Shchedrovitsky, G. P. (1981)

Principles and General Scheme of the Methodological Organization of System-Structural Research and Development.

I. The current socio-cultural situation and the systemic movement

1.

In the last 10-15 years, systems and systems analysis have become one of the most fashionable topics and are discussed in different ways and from different perspectives. There are a lot of different expressions and terms in use: For example, the "systems revolution" that has engulfed the world of science, engineering, and practice [*Ackoff, 1971; Ackoff, 1972*], the "systems approach" that characterizes a new style and new methods of scientific thinking [*Blauberg et al., 1969; Blauberg, Yudin, 1973*], the "general theory of systems" as a scientific theory of a special type that performs methodological functions [*General theory of systems, 1966; Zadeh, Desauer, 1970; Mesarovich and others, 1973; Uemov, 1978*], the "general theory of systems" as a metatheory [*Trends, 1972; Sadovsky, 1974*], and the "systems analysis of operations" [*Quaid, 1969; Otdel, 1974; Optner, 1969*], "system orientations" [*Yudin, 1972*], and so on.

However, it remains unclear whether all these expressions capture what has already been created and actually exists, or only the projects and programmes put forward by different groups of researchers.

In any case, with such an abundance of different points of view, we are forced to ask what is actually happening now in this whole systemic area, and if it turns out that it includes all the above-mentioned formations, then we will have to somehow correlate and link them to each other to get an objective and concrete picture of what is happening. But for this, of course, we need special means and, in particular, some general idea, which would cover and unite all the above-mentioned.

In our view, the most general yet most accurate notion, covering everything that is currently happening in the 'systems field', would be the notion of *a systems movement*.

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For us this thesis means that the analysis of everything that belongs to the systems field should not start from the systems approach or the general systems theory, but from the systems movement, and everything else – systems analysis, systems engineering, systems orientations, and everything else -

should be considered as various elements, functional components and organisations of the systems movement [*1974 b**].

The main feature and characteristic of the systems movement (making it a "movement" rather than a "direction", an "approach" or the like) is that it brings together *representatives of different professions* (engineers, military, teachers, scientists, philosophers, mathematicians, organisers and managers), who have different means and styles of thinking, different values and points of view.

The motives for such association are not so much content-related as socio-cultural (or even socio-organisational).

The representatives of the different professions, when they join the systems movement, nevertheless remain oriented towards the standards and norms of their profession, still strive to obtain such products which have been set as models in their profession, and work in the professional means and methods they are accustomed to. Moreover, representatives of each profession interpret the meaning and content of the systems movement according to their professional canons and strive to transform and organize the entire systems field so that it corresponds to their familiar schemes, and even insist that all other participants in the systems movement work only according to these schemes. In other words, each profession within the systems movement seeks to absorb and assimilate all the material of the systems movement and the systems field into its specific forms of thinking and activity.

At this stage in the development of the systems movement, such a strategy is natural and justified, because the structure and organisation of the systems movement itself has not yet been established, and the products it must create are not set or defined in any way. And so each profession has the right to put forward its own professional ideal of organisation and its own idea of the final product of all work as a model.

Accordingly, a very complex and internally contradictory range of ideas emerges in the systems movement, on the one hand, and on the other a multitude of different system orientations. They express ideas about the cultural-historical products that the systemic movement can and must produce. And herein lies the main source of conflict between the actors of the systemic movement.

2.

To highlight only the most visible and sufficiently formed, we can name eight main proposals and respectively eight draft cultural products of the systemic movement:

1 The development and improvement of already existing private sciences and fields of engineering and practice by introducing systems concepts, notions and methods of analysis into them [*Evenko, 1970; Kosygin, 1970; Large Systems, 1971; Lyubishchev, 1971; Akoff, 1972; Guishiani, 1972*].

2 "General systems theory", similar to already existing natural science theories, such as physics, chemistry, biology, and so on [*Bogdanov, 1925-1929; Sadovsky, 1972; Mesarovich et al, 1973; Uemov, 1973, 1978; General systems theory, 1966*].

3 "General systems theory", similar to traditional mathematics like geometry or algebra, or new ones like Shannon's information theory [*Large Systems, 1971; Zadeh, Desauer, 1970; Kalman and others, 1971; General systems theory, 1966*].

4 "General systems theory" of the type of meta-mathematics in the sense of D. Hilbert and S. Kleene [*Trends..., 1972; Sadovsky, 1974*].

5   A practical methodology or methodology along the lines of disciplines such as operations research, decision analysis and the like [*Quaid, 1969; Optner, 1969; Evenko, 1970; Johnson et al, 1971*].

