**Articles**

From *EKISTICS,* Vols. 30-38, July 1970 – Dec. 1974

# Action for a better scientific approach to the subject of human settlements:

# the Anthropocosmos model

This article consists of parts from three papers presented to Delos Eleven, with the addition of some explanatory passages from *The Human Settlements Research Project* report presented by C.A. Doxiadis to the International Federation of Institutes for Advanced Study (IFIAS) in May 1974.

## 1. The overall concept of Anthropocosmos

The purpose of this study is to help us clarify Anthropocosmos and to understand how we can be more successful in dealing with human settlements. Anthropocosmos is our system of life and human settlement is our goal. Its purpose must always be to serve Anthropos[1] and not any individual interests that work against the broader human goal.

The basic tasks of this study are to define:
1. the overall concept of *Anthropocosmos*
2. the notion of *human settlements*
3. the *language* we should use
4. the *taxonomic frame*
5-8. *basic classifications*
9. a working *model of Anthropocosmos*
10. the *selection and evaluation of data*

In my introductory article I set out the *twelve radical changes* we need to lead toward action for human settlements.

The solution of the problem of our confusion about the overall concept of Anthropocosmos is to create a frame model which can help us understand how to conceive and to build the whole Anthropocosmos properly. We can begin to do this in the following way:
1. Define our total system of life — Anthropocosmos — by creating a systematic frame so that any part of it can be clearly located within it.
2. Define all relationships (causal and non-causal) that may exist between any parts of the system so that we can understand its functions and changes.
3. Define a method for the measurement or evaluation of all parts of the system and their interrelationships (including those that cannot now be scientifically measured), so that we can recognize the relative importance of each situation and each problem.

Each human settlement contains so many individuals, organs, cells and elements that there is no hope of progress unless we develop a comprehensive model to include every single element, aspect, relationship, and so on, that exists within each settlement. This is the Anthropocosmos model (Fig. 1). Into this comprehensive model we can insert the input from all the disciplines concerned. The model can also help to work out a strategy for breaking down mental barriers and connecting disciplines together. Thus, we may hope to avoid interdisciplinary anarchy and build up a team which, having grasped the concept that settlements are a total system can bring all the necessary hard-headed expertise together.

The only way to mobilize the resources provided by many disciplines for the benefit of human settlements is to guide them towards making the interconnections which are needed, and to create a framework which can contain all the contributions they want to make, and can make.

