2003b, p. 208)

<sup>46</sup> The urban qualities that are used appear in the design brief. In university projects, the design brief deals with a more limited selection of qualities.

Hence, returning to the nodes delineated in the first step, teams elaborate on them and embed them within the project perimeter, aiming to study each node more carefully with the help of the morphological and physiological indicators. In a nutshell, the major difference between the first and the second step consists in the accuracy with which the work is carried out.

Operationally, the first exercise consists of mapping the four activity types in the project perimeter: eating and recreation; cleaning; living and working; transport and communication. At the end of the exercise, we will obtain four drawings: the distribution of residential areas, of workplaces and of areas dedicated to maintaining or improving the health of the population<sup>47</sup>, and the transport and energy networks. Taken together, they provide a highly accurate description of the architecture of nodes.

Subsequently, the density of settlements and of developed land, the granulation of the urban texture and its fragmentation, as well as the accessibility of nodes are calculated or approximated.

The second exercise consists of the physiological study of the nodes. Here, the nodes must be associated with the appropriate territorial scale, based on commuting and the density of institutions that operate at the regional level.

The classification of nodes at different territorial scales is derived from these two exercises. In other words, we obtain the number of regional, communal, and local nodes.

During the second step, we work with the following principles:

**(P04) The morphological and physiological study of the nodes in the project perimeter must be sufficiently accurate to enable the classification of nodes in the project perimeter into regional, communal, and local ones.**

**(P05) Where no precise data for the calculation of morphological and physiological indicators is available, they must be approximated through observation or surveys.**

### **The third step: the first assessment of urban qualities**

Results obtained in the second step lay the foundation for the assessment of the five qualities expressed by the urban system: identity, diversity, flexibility, degree of self-sufficiency and the efficiency with which it uses the available resources. In brief, we work with four guiding questions (Oswald & Baccini, 2003b, p. 218ff):

1. Which network traits are strong points of the project perimeter?
2. Which strong points are best suited for development?
3. Which network features are weak points of the project perimeter?

<sup>47</sup> This includes both the wastewater treatment plants and the areas destined for the selective collection of waste, its sorting and subsequent recycling.

4. What are the weak points that prevent a future development of the project perimeter?

The four questions above lead to a minimum of three anticipated results:

1. The assessment of urban qualities must be transparent, so that they form a verifiable starting point for the future conversion of the project perimeter.

2. The future conversion of the project perimeter<sup>48</sup> must be accompanied by a minimal set of indicators, aimed at measuring the performance and the effects, or impact, of the proposed urban projects, to the extent that this is indeed possible.

3. The vision for the project perimeter must be translated into a minimal set of clear and, preferably, measurable objectives, aimed at producing an operational goal.

We thus have four guiding questions and a minimum of three anticipated results with which to classify the characteristics of the network studied in the second step by using the five urban qualities. In other words:

“The classification is divided into sub-steps. The basis is constituted by [auth.n.: It is based on] lists and diagrams of the network features identified and key variables for the actual condition in the project perimeter. Network features and key variables are divided into strengths and weaknesses with reference to the five quality criteria, classified according to these criteria and represented in a matrix. [auth.n.: Network features and their key measurements are classified into strengths and weaknesses, according to the five urban quality criteria. Then they are represented in a matrix, aimed at providing a clear overview of the network and its features]. The knowledge, subjective experience and the understanding of the problems gained in the previous design steps can be used here to help with the process of classification.

In discussions between the transdisciplinary work groups, the initial subjective judgments are examined

„Die Einstufung gliedert sich in Teilschritte. Die Basis bilden Listen und Diagramme der festgestellten Netzeigenschaften und Schlüsselgrößen für den Ist-Zustand im Projektperimeter. Netzeigenschaften und Schlüsselgrößen werden in Bezug auf die fünf urbanen Qualitätskriterien in Stärken und Schwächen aufgeteilt, ihnen zugeordnet und dementsprechend in einer Matrix dargestellt. Als Hilfsmittel zur Einstufung dienen am Anfang die Kenntnisse, das subjektive Erfahrungswissen und das Verständnis der Probleme, wie sie im vorausgegangenen Entwurfsschritten gewonnen werden konnten. In den Auseinandersetzungen transdisziplinärer Arbeitsgruppen werden die ersten subjektiven Urteile überprüft und gegebenenfalls abgeändert, bis sie als Wertungsergebnis feststehen.