6   Engineering methodology such as Hood and R. Makol's Systems Engineering [*Hood, Makol, 1962; Nikolaev, 1970; Simon, 1972*].

7   The so-called 'systems philosophy' [*Laszlo, 1972*].

8   System-structural methodology as a section or part of "general methodology". [*1964 a*; 1965 a; 1967 g*; 1969 b; Spirkin, Sazonov, 1964; Dubrovsky, Shchedrovitsky L., 1971; Gushchin et al, 1969; Kuzmin, 1976; Development, 1975*].

The first seven sentences have a historical prototype already implemented on other material.

This is their strength. But at the same time it also, in our view, raises a major objection. When each participant of the systems movement offers his professional solution to systemic problems, he acts as an agent of an already existing and functioning sphere of thought and activity – science, engineering, mathematics, philosophy, and so on, within which he has been formed as a "systems person", and as such he is always bound and limited by the private cultural and historical situation in which he understood the meaning and importance of systemic problems and tasks. Consequently, in the end, he always only develops the professional organisation of his initial thought activity at the expense of systemic means and methods. But it is well known (and can even be considered generally accepted) that the systems movement has emerged and is developing as an *interdisciplinary* and *interprofessional* entity. This means that it must form and create an organization that transcends the boundaries of every single scientific discipline and every single profession. Consequently, the systemic movement, in its formation and development, must take into account the entire contemporary socio-cultural situation and proceed from an extremely broad understanding of the possibilities and prospects of its development. Thus, we are faced with the need to discuss the contemporary socio-cultural situation as a whole.

3.

In our view, there are at least eight points in the current socio-cultural situation that have the most direct connection to the systemic movement.

The first of these is *a process of increasing differentiation between the sciences and the professions*. Progressive in the eighteenth and nineteenth centuries, it has now led to a mass of isolated scientific subjects, each developing almost independently of the others. These subjects now not only organise, but also limit the thinking of researchers. Techniques and ways of thinking, new techniques and new methods created in one subject do not extend to others. Each of the scientific subjects creates its own ontological picture, which does not join the ontological pictures of other subjects. All attempts to build a unified or at least coherent picture of our reality encounter great difficulties.

The second point is *the existence of highly specialised channels for transmitting a compartmentalised subject culture*. The modern mathematician has little knowledge and understanding of physics, the less of biology or history.

A philologist is usually ignorant of mathematics and physics, but just as ignorant of history and its methods. Already at school we are beginning to divide children into those capable of mathematics

and those capable of literature. The idea of general education is increasingly being destroyed by the idea of specialised schools.

The third point is the *crisis of classical non-Marxist philosophy*, caused by the realization of the fact that this philosophy had lost its means of controlling science and lost its role of coordinator in the development of sciences, the role of mediator, transferring methods and means from one sciences to another. This circumstance became clear already in the first quarter of the nineteenth century and became a subject of special discussion. Much attention was paid to it by Karl Marx and Friedrich Engels in their works, who redefined the function of philosophy in relation to natural sciences and humanities. The loss of direct connection with philosophy has forced different sciences to develop their own forms of comprehension, their own proprietary philosophy. This gave rise to various forms of positivism and, more recently, to so-called 'scientism'.

The fourth point is the *formation of engineering as a special activity combining constructing with various forms of quasi-scientific analysis*. Traditional academic sciences, developed immanently in many respects, turned out to be disconnected from the new directions of engineering, and this forced engineers to create new type of knowledge systems, not corresponding to the traditional patterns and standards. Information theory and cybernetics are only the most striking examples of such systems.

At the same time, the problem of the relationship between construction and research emerged and began to be intensively debated.

The fifth (very important) point is the *continuing separation and isolation within the activity sphere of various production technologies*, which are gaining an independent significance, becoming a new principle and objective law in the organisation of all our activities and, ultimately, subordinating the activities, nature and behaviour of people. The maintenance of these technologies is becoming an essential necessity and almost the main purpose of all social activity.

At the same time, technological forms of activity organisation are continually being formalised and becoming more and more important, extending also to thinking.

The sixth point is the *emergence, formalisation and partial isolation of designing as a special kind of activity*. As a result, the question of the connection and relationship between designing and research has become even more acute. Designing directly and with all power sticked with the problem of the relationship between the natural and the artificial in the objects of our activity [*1967 g*; Simon, 1972*]. Neither of these problems has been solved within the traditional sciences.