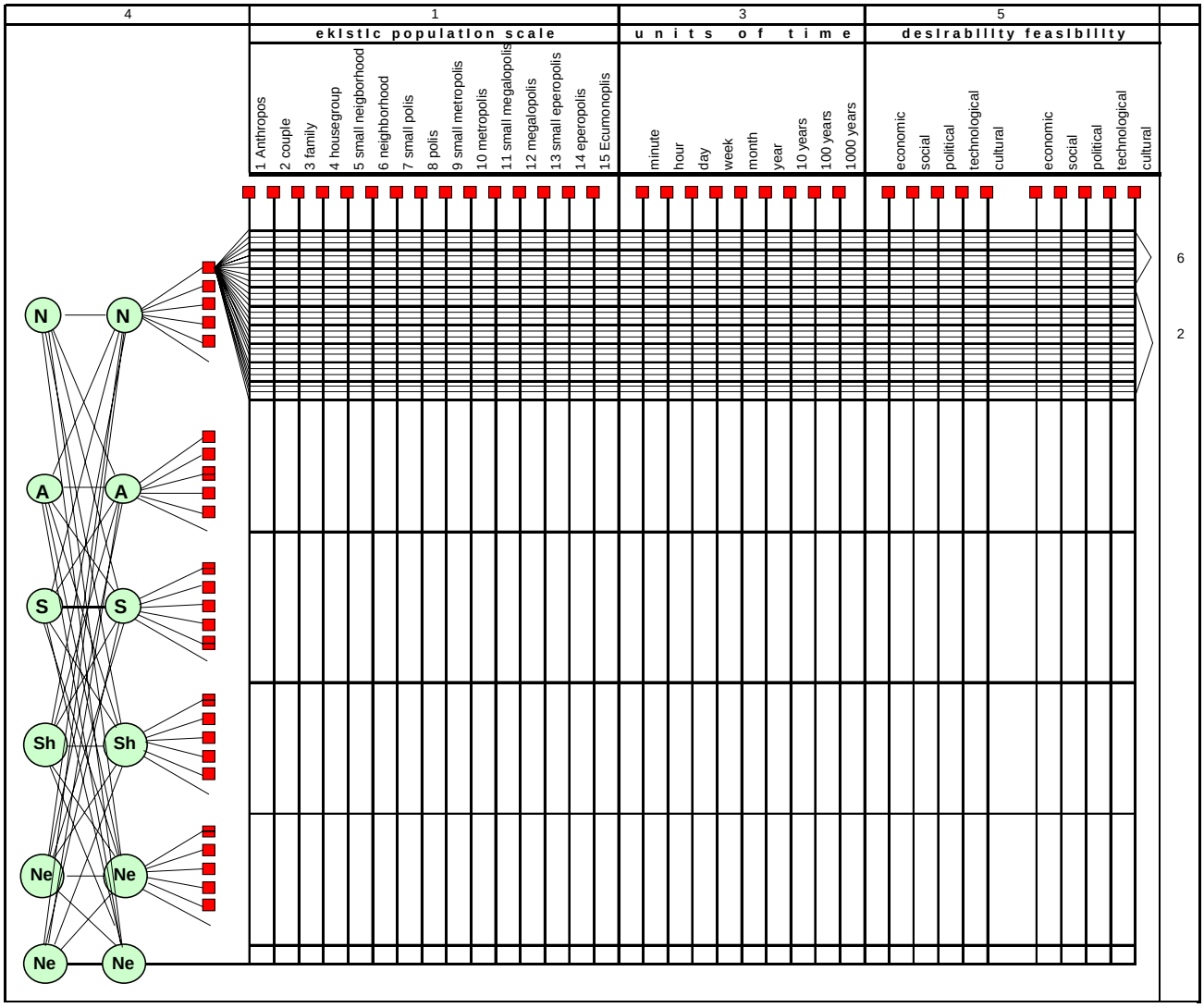


Fig. 1: The total Anthropocosmos model

*Legend*

1 Ekistic population scale (see Table 2)
2 Ekistic territorial scale (see Table 3)
3 Ekistic time scale (see Fig. 3)
4 Ekistic elements (see below)
5 Aspects (see Fig. 4)
6 Principles (see Fig. 4)

N Nature
A Anthropos
S Society
Sh Shells
Ne Networks
HS Human Settlements

## 2. The concept of human settlements

Human settlements are the territorial arrangements made by Anthropos for his own benefit and welfare. They are the results of human action and their goal is human survival, an easier and better life (especially in early childhood); happiness and safety (as Aristotle demanded)[1,2] and opportunities for human development.

The term "human settlements" is not yet clearly defined. What exactly *are* human settlements? Are they cities, villages, housing, people, society, buildings, or something else? In 1964 I proposed using the term "human settlements" instead of "housing, building and planning" to the United Nations Committee on Housing, Building and Planning.[3] My motion was defeated then, but a few years later "human settlements" was accepted as the correct term, although — even within the United Nations itself — there is no "agreed-upon definition."[4] This is because human settlements are the most complex systems of life on our globe. They are two orders

higher than cells and one order higher than "bodies" (if we follow Sir Julian Huxley's classification of individuals).[5] However, human settlements not only have a complexity many times higher than their component bodies (or individuals), they are further confusing because they are much younger and more primitive than bodies, and very much more so than cells.

Human settlements include very temporary settlements (where the ground has simply been leveled enough for a night's sleep), semi-permanent settlements (from nomadic tents to spaceships), and permanent settlements (from very small to enormous ones). Some of these are growing so much that we are beginning to face millions of individual human settlements merging into one universal human settlement that is Ecumenopolis.