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48 Viz., the transformation from the existing to the proposed situation.



Der Prozess der Bewertung kann kontrovers und mit Ungewissheiten und Entscheidungskrisen gespickt sein. Er führt jedoch stets zu einer schärferen, auch vertieften Wahrnehmung von Problemen. Als Folge der vertieften Kenntnisse kann sich die Wiederholung des Bewertungsprozesses aufdrängen.

Die erste Bewertung ist mit der Einstufung der Stärken und Schwächen noch nicht abgeschlossen. Es müssen darüber hinaus Leitideen eingeführt werden, wie mit festgestellten Stärken und Schwächen verfahren werden soll, sonst bleibt die Bewertung abstrakt und unverbindlich.“

(Oswald & Baccini, 2003b, p. 219)

and, if necessary, revised until they are established as evaluation results.

The process of evaluation may be controversial and plagued by uncertainties and decision crises. However, it leads to a keener and deeper perception of problems. One consequence of this deeper knowledge may be a perceived need to repeat the evaluation process. The classification of strengths and weaknesses is just one part of the initial evaluation. Key concepts must be introduced that show how to proceed with the identified strengths and weaknesses. Otherwise, the evaluation will remain abstract and non-committal.”

(Oswald & Baccini, 2003a, p. 219)

Unfortunately, we cannot find more precise information on how the assessment of urban qualities is carried out in practice,<sup>49</sup> which means that it must be conceived and adapted for each individual project. Yet we can formulate a series of principles here as well:

**(P06) The assessment of urban qualities must be transparent and intuitive. It starts by creating a hierarchy of weak and strong points of the project perimeter, relating to the urban quality in question. Subsequently, the main ideas that structure the approach to the existing situation in the project perimeter receive their first formulation.**

**(P07) The assessment of urban qualities is generally a cyclical exercise whose degree of accuracy increases gradually, with each repetition.**

### **The fourth step: formulating the objectives of urban development**

The fourth step is given the briefest coverage in the description of the method. Essentially, it entails the transformation of both the strong and the weak points uncovered in the previous step into the following guiding questions:

1. Who sets the objectives for the urban conversion that will take place in the project perimeter?<sup>50</sup>

<sup>49</sup> A few instructive examples are given in Oswald & Baccini (2003b, p. 219ff.), but they are not explained in detail.

<sup>50</sup> In other words, who formulates the objectives for the development within the project perimeter?

## 2. Who formulates the strategy for the urban development within the project perimeter?

This refers to the selection of the parties involved who in the following step will be given mandates to carry out the urban projects and to implement the proposed strategy. More specifically:

„Hier handelt es sich um Entscheidungen, die den Ist-Zustand in einen Ziel-Zustand zu überführen in der Lage sind. Mit ihnen werden weitere Entscheidungen zur Übernahme praktischer Verantwortung verknüpft.

Vor dem Hintergrund verpflichtender Prinzipien lassen sich diese Leitfragen eindeutig beantworten. Es entscheiden vorrangig diejenigen Gruppierungen von Umbauziele und Strategien, die selbst von den Folgen betroffen sind. In einer offenen Gesellschaft hat kein Individuum und keine Gruppierung ohne demokratische Legitimation das Recht, durch Diktat urbaner Entwicklungsziele und Strategien die Entscheidungsgewalt über andere Menschen auszuüben. Geeignete Beteiligungsverfahren können hingegen helfen, die für den Projektperimeter relevanten Akteure gezielt auf die Aufgaben und Verantwortungen hinzu führen, die sie in der Stadtentwicklung wahrnehmen.“

(Oswald & Baccini, 2003b, p. 221)

“We are concerned here with decisions that help transform the actual [auth.n.: present] condition into a target [auth.n.: future] condition. These decisions are linked to further decisions concerning the assumption of practical responsibility. These key questions can be answered unambiguously on the basis of obligatory [auth. n.: precautionary] principles. Priority in decision-making as regards reconstruction goals and strategies must be given to those groups directly affected by the consequences. In an open society, no individual or group without democratic legitimacy can claim the right to make decisions on urban development goals and strategies that affect other people. Appropriate participatory processes may help to guide relevant actors to the tasks and responsibilities they come to perceive as part of urban development.”