The seventh point is the *increasing importance and role of organizational and managerial activity in all our social life*. Its effectiveness depends first and foremost on scientific support. However, traditional sciences do not provide the knowledge necessary for this activity; this is primarily due to the complicated, synthetic, or, as they say, complex, nature of this activity and the analytical, or "abstract", nature of traditional scientific disciplines.

The eighth point (also particularly important) is the *emergence and formation of a new type of science, which roughly could be called "complex sciences"*. This includes the sciences serving pedagogy, engineering, military science, management, and so on. Now these complex practices are served by unsystematised agglomerations of knowledge from different scientific disciplines. But the very complexity and versatility of this practice, its orientation to both normative, artificial and

realisational, natural plans of activity require a theoretical unification and theoretical systematization of artificial and natural knowledge, which cannot be achieved.

All these points, which are characteristic of the contemporary socio-cultural situation, give rise to *a common "counter-intelligence"*. The differentiation of the sciences gives rise to an attitude of unification and the creation of a bridgehead that corresponds to this goal. The professionalization of education gives rise to a direction towards common polytechnic and university education and stimulates the development of the generalized and universal systems of knowledge necessary for this. The crisis of traditional philosophical consciousness and the loss of the old classical philosophy's governing role for science gave rise to the idea of a restructuring of philosophy itself and of all sciences in which philosophy could reconnect with the sciences and regain its former leading role in the world of thought. Similarly, from the opposition of the emerging situation, the demand for the establishment of organic and effective links between engineering and science has been put forward, followed by the demand for a complex organisation of natural, technical, humanitarian and social sciences [*Ackoff 1972; Volkov 1973; Development..., 1975*].

All these aspects of the contemporary socio-cultural situation are generally well known, and we note them here only to point out the connection between them and the systems movement. The fact is that the systems approach (whether fixed or not) carried hope from the very beginning that it would solve all these problems, integrate the disintegrated parts of science and technology, develop a common language and homogeneous methods of thinking for all fields and spheres of activity and, finally, in the limit, create a single reality for modern science, technology and practice. In essence, these are the same hopes that were pinned on physicalism in the 1930s and on cybernetics in the 1950s.

4.

From our point of view, all these hopes for the present variants of the systems approach are as unjustified as the previous hopes for physicalism and cybernetics. But what matters to us here is not whether or not the current variants of the systems approach justify the hopes placed in them, but the other, one might say opposite, aspect of the problem: those *requirements for the systems approach that the current socio-cultural situation puts forward*, and it is these requirements that we want to base our reasoning on. If the attitude towards the integration and synthesis of different activities is fixed as a fact and if it is accepted as a value (at least for thought work), then next we must wrap the task and discuss the structure of the product to be obtained in the systems movement, if its goal is indeed to achieve such synthesis. And only after resolving this question can we begin to analyse the means of systemic thinking, its categories, basic concepts, methods and the like. And in this way we can obtain data to answer the question: can the systems movement create such a product?

It should be emphasised that this turning around of the task creates a very different plan and style of analysis: it will not be about what is actually being created now in the systems movement, but about *the programmes and projects* put forward by different groups of professionals involved in the systems movement, the validity of these programmes and projects and their feasibility. It will be, on the one hand, a criticism of existing programmes and, on the other hand, the nomination of new programmes which we consider to be more promising.

5.

The first, critical part of this work has already been done to some extent by us and has been published in some of its parts [*1964 a*; 1974 b*; 1976; Development..., 1975*]. Therefore, here we

shall dwell only on the second part of it: we shall try to outline the essence of our own programme, which can be discussed within the systemic movement along with all other programmes and projects. This is a programme to develop a "system-structural methodology".

The main idea of our proposal is to combine the development of a systems approach with the development of new methods and ways of thinking, which we call *"methodological"* [*1964 a*; 1969 b, pp. 50-84; Development..., 1975*]. Hence, we proceed from the fact that, by their origin and specific character, the system problems and tasks are considered not from an object standpoint, but from a subject perspective. They arise in a situation where it is necessary to relate and connect different subject views of one object with another [*1964 a*; 1964 h*; 1966 a*; 1971 i*]. Particularly, these problems and tasks generate, from our point of view, a specifically systematic technique of thinking, in particular in research, designing, planning and management, and this technique remains efficient and effective only in the movement from a multitude of disparate unilateral representations of an object to a unified and coherent representation. When these conditions disappear and we obtain a homogeneous constructively deployable representation of the object, then the systemic thinking technique becomes unnecessary and the systemic problems and challenges disappear [*1974 b**].