For some 10,000 years human beings experimented with the creation of village-scale human settlements, and then for another 8,000 years or so with towns and cities. These reached a successful maximum size of 50,000 people (ekistic unit 8). Larger human settlements were few; they reached up to some hundreds of thousands (ekistic unit 9) and some even touched a maximum of one million people (ekistic unit 10), but, with a few exceptions (such as Peking), these settlements did not survive. This can be interpreted to mean that humanity has managed to solve the problems of human settlements up to the level of ekistic unit 8.

Nowadays human settlements are increasingly complex for many obvious reasons, including the increase in population and the introduction of new factors such as machines. The overriding reasons for their greater complexity are the many changes in their different dimensions. We now live in metropolises and also in megalopolises (ekistic units 10-12) and even, in some respects, in the global city (ekistic unit 15).

One of the negative comments made on the possibility of a scientific approach to a science of human settlements is that human settlements are so different from each other that any systematic study of them is not possible. It is a good thing that Carolus Linnaeus was not impressed by such statements because there are much greater differences between the different kinds of plants and animals; yet, in spite of this, we have both botany and zoology. There is no question that we need to find a systematic and scientific approach to human settlements.

One of the difficulties of developing a classification system for human settlements is that we have to deal with much smaller total numbers than when dealing with animals or plants. Altogether there are no more than a few tens of millions of settlements (if we do not consider house units but only entire settlements, from small hamlets to large cities) whereas there are more than 300,000 species of plants and more than one million species of animals; and new discoveries increase these numbers by 10,000 to 20,000 a year.

### 3. The need for a common language

There is a basic need to develop an accepted terminology, so that all those people dealing with human settlements can understand one another. One of the main reasons we face such a state of confusion today is that we have no accepted terminology.

Moreover a common language is essential to open the road for the necessary comparative studies and attempts at measurement which can lead to a systematic taxonomy and classification.

For example we can regard the total human settlement as consisting of four types of areas: the *Naturareas* (where Anthropos is only a visitor and hunter), *Cultivareas* (where Anthropos cultivates Nature), *Anthropareas* (where Anthropos lives and uses Nature's territories for all expressions of life, from houses to work, entertainment, sports, etc.), and *Industrareas* (where Anthropos transforms natural resources as in mining and industry).

**Taxonomic framework and classification**

The next task is the creation of a logical and taxonomic frame for a systematic understanding and classification of Anthropocosmos and human settlements. Taxonomy is the basis of "the theoretical study of classification, including its bases, principles, procedures and rules"[6] and numerical taxonomy uses taxonomy as the proper term.[7] The following classification system uses both Aristotelian logic, as Linnaeus did, and taxonomy which provides a means "to arrive at judgements of affinity based on multiple and unweighted characters without the time and controversy which seem necessary at present for the maturation of taxonomy judgments."[8]

The first question is how we can proceed to classify human settlements. At present we have only very general categories, such as villages, towns, cities, etc. Among several efforts for more specific classification there is a tendency (especially since photography is the main method of visual presentation of human settlements) to attempt a classification on the basis of their appearance and to speak of a morphogenesis. But a "purely morphological definition must be subordinated to the concept that the species is composed of populations in which variability is inherent."[9] Thus we have to find a way to measure all possible characters.

I propose a taxonomy of human settlements which is similar in structure and terminology to that of animals and plants (Table 1,). A proper classification requires the consideration of a very great number of characteristics, but I am only using a few here to demonstrate the process that we need to achieve this goal.

| | Rank | Characters and views |
|---|---|---|
| 1. | Division | basic dimensions and economic function |
| 2. | Class | Ekistic Population Units |
| 3. | Order | central and peripheral |
| 4. | Genus | structure and function (compact or dispersed, etc.) |
| 5. | Section | structure and function (natural, planned, both natural and planned, static, dynamic, etc.) |
| 6. | Series | structure and function (radial, orthogonal, etc.) |
| 7. | Species | satisfaction of five principles |
| 8. | Variety | satisfaction of five aspects |

Table 1**:** Taxonomy of human settlements

There are some basic differences between the taxonomy of plants and animals and the taxonomy of human settlements. While it *is* very clear that the taxa of plants and animals are mainly based on their genetic inheritance, this can be disputed for human settlements. Another difference is that most human settlements that have been created are still alive, although they may have undergone positive and negative changes. This means that two small towns, very similar in structure and form, may not be able to be classified in the same taxon if one is losing people and the other is not. In other, words, our classification cannot be limited to identifying species but must also include the phases and conditions of life inside human settlements. It is necessary to bring in the notion of developmental phases (like an applied science of medicine for human settlements), as a classification which only refers to a static situation may confuse the situation instead of clarifying it.