(Oswald & Baccini, 2003a, p. 221)

The fourth step uses a supplementary method, named the Synoikos Method, which is not in fact part of the Netzstadt Method.<sup>51</sup> It is schematically represented in Fig. 5.

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<sup>51</sup> It is described more extensively in Oswald & Baccini (2003b, pp. 251-289).

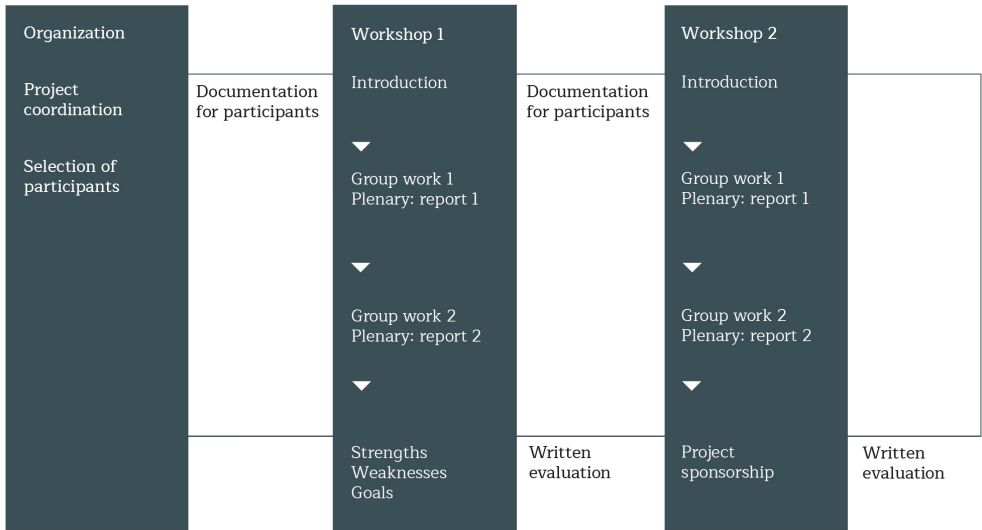


Fig. 5. A brief overview of the Synoikos Method. Source: adapted from Oswald & Baccini (2003a, p. 259).

In sum, the method has four aims (Oswald & Baccini, 2003b, p. 258f):

\_Both the weak and strong points of the observation perimeter are highlighted and classified.

\_The future urban qualities of the project perimeter are established and explicitly stated.

\_Sketches of the urban projects are available, aimed at guiding the urban conversion of the project perimeter.

\_Participants to the briefings and consultation process assume tasks and responsibilities for completing the urban projects and implementing the strategy of urban development.

The four aims rely on the following series of prerequisites (Oswald & Baccini, 2003b, p. 258):

\_Firstly, a team of strong regional personalities must be formed. This core group must act as a link to the rest of the community in the project perimeter. In principle, the selected personalities should not have any political affiliations.

\_Once formed, this core group needs to be completed by as diverse a public as possible, made up of curious, motivated, dedicated, and communicative individuals from the widest possible range of backgrounds: politics, culture, finance, and public administration. They should be able to show a strong track record in their respective fields, to function as a dissemination chain after the end of the collaboration, both in the personal and in the professional sphere.

\_Finally, there is a need for preparation, leadership and adequate professional (technical) evaluation of the entire procedure dedicated to this structured collaboration, so that the relatively brief cooperation over the two one-day workshops should make maximum use of the participants' time and abilities. For this reason, moderators, scriptwriters, organisers, and secretaries are required to direct the process.

It is worth noting that the method uses a simple scenario:

“The dramaturgical structure of the process is made up as follows [...]:

– The selected and registered participants receive a document folder ten days before the first workshop. This folder also includes several scenarios for the next fifty years of the region's future.

– The first of the two one-day workshops is dedicated to goals 1 and 2.<sup>52</sup>

– The evaluated results of the first workshop are sent to the participants. Ten days prior to the second workshop, they will again receive preparatory written documents.