In other words, systemic problematics and systemic thinking, from our point of view, exist only where there are several different subjects, and we must work with these different subjects, moving as if *over them and through them,* achieving a coherent description of the object in the diversity and multiplicity of the subjects fixing it. In these cases, obviously, we can no longer be inside these domains and act according to the laws immanent to them, but have to "jump out" beyond their borders, working in some special way, linking elements of different subjects together either for private practice or for broad theoretical purposes.

But then, naturally, we come to the question of what are the organisational scopes of research and project work, more generally, *the organisational scopes of thinking,* that enable us to assimilate scientific subjects and describe an object not through the prism of a single subject, but by taking into account many subjects at once, the special features of each of them and at the same time having a special perspective that differs from each subject and turns these subjects themselves both into functional elements of our "thinking machine" and into objects of our thinking and operational activity.

From our point of view, the specific organizational scope solving these problems is the *organizational scope of methodological thinking and methodological work*, which should not be identified neither with the philosophical nor with the special scientific forms of organization of thinking and activity. Therefore, further on, we have to elaborate the specific characteristics of methodological work and the possible project of organizing and constructing systemic-structural methodology.

II. General description of the methodological work

1.
Let's start with a few important, but so far purely verbal, characteristics of methodological work as such.

In this context, it can be distinguished and contrasted with concrete-scientific and philosophical work in six main ways:

1 Methodological work is not "pure research"; it also includes criticism and schematisation, programming and problematisation, construction and designing, ontological analysis and standardisation as deliberately delineated forms and stages of work. The essence of methodological work is not so much cognition as it is *the creation of methods and projects*; it does not only reflect but also, to a greater extent, creates, initiates anew, including through construction and project. And this defines the basic function of methodology: it serves the entire universe of human activity, above all *through projects and prescriptions.* But this also means that the main products of the methodological work – constructions, projects, norms, methodological prescriptions, etc. – cannot be and never are checked for truth. They are only tested for feasibility. The situation here is the same as in any kind of engineering or architectural design. When we project any city, it is meaningless to ask whether our project is true: after all, the latter corresponds not to the city that was, but to the city that will be; not the project, therefore, reflects the city, but the city will be the realisation of the project.

This is a very important and fundamental point in understanding the nature of methodology: the products and results of methodological work in their bulk are not knowledge verifiable for truth, but projects, project schemes and prescriptions. This is an inevitable conclusion, as soon as we abandon a too narrow, purely cognitive attitude, accept Marx's thesis about a revolutionary-critical, transformative character of human activity, and begin to consider, along with cognitive activity, also engineering, practical, organizational, and managerial activities, which can never be reduced to the acquisition of knowledge. And it is natural that methodology, as a new form of organization of thought and activity, should encompass and cover all the types of thought activity mentioned.

2 All these strong statements are not to say that research and knowledge are excluded from the field of methodology. On the contrary, methodology differs from methods precisely because it is knowledge-rich (in the precise sense of the word) to the extreme and involves clearly delineated, dedicated and, one might say, sophisticated research; methodological work and methodological thinking connect designing, criticism and standardisation with research and cognition. In doing so, research is subordinate to designing and standardisation, although it may be organised as an autonomous system; but in the end, research within methodology always serves designing and standardisation, it is guided by their specific objectives.

3 Methodology does *not only not reject the scientific approach, but on the contrary, it continues and extends it to areas where it was previously impossible*.

First and foremost, this manifests itself in the fact that methodology creates very complex compositions of different types of knowledge that are inaccessible to traditional science. In particular, it combines and connects natural scientific, constructive-technical, historical and practical-methodological knowledge in a new way. Traditional science avoided combining these four types of knowledge, and in this it was right, as its main task was to create a "pure image" of the natural object. Science (in the narrow and precise sense of the word) is oriented towards the separation of truly objective, "natural" knowledge from all other knowledge, in particular from that which determines what should or must be done to achieve a particular practical goal. Science assumes that the story of how to measure fields is a pre-scientific story. And while ancient Egyptian practical-methodical knowledge, which captures how to measure fields of various shapes, does fall into the section of the history of mathematics, the section itself and the corresponding stage of history are considered pre-scientific in contrast

to ancient Greek mathematics, which all unanimously attribute already to science. Methodology supports this line of demarcation of different types of knowledge and their corresponding types of thinking. Moreover, for the first time it gives scientific (epistemological) grounds for such a division. But in parallel it creates more complex superstructures, linking knowledge of different types, and constantly uses such links.

In addition, as already mentioned, methodology creates and uses knowledge about knowledge, it is as if it is always aware of itself, of its own structures, and this is necessary, because without such awareness of the form and structure of knowledge in general and the specificity of different types of knowledge in particular, the link and coordination of different types of knowledge that has just been mentioned cannot be realised.