**5. Classification by basic dimensions** (division and class)

By starting with measurements we can follow a process step by step, each step based on one or a few characters because if we use too many characters we can become very confused. I present here the very first step. It covers three dimensions, but I start with the first two: population and territory. This is not a new approach; experts like Berry and Garrison have stated that "city-size relationships is a base on which to build or to relate city-size relationships to other relationships."[10] But it is only a base. We need a total approach.

The Ekistic Population Scale (EPS) (Table 2) starts with unit 1 (Anthropos or a single individual). The next unit is two individuals (from early needs for contact and dependence on another person to sexual relations, marriage, etc.). The third unit is the nuclear family (estimated as 5 members because present averages range between 4.4 and 5, omitting China). After the family unit we proceed by multiplying each successive ekistic unit by a standard figure of seven.

| | Ekistic Population Scale | Persons |
|---|---|---|
| 15 | Ecumenopolis | 69,206,436,005 |
| 14 | Eperopolis | 9,886,633,715 |
| 13 | Small eperopolis | 1,412,376,245 |
| 12 | Megalopolis | 201,768,035 |
| 11 | Small megalopolis | 28,824,005 |
| 10 | Metropolis | 4,117,715 |
| 9 | Small metropolis | 558,245 |
| 8 | Polls | 84,035 |
| r | Small polis | 12,005 |
| 6 | Village | 1,715 |
| 5 | Small village | 245 |
| 4 | House group | 35 |
| *3* | Family | 5 |
| *2* | Couple | 2 |
| 1 | Anthropos | 1 |

Table 2**:** Ekistic Population Scale (EPS)

The Ekistic Territorial Scale (ETS) (Table 3) starts from the total habitable land of the globe which I have taken to be 135,750,000 sq km (excluding the Antarctic). I then proceed on the basis of the only practical theory of spatial organization, which was developed by Christaller.[11] His division on the basis of hexagons has proved the most reasonable one in a number of cases. The Ekistic Territorial Scale moves from the total habitable land down to unit 1, corresponding to the human bubble of 4 sq m, to unit -1, for standing persons, and to unit -2, for persons squeezed together to the maximum possible degree.

| | Ekistic Territorial Scale | Square meters |
|---|---|---|
| 18 | Biosphere | 000,000,000,000,000.000 |
| 17 | All habitable land | 135,750,000,000,000.000 |
| 16 | | 19,392,857,000,000.000 |
| 15 | | 2,770,408,000,000.000 |
| 14 | | 395,772,000,000.000 |
| 13 | | 56,538,000,000.000 |
| 12 | | 8,077,000,000.000 |
| 11 | | 1,153,850,000.000 |
| 10 | | 164,836,000.000 |
| 9 | | 23,548,000.000 |
| 8 | | 3,364,000.000 |
| 7 | | 480,570.000 |
| 6 | | 68,650.000 |
| 5 | | 9,800.000 |
| 4 | | 1,400.000 |
| 3 | House | 200.000 |
| 2 | Room | 28.059 |
| 1 | Human Bubble | 4.084 |
| -1 | Standing Person | .583 |
| -2 | Squeezed Person | .083 |

Table 3**:** Ekistic Territorial Scale (ETS)

Figure 2 shows the three hundred possible interrelationships of these two most important characteristics, population and territory.