– The second workshop takes place several weeks or months after the first and deals with goals 3 and 4.<sup>53</sup>

(Oswald & Baccini, 2003a, p. 258)

„Der dramaturgische Aufbau des Verfahrens hat folgende Gliederung [...]:

- Die ausgewählten und angemeldeten Teilnehmer erhalten zehn Tage vor dem ersten Workshop schriftliche Unterlagen befinden sich auch einige Szenarien zur Situation ihrer Region in 50 Jahren.

- Der erste der folgenden zwei eintägigen Workshops widmet sich den Zielen 1 und 2.

- Die ausgewerteten Resultate werden den Teilnehmern nachgeschickt. Sie erhalten wiederum zehn Tage vor dem zweiten Workshop schriftliche Unterlagen zur Vorbereitung.

- Der zweite Workshop findet nach einigen Wochen oder Monaten statt und erarbeitet die Ziele 3 und 4.“

(Oswald & Baccini, 2003b, p. 258f.).

We can now formulate the next series of principles for the fourth step:

**(PO8) The communities affected by the development initiative and, implicitly, by the urban projects it encompasses, have priority in formulating the strategy and establishing the objectives it contains.**

<sup>52</sup> I.e., the systematisation of weak and strong points of the observation perimeter, as well as the choice of future urban qualities for the project perimeter.

<sup>53</sup> I.e., the sketching of possible urban projects and the assumption of tasks and responsibilities by the parties involved.

**(P09) The selection of parties involved in carrying out the projects and in implementing the strategy for urban development implies that each interested party accepts a series of tasks and responsibilities. The selection of involved parties usually employs a procedure of structured collaboration, wherein informing and consulting the population usually plays an important part.**

### **The fifth step: preparing the proposals of urban projects**

The final step of the method transforms the project goal into a series of urban projects, built on the following guiding questions<sup>54</sup>:

1. What do the urban projects, geared towards reaching the objectives of urban development, look like?
2. What are the actions, means and deadlines for implementing the proposed strategies?
3. Who are the parties involved in implementing the strategy and in carrying out the urban projects? What is the mandate for each party?

The three questions above lead to the choice of the appropriate urban programme for each project perimeter. More specifically, work teams use them:

- \_ To designate the beneficiaries of each urban project.
- \_ To choose the functions to be developed in the project perimeter.
- \_ To create a portfolio of possible activities within the project perimeter.
- \_ To attract potential public and private investors.
- \_ To formulate the minimal expected results for each urban project.

Once again, we find only a brief description of the fifth step in the text.

„Im letzten Entwurfsschritt werden urbane Projekte für den Umbauprozess konkretisiert und in den wesentlichen Merkmalen so ausgearbeitet, dass die drei Leitfragen für die verantwortlichen Akteure nachvollziehbar verantwortet beantwortet werden.

Im Stadtumbau sind projektierte Zielzustände für sich allein genommen von geringem, aber im Vergleich zum Ist-Zustand von bedeutendem Interesse, weil die Spanne vom Ist- zum Zielzustand für die Wahl der Strategie zur Stadtentwicklung bestimmend ist.

Die Strategie beschreibt das gesellschaftlich-politische Verhalten, das zu den erwünschten Zielen innerhalb von zwei Generationen führen kann. Sie wird durch verantwortliche Akteure eingeführt und laufend befördert.“

(Oswald & Baccini, 2003b, p. 222)

“In the last design step, urban projects were defined in concrete terms for the reconstruction process, and their essential features were elaborated so that the three questions for the responsible actors could be answered in a comprehensible form.

<sup>54</sup> The guiding questions must be explicitly mentioned in the design brief.

In urban reconstruction [auth.n.: conversion], the target conditions are themselves of little interest. However, they become significant when compared with the actual condition, because the span between actual and target [auth.n.: present and future] condition is decisive for the choice of the urban development strategy.

The strategy describes the socio-political behaviour that can bring about the desired goals within two generations. It is initiated by the responsible actors and promoted continuously.”

(Oswald & Baccini, 2003a, p. 222)

Furthermore:

“The strategic aspect relates to the long-term target characteristic of sustainability and the practical aspect of shapability [auth.n.: design].