4 At the same time, methodology *strives to connect and merge knowledge about activity and thinking with knowledge about the objects of this activity and thinking*, or, to invert this relation, directly object knowledge with reflexive knowledge. Therefore, the object, with which methodology deals, resembles a matryoshka doll. In fact, it is a special type of alignment of two objects in which into the initial for methodology object – activity and thinking – is put another object – the object of this activity or this thinking. Therefore, methodology always deals with a duality of objects, not with the activity as such and not with the object of this activity as such, but with their "matryoshka" like connection. If we simply describe and fix activity in our knowledge, presenting it as an object of a special type, it would be a natural-scientific view of activity and the latter would appear as one of the objects of the natural-scientific type in the same line with such objects as the physical and biological ones.

Methodological knowledge, by contrast, should consist of two knowledges – knowledge about the activity and knowledge about the object of this activity. If we break this bond and consider its constituent knowledge as autonomous, we would have to say that it is simply different knowledge about different things. But the essence of the methodological approach is precisely that we link and connect this knowledge. And just how the ways of connecting these different kinds of knowledge are defined and established the most important feature of methodology. After all, there is no "whole-part" relation between the activity and its object: the activity is not added to the object as a second, supplementary part and in the same way the object is not just a part of the activity; the object of activity is included in the activity many times – as its element, and as the content of other elements, for example, knowledge, and as material.

In this way, methodological knowledge combines and unifies many different and heterogeneous knowledge; it is internally heterogeneous and heterarchicalised.

But at the same time, it must be unified and coherent, despite its internal complexity and heterogeneity. In methodological work, we must have knowledge that integrates both our imagination about the activity and the object of the activity, and they must be connected so that we can use this connection in our practical work.

Lets repeat that this way of connecting heterogeneous knowledge with the help of knowledge about activity and through this knowledge is the specificity of methodological knowledge. Thus, one can say that methodology defines the logic of reflection, i.e., the logic and rules of such a connection of distinct knowledge.

5   For methodology it is characteristic to *take into account the differences and multiplicities of different positions of the actor in relation to the object*; hence working with different perceptions of the same object, including different professional perceptions: in this knowledge itself and the fact of its multiplicity are seen as *an objective moment of the thought-activity situation*.

This is an extremely important point. Classical philosophy, like all science built on it, was based on the notion of one single true knowledge. If the same situation was described differently in different knowledge, the question was usually posed as to which knowledge was true. Methodology, by contrast, assumes that the same object can correspond to many different perceptions and knowledge and there is no point in testing them for truth in relation to one another, because they are simply different. This is the most important principle of modern methodological thinking, which is called *the principle of multiplicity of perceptions and knowledge related to one object*. But since the object itself is always taken subjectively, i.e. always in connection with its representations, the plurality of different representations turns out to be a fact of an active and communicative situation, which unites different professionals. Methodology starts its work with the professionals' perceptions of an object, and initially the object is defined only by this multitude of perceptions. Only then, starting from this whole set of representations, the methodologist can put the question about the reconstruction of the object as it exists "in fact" and make this reconstruction, supposing that all the available representations characterise the object from different sides, as if in its different projections [*1964 a*; 1964 h*; 1971 i*].

Of course, this approach can be accused of a lack of autocriticism: after all, the ontological representation of the object created in this way will be such only for a strictly defined set of selected knowledge and professional activities, and if we choose another set of knowledge and professional positions, we will get another ontological representation. But these considerations do not prove the subjectivity of ontological representations at all, but only their historically transient nature. So anyone who speaks of an object as it "really is" must always remember that any ontological representation of an object is authentic only from a historically limited point of view. And since we can never escape this limitation, we must always consider the object in conjunction with a set of knowledge about it, and always relate and link together knowledge of different types – knowledge about the object and knowledge about knowledge. Therefore methodological thinking always makes use of schemes of many knowledges and fixes many different knowledges of one object in its images; this is called *the reception of many knowledges* [*1964 a*; 1971 i*]. To each of the images alternately the index of objectivity may be ascribed, that is, it is claimed that this particular knowledge corresponds to the object, and then all other knowledges are evaluated in relation to it and transformed so as to correspond to it. Then we can transfer the objectivity index to another knowledge or representation, and then all other knowledges are evaluated according to it. O.I. Genisaretsky called this method of work a "rafter's strategy": it's like running along logs, stepping on one and pushing those floating nearby, then jumping from this log to another, to a third, constantly changing the fulcrum and thus moving the entire raft forward.