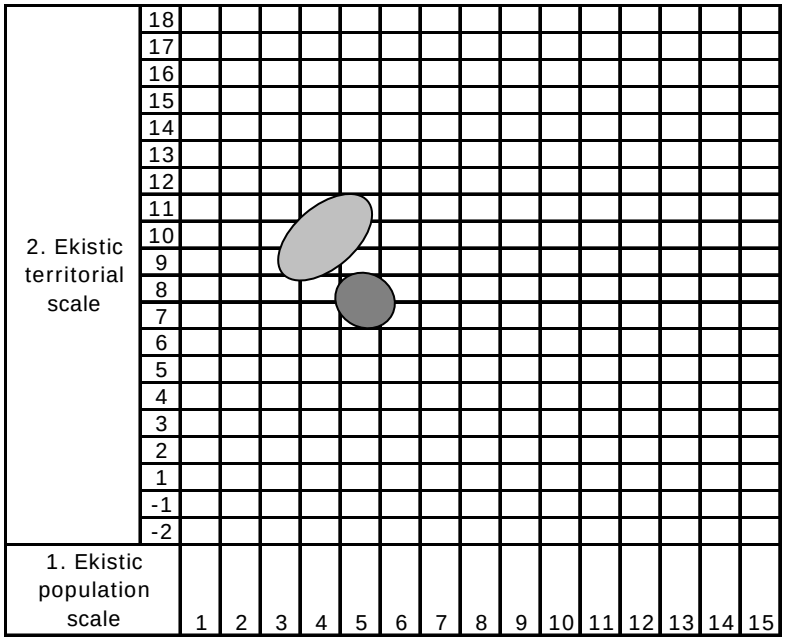


Fig. 2: Classification of uni-level human settlements on the basis of two characters: population and territory

uni-level settlements of hunters' bands

uni-level settlements of farmers' villages

But we cannot classify anything properly on this basis unless we also consider a third characteristic, that is, the main economic function of the human settlement. This is not included here, but is discussed in my introductory article (pp. 390-93).

## 6. Classification by central and peripheral (order)

The characteristic that describes the order under which any settlement should be classified is whether it has one level (like the territory of a hunting band or a very isolated village) or many levels (its own territory plus that of other settlements which depend on it for central services and/or serve it with their products). For example, as megalopolises may range from below 28 to above 201 million people, we can classify the Roman or Chinese Empires and the US Northeast Megalopolis as megalopolises on the population scale, but there are enormous differences in the territory each one covers. Furthermore, Imperial Peking (with one million people) must be distinguished from a modern small metropolis (also with one million or more people) because Imperial Peking served a much greater area and population than the modern small metropolis.

## 7. Classification by Structure and function (genus, section, series)

Structure and function depend in the first instance on the four areas (Naturarea, Cultivarea, Anthroparea and Industrarea), in terms of their interrelationships, dimensions, and location. The human settlement is then examined in terms of the five elements (Nature, Anthropos, Society, Shells, Networks). For example, general population density in any of the four areas is a relation of Nature and Anthropos in the total area, whereas housing density is measured by Anthropos and Shells, etc., in relation to a specific part of the Anthroparea.

The model of structure and function is the basis for classification of genus, section, and series (see Table 1).

Without time-dimensions, interaction and function do not exist in any living system. Thus, Figure 3 demonstrates the interactions between the five elements and the human settlement in terms of time.