In practice, urban projects allow the realization of the target characteristic of shapability over the short or medium term [auth.n.: In practice, urban projects allow the design realization over the short or medium term]. This makes it possible for all actors to examine the realized project in relation to the strategic goals and thus gain knowledge for the further implementation of the selected strategy of sustainable urban development.”

(Oswald & Baccini, 2003a, p. 222)

„Die strategische Ebene bezieht sich auf das langfristig gültige Qualitätsziel Nachhaltigkeit und die praktische auf das Qualitätsziel Gestaltung.

Urbane Projekte erlauben, dass in der Praxis das Qualitätsziel Gestaltung in relativ kurzen oder mittleren Fristen verwirklicht werden kann. Damit ist die Voraussetzung dafür geschaffen, dass alle Akteure das realisierte urbane Projekt an der strategischen Zielsetzung überprüfen und Erkenntnisse für die weitere Umsetzung der gewählten Strategie zur nachhaltigen Stadtentwicklung gewinnen können.“

(Oswald și Baccini, 2003b, p. 222f.)

Thus, the fifth step must also be processed in collaboration with tutors. Nevertheless, we can still formulate a brief set of principles:

**(P10) The proposed urban projects must make a visible and measurable contribution to the implementation of the urban development strategy. Hence, each project must have a series of minimal anticipated results.**

**(P11) Each urban project must have a beneficiary and the parties involved in carrying it out must know and explicitly accept their tasks and obligations. In other words, the mandate of each involved party must be clearly established for every urban project.**

## Summary

The following passage provides the overall presentation of the steps involved in the Netzstadt Method (Oswald & Baccini, 2003b, p. 66f).

“The Netzstadt Method ensures that the work of designing urban systems proceeds in stages. It comprises five steps:

1. Work starts with a perimeter of observation in which the urban system to be designed is embedded as a project perimeter. The first step addresses the project perimeter as a network component in a larger urban system, in order to characterize the nature of the system’s interactions with the outside world (in their current condition or over the course of history).

2. The node in the observation perimeter is addressed according to morphological criteria [...], followed by physiological analyses [...], in order to recover the nodes and flows true to scale within the project perimeter.

3. The third step is to perform a first assessment of the urban features in the project perimeter [...]. The objectives of the assessment are:

– to yield a comprehensible point of departure for the work of designing new target conditions.

„Die Netzstadtmethode gewährleistet einen stufenweisen Aufbau in der Entwurfsarbeit an urbanen Systemen. Er umfasst fünf Schritte:

1. Der Einstieg erfolgt mit einem Beobachtungsperimeter, in dem das zu gestaltende urbane System als Projektperimeter eingebettet ist. In einem ersten Schritt wird der Projektperimeter als Netz-Teil eines größeren urbanen Systems angesprochen, um das Wesen der Interaktionen nach außen charakterisieren zu können (im Ist-Zustand oder in der geschichtlichen Entwicklung).

2. Die erste Ansprache der Knoten im Beobachtungsperimeter erfolgt nach morphologischen Kriterien [...], gefolgt von den physiologischen Analysen [...]. Ihre Aufgabe ist es, Knoten und Flüsse im Rahmen des Projektperimeters skalengerecht zu erfassen.

– to provide a yardstick for the rebuilding process [auth.n.: to provide a benchmark for the conversion process] from the current condition to the target condition, which can be used to measure the effects on the system as a whole [auth.n.: global effects] of individual changes that have been realized already or are planned for the future.

4. In participatory procedures, for instance using the Synoikos Method, development targets are set for the selected project perimeter. These development targets must be translated back into Netzstadt language for the next step.

5. The final step consists of designing the reconstruction process from the current to the target condition.”

(Oswald & Baccini, 2003a, p. 66)

3. Im dritten Schritt erfolgt eine erste Bewertung der urbanen Eigenschaften im Projektperimeter auf der Basis von fünf Qualitätskriterien [...]. Diese Bewertung hat folgende Ziele:

- Sie soll eine nachvollziehbare Ausgangslage für die Entwurfsarbeit neuer Zielzustände gewinnen.

- Sie soll dem Umbauprozess vom „Ist-Zustand zum Soll-Zustand“ einen „Maßstab“ geben, an welchem man realisierte oder geplante einzelne Veränderungen in ihren Wirkungen auf das gesamte System abschätzen kann.