6   In methodology, *it is above all not the schemes of the object of activity, but the schemes of the activity itself that connect and integrate different knowledge*. To reconstruct the object on the basis of the different representations of the professionals we have no other way than to

find out, what was the "active interest" of these professionals. Only after we have described the thought-activity that made professionals imagine the object in that way and not otherwise, and thus have determined the foci in the view of which they built their perceptions, only after that we can begin to collect and coorganise all these perceptions, but again not directly through the perception of the object, but foremost, through the perception of an activity, since really different perceptions are to be assembled and coorganised into a whole only when the activities with which they are connected enter into cooperation with one another, when they begin to process from different sites the object that has become one for all of them. This is the basic principle of methodological thinking: *the concept of a complex cooperative activity serves as a means of linking together different conceptions of the object of this activity* [*1965 a; 1967 g*; 1969 b, pp. 50-84; Development..., 1975*]. And this binding goes not so much on the logic of the structure and life of the object in question, as on the logic of the use of diverse knowledge in collective cooperative activity.

For this reason, in methodological work there is always not one ontological representation, but at least two: one of them depicts the structure of a professional cooperative activity – this is the so-called *ontology of organizational activity*, and the other depicts the object of this cooperative activity – this is *the ontology of the natural object*. The particular relation and connection of these two ontological representations constitute each time a specific feature of a particular methodological work (cf. [*1979b*]).

2.

All the above-mentioned points can be summed up in one thesis: *methodological work is directed not on nature as such, but on thought-activity and its organisational scope,* and organisational scope of thought-activity has a seemingly double existence: once as elements and components of thinking and activity, and once as independent and autonomous formations (as a rule, artificial-natural ones), multiplied in different forms and connected with each other by thought-activity processes. The "natural objects" themselves are seen in this case as special organisational scopes of thought activity, created within philosophy and natural science domains together with others: the natural science orientation towards the so-called natural object turns out to be only one of many subdivisions in the organisation of our knowledge and our thinking.

But this circumstance – the change from a natural reality to an activity-based one in the transition to methodological forms of work – confronts us with a new range of very complicated problems: In order to learn to work with complex knowledge structures that combine methodological, constructive-technical, natural-scientific, historical and philosophical knowledge, on the one hand, and knowledge about objects and knowledge about knowledge and thought-activity, on the other hand, a new logic of thinking must be developed, which can be in summa called as *logic of reflection*; from this perspective, modern methodology will be characterised as being based on the logic of reflection.

It may be added that the logic of reflection itself presupposes special *knowledge about reflection* [*Elaboration..., 1975, p. 131-143*].

When we discuss this whole range of questions, we are moving into another, special type of knowledge, which can be called *methodologically reflexive*. Many of the statements made above were not deployed in the reality of methodology, but in the reality of metamethodology: instead of carrying out and demonstrating a thinking or activity procedure, we *described* either the procedure

itself or the transformation it carried out, its possible products and results. This is what made appearing the difference *between the reality of methodology and the reality of methodological reflection* (*metamethodology*). This circumstance, too, has to be constantly kept in mind.

Many of the statements made above will have different meanings depending on how we interpret them; as directly objectifiable or as belonging to the specific reality of the meta-methodologist. To some extent, this distinction can be accounted for and captured by the technique of double (or generally multiple) knowledge. In particular, it is possible to set certain images of an object and say that it is the object as it is "really"; in this way objectification will be produced and we can then question how such an object can and is actually described depending on certain research tasks, and we will construct these descriptions, obtaining a second knowledge of the object. But in the same way we can, having given a certain image of an object, say that this is only our *subjective* representation of it, obtained in a certain professional position, and then we will need to raise the question of what the object is "really" like, and look for an image for it. And although in the second case, by introducing a certain image of the object, we thus introduce a representation of the object itself, its properties and characteristics, its structure as an object will be problematized, while the structure and character of knowledge and its reality will be dogmatized; in the first case, by contrast, the structure of the object will be dogmatized, while the structure of knowledge will be problematized. But this methodological reflection is a necessary and organic part of methodological thinking as research, construction, designing, criticism, and the like are.

After this summary characterisation of methodology, we can move on to our main question: to characterise the systems approach from a methodological point of view and outline a sketchy project for organising a systems-structural methodology.

III. Basic scheme of organisation of system-structural methodology

1.
So far, we have avoided questions about the specifics of the systems approach. And this was not by chance, for we did not have a framework within which to answer them. Now there is a framework and we can move on to discussing the "systems approach" itself.