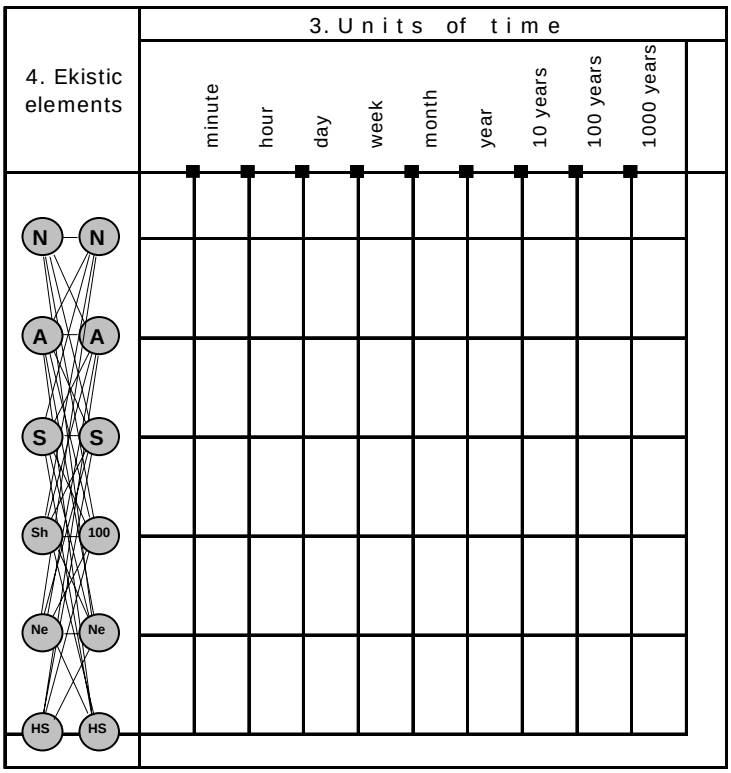


Fig. 3: The model of structure and function

The divisions on the ordinate of Figure 3 record the forces that have created the human settlement, whether it grew "naturally" over time, was deliberately planned, or both. The divisions along the abscissa record when the various events or actions took place and how long they lasted. It is here that the distinction can be made between static and dynamic settlements (dynapolis).

The series relates to the forms of the physical structure of the settlement, which may be radial, orthogonal, etc.

**8. Classification by human Satisfaction** (species, variety)

Basic dimensions are some of the criteria for identity, taxonomy and classification. An elephant and a rat are very different not only in size, but also in many other ways. Thus we have not only to separate criteria in terms of dimensions, structure, function and time, but also by quality and the satisfaction created.

To deal with this very difficult question of happiness or satisfaction, we turn to five principles[13] which have guided Anthropos throughout history (Fig. 4). These can help us to evaluate many dimensional and nondimensional problems in relation to satisfaction. For example, the density inside the Anthroparea in relation to Shells can provide an answer to the satisfaction of the third principle of protective space. However this answer is not complete, unless we clarify the aspect from which we evaluate the situation: economic, social, political, administrative, technological or cultural. Our judgment here also depends on whether we are considering desirability or feasibility (Fig. 4).

| 5. Aspects / 6. Principles | Desirability | | | | | Feasibility | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Economic | Social | Political | Technologic | Cultural | Economic | Social | Political | Technologic | Cultural |
| 1. maximum of contacts | | | | | | | | | | |
| 2. minimum of effort | | | | | | | | | | |
| 3. optimum of protective space | | | | | | | | | | |
| 4. optimum of quality of the total environment | | | | | | | | | | |
| 5. optimum in the synthesis of all principles | | | | | | | | | | |

Fig. 4: The model of satisfaction

This model enables us to clear up some of the confusion concerning the meaning of satisfaction. If some inhabitants of a small and beautiful "ideal" town say that they do not like it because it does not have a university, a big hospital and enough jobs, this means that they do not like this species of settlement, and would prefer a big city (metropolis, etc.), because a small town cannot contain a big university, a big hospital and many types of jobs. A cat can be the most beautiful cat in the world, but a person may hate it because he likes only horses or dogs. In this case, it is not a matter of quality, but of a different kind of animal. Through this type of approach we can also learn whether another "ideal" town which is beginning to be abandoned (because of no satisfaction of the first and second principles) could solve this problem by becoming properly connected through high-speed routes and also whether such action is feasible or not.

## 9. The total model

Through continuous classification we have reached the point where the total model of the Anthropocosmos (which incorporates dimensions, parts, elements, structures, functions and criteria) can help us to conceive the ideal yet feasible human settlements that we need. In completing this total model (Fig. 1) we can understand how the structure and function model represents a very small part of the basic dimensions model, and the satisfaction model a very small part of the structure and function model (Fig. 5). The total image, which incorporates everything in the same grid (Fig. 1), provides a framework which can explain all the dimensional relationships, although it is quite clear that, in the simplified way in which it is presented here, it does not incorporate every order of dimensions, elements, etc.