4. In partizipativen Verfahren, zum Beispiel mit der Synoikos-Methode [...] werden für den ausgewählten Projektperimeter Entwicklungsziele gesetzt. Diese Entwicklungsziele müssen für den nächsten Schritt wieder in die Netzstadt-Sprache übersetzt werden.

5. Den Abschluss bilden die Entwürfe für den Umbauprozess von Ist-Zustand zum Soll-Zustand.“

(Oswald & Baccini, 2003b, p. 66f.)

## Conclusions

The time has come to state the lessons learned.

The first is that the text by Oswald and Baccini is interesting, but rather ambiguous. In other words, the systematisation we have undertaken above has been laborious and we have frankly not always been content with the results. We have kept the descriptions in our summary as rich as possible to preserve the main ideas unchanged, but we have been unable, in most instances, to compensate for the lack of methodological precision. For example, we decided to exclude the formulae for morphological and physiological indicators because some of them are partly wrong, and their derivation is sometimes completely absent, especially for secondary indicators. We intend to verify them one by one, but at present we can only reference the original text and rely exclusively on the readers' due diligence.

Furthermore, even though the Netzstadt Method is correctly divided into the five steps outlined in Fig. 2, important information is missing at almost every turn. The order of analyses is occasionally missing, or the minimal anticipated results are absent in some instances. In addition, the more timid instructors will not find support for decision-taking anywhere in the text. Hence, the method is not well suited to studios that lack a propensity for experimentation.



Nevertheless, it has a few clear advantages: firstly, it encourages research. Thus, the Netzstadt Method can be linked fairly easily to morphological density as well as to network theory.

Density is more intuitive at the moment, largely due to the instruments built by Meta Berghauser Pont and by the research group on territorial morphology,<sup>55</sup> at Chalmers University of Technology (Sweden): *Place Syntax Tool and Spacemate* (Berghauser Pont & Haupt, 2009). We have already tested the *Spacemate* diagram over the last two academic years, both in urban planning disciplines<sup>56</sup> of the second year at the Faculty of Urban Planning within the “Ion Mincu” University of Architecture and Urban Planning and in the Master programme in Smart Territorial Development at the Faculty of Geography within the University of Bucharest. In both cases, the *Spacemate* has been easily assimilated and produced good results. Thus, after slightly more rigorous testing of the Netzstadt Method, we have the possibility of linking it more closely to the morphological analysis of density.

Concerning network theory, the situation is slightly more complicated. Network analysis is not at present part of the tools of urban analysis in undergraduate or Master programmes at the Faculty of Urban Planning. In addition, there are no textbooks to facilitate its introduction and assimilation. It is true that a few, somewhat older, texts are available, like Enache (1977) or Botez and Celac (1980), but they can only be used at present as general introductions to the topic. There is no user-friendly text that also contains tools for detailed analysis (such as, for example, Newman, 2010). In addition, there are no doctoral research projects that could produce this type of publication.

Secondly, the Netzstadt approach is an experimental and open method that fully exploits research questions, which are by far the most valuable components of the book. Studio guidance should therefore be both bold and flexible. In the absence of the minimal results associated to each step of the method, decisions must be taken *ex tempore* and repeatedly verified. Furthermore, since it is an open method, the workshops should be regarded as research projects and not as solving exercises for a given design brief. We thus refer to a different type of workshop, more akin, in principle, to diploma projects at the Faculty of Architecture and to dissertation projects at the Faculty of Urban Planning.

Finally, the Netzstadt Method is interdisciplinary, in the fullest sense of that word. For this reason, it is more suitable for Master programmes, where design teams include different specialties.

Additionally, tutors must be able to bring different professions to the workshops, at least as guest lecturers if not as constant guidance. Given that part of the specialties required by the method are not available, at least for the present, at the “Ion Mincu” University of Architecture and Urban Planning, the workshops constitute an exceptional opportunity for building institutional partnerships with national as well as foreign universities.

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<sup>55</sup> *Spatial Morphology Group*.

<sup>56</sup> UT-49: Urban Design (1) and UT-58: Urban Design (2).



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