Our first claim in this regard (in line with all that has been said above) is that the specificity of the systems approach can only be defined in describing the structure and forms of organization of methodological work, for, in our conviction, *the systems approach exists only as a subdivision and special organization of methodology and methodological approach*. It arises in conditions where we have to combine several different subjects – we have already mentioned this – and move in accordance with the means and norms of methodology. And if the very expression "systems approach" and the organizing of thinking and activity corresponding to it appear also for representatives of special sciences, it occurs, in our opinion, only due to the fact that they borrow the means, methods and ontology of methodological work.
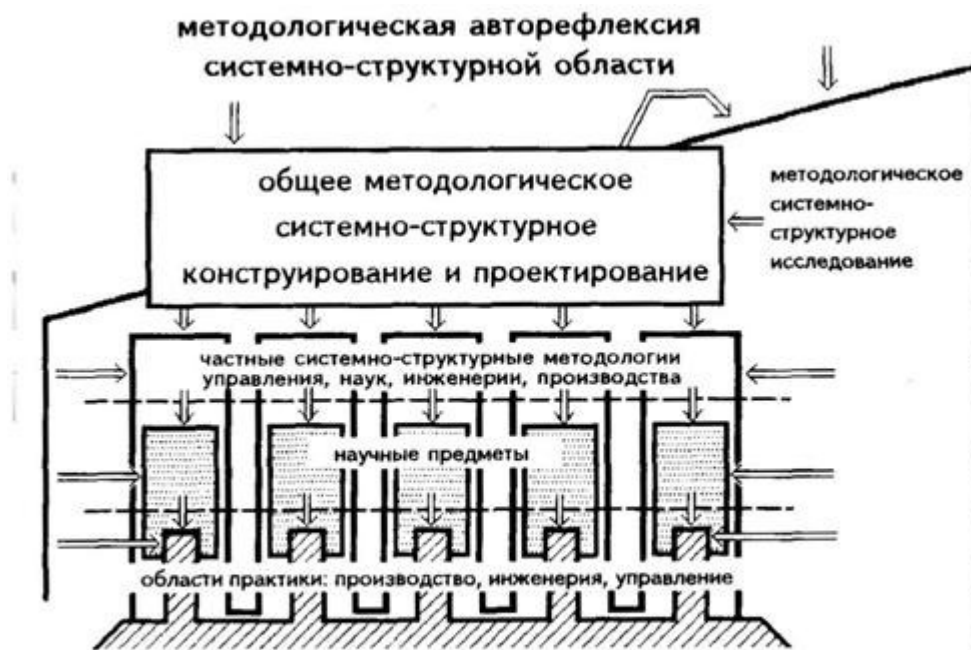
Consequently, only describing the structure of methodological work and methodology we can approach the question of the specificity of the systems approach. Prior to this, we could not even attempt to answer this question at all. Moreover, since different systems of representations can be used in the methodological position, the specificity of the systems approach, even if we look for it in the reality of methodology and methodological work, will also be defined differently, depending

on which system of descriptions we choose. If we choose a description in a theory of thought, we will define the specifics of systems thinking. But it is possible to describe the systemic approach also in the means of a theory of activity, and then its specificity will be expressed and fixed differently. Thus, here, too, we must take into account the plurality of possible representations.

Once this has been captured, the next step can be done and we can try to collect and imagine in the scheme the special features or principles of the methodological approach that were formulated earlier. In other words, it is now time to draw a scheme of system-structural methodological work, taking into account the principles formulated above.

2.

In the preceding considerations, it has been established that methodological work is directed towards activities – practical, engineering designing, research, management and the like – and their organisational scopes; it should ensure their construction, organisation and further development (cf. [*1969 b*; Development..., 1975*]). This work is of a substantive character and is carried out on the material of individual subjects – scientific, engineering, management and the like. Therefore, in the scheme, the blocks of subjects growing over practices of various kinds are covered by particular system-structural methodological developments (see Scheme 1).

методологическая авторефлексия
системно-структурной области

общее методологическое
системно-структурное
конструирование и проектирование

методологическое
системно-
структурное
исследование

частные системно-структурные методологии
управления, наук, инженерии, производства

научные предметы

области практики: производство, инженерия, управление

Общая схема организации системно-структурной методологии

Схема 1

But it is natural that methodological work cannot be limited to this: after all, particular systems-methodological developments, whether in physics, biology, management theory or psychology, cannot provide a general concept of system and cannot lead to general methods of systems work, equally applicable in all domains. Consequently, more layers of methodological work are needed to provide all particular-methodological developments with common concepts, common ontological pictures and the logic of systems thinking. Thus we get four layers of activities, each of which seems to build on and assimilate the preceding one; these are:

- layer of practice (including engineering and designing, organisation and management, construction, pedagogical and other developments);

- layer of science, engineering, management, project and other domains;

- layer of particular methodological developments, and finally;

- layer of general methodology.