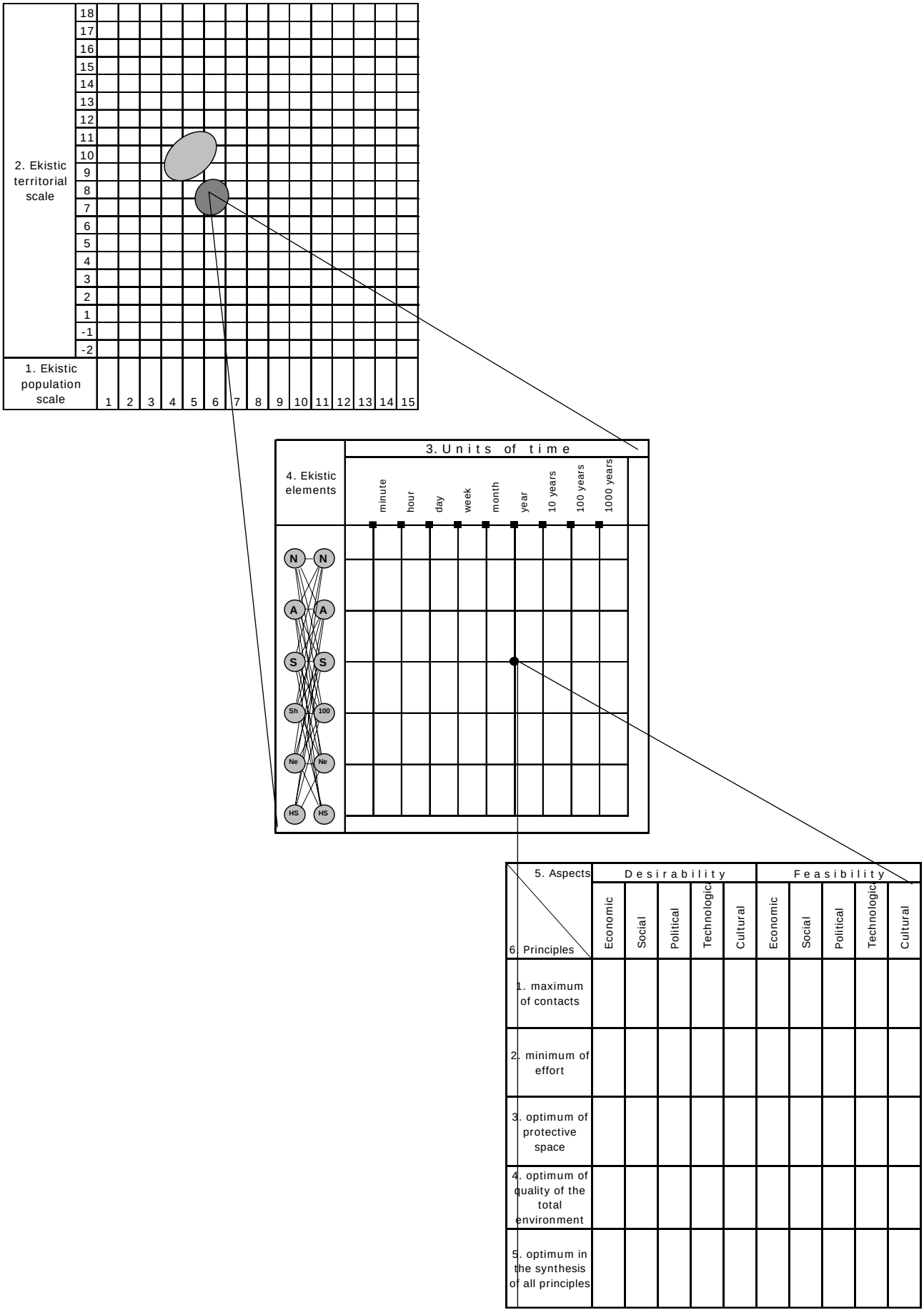


Fig. 5: Combination of the three models into the total one

Classification of uni-level Human Settlements on 1 basis of two characters: population and territory

uni-level settlements of hunters' bands

uni-level settlements of farmers' villages

the model of structure and function

the model of satisfaction

But what such a model has to achieve is the creation of a frame for every type of work, from simple concepts during discussion or thinking, to the creation of systematics, classification and taxonomy, to the preparation of algorithms, to operations research, and finally to exact calculations by computers (for which reason it has to lead to code numbering).