Now we need to take the next step and answer the question of how we can imagine the structure of a general system-structural methodology.

We have already emphasised above that the product of methodological developments should be not only and not so much knowledge (especially scientific) as methodological prescriptions, projects, programmes, norms and the like, which will be used in the lower layers of thinking and activity – in private-methodological developments, in domains of various kinds and in practice.

Therefore, the first and main part of the general system-structural methodology should not be research, but construction and designing. In schematising this conclusion, we have depicted in the "body" of general methodology over a set of particular methodological developments a layer of general methodological system-structural construction and designing (in Scheme 1, the arrows running from this block depict the process of providing particular methodological and domain-specific elaborations with common tools).

The relationship of the layer of methodological system-structural construction and designing to the underlying layers of thinking and activity can be explained using the example of work in a scientific domain (which has so far been better analysed than other types of domain work).

It has been established in special logico-methodological studies (see, in particular, *Problems of Research on the Structure of Science, 1967, pp. 106-190*) that every scientific domain has at least nine different epistemological units:

1 Problems.
2 Tasks.
3 "Experiential Facts".
4 "Experimental Facts".
5 The body of general knowledge that constitutes this scientific domain.
6 Ontological schemata and pictures.
7 Models.
8 Means (languages, concepts, categories).
9 Methods and methodics (see Scheme 2).

This is a set of basic building blocks of a scientific domain.

With this list at hand, we can now ask which of the above-mentioned organisational scopes are formed and created directly in the scientific domain, and which, on the contrary, are borrowed from methodology and shaped under its determining influence. The historical-scientific analysis gives a very definite answer here: at least four elements of any scientific subject – ontological schemes and pictures, means and methods, and problems – have always been developed either entirely outside the scientific domain (in philosophy and in the incipient structures of natural science methodology), or formally within science, but in fact in the systems of philosophical and methodological thinking captured by it.
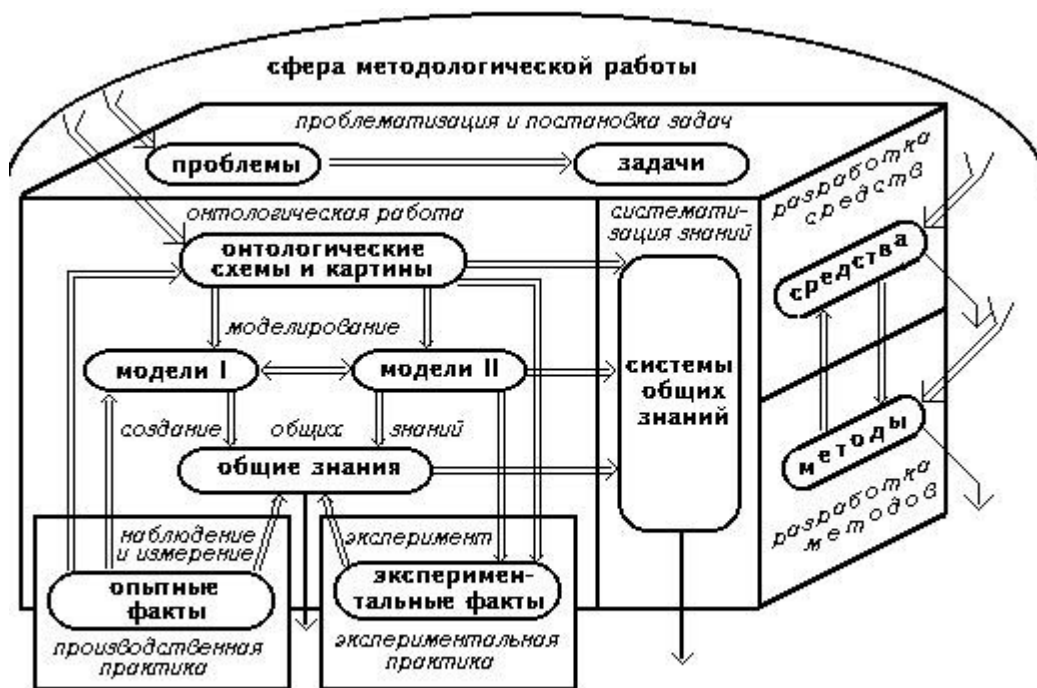
сфера методологической работы

проблематизация и постановка задач