## 10. Selection and evaluation of data

Once we come to an agreement (even a tentative one) on Anthropocosmos and the Anthropocosmos model, we have to collect and evaluate data on certain human settlements representing the global situation.

Within the framework of our effort as a World Society for Ekistics this can be done only on the basis of some human settlements that have to be representative of the global situation in order to lead towards some first conclusions about them.

The human settlements to be selected must range from at least one megalopolis to hunter's settlements.

The cases to be selected should be human settlements of several taxa, where realistic implementation programs have either been completed or are underway. We certainly will not find any megalopolis with such a program underway — it has not even been conceived — but we can find programs for smaller human settlements which will be worth presenting, evaluating and judging.

Following the final and coordinated evaluation of the global situation of human settlements and their problems, we will move into the future, because no action (even magical) can save the present situation. The period of 1976 to 1980 is needed for the preparation of detail plans, organization, financing programs, etc., using the data obtained. Beginning with 1980, we should be able to make projections for the next sixty to one hundred years, and list the problems that can be faced over ten-year periods.

**References**

1. I change the word Man to Anthropos, meaning all humans no matter what their sex, age, etc. (see EKISTICS vol. 37, no. 222, May 1974, p. 305).
2. C.A. Doxiadis, "A city for human development: eighteen hypotheses," EKISTICS, vol. 35, no.
209, April 1973, p. 177; C.A. Doxiadis, *Anthropopolis: City for Human Development* (Athens Publishing Center, Athens, 1974).
3. C.A. Doxiadis, "A United Nations Organization for Human Settlements," EKISTICS, vol. 17, no. 101, April 1964, pp. 219-226.
4. *Habitat* 76, "United Nations Conference-Exposition on Human Settlements," Vancouver, Canada, 31 May — 11 June 1976. Report by the Preparatory Planning Group submitted to the Executive Director of the United Nations Environment Program (31 December 1973), p. v.
5. Sir Julian Huxley, *The Uniqueness of Man* (London, Chatto & Windus, 1941).
6. G.G. Simpson, *Principles of Animal Taxonomy* (New York, Columbia University Press, 1961), p. 11.
7. Robert R. Sokal and Peter H. A. Sneath, *Principles of Numerical Taxonomy* (San Francisco and London, Freeman, 1963), p. 3.
8. *Ibid,* p. 11.
9. Karl Patterson Schmidt and Alfred E. Emerson, "Taxonomy," in *Encyclopedia Britannica,* vol. 21 (The University of Chicago Press, 1970), pp. 728-31
10. Harold M. Mayer and Clyde E. Cohn (eds.), *Readings in Urban Geography* (The University of Chicago Press, 1959), p. 239.
11. W. Christaller, *Central Places in Southern Germany,* trans. C.W. Baskin from the German edition of 1933 (Englewood Cliffs, N.J., Prentice-Hall, 1966); Brian J. Berry and William L. Garrison, "The functional bases of the central place hierarchy," in Harold M. Mayer and Clyde F. Kohn (eds.), *Readings in Urban Geography* (The University of Chicago Press, 1959), pp. 218-27.
12. E.T. Hall, *The Silent Language* (Garden City, N.Y., Doubleday, 1959); E.T. Hall, *The Hidden Dimension* (Garden City, N.Y., Doubleday, 1966).
13. C.A. Doxiadis, "Five principles for the creation of human settlements," EKISTICS, vol. 28, no. 167, October 1969, pp. 223-25; C.A. Doxiadis, "The future of human settlements," in Arne Tiselius and Sam Nilsson (eds), *The Place of Value in a World of Facts* (New York, London, Sydney; Wiley Interscience Division, John Wiley and Sons, Inc.; 1970), pp. 307-38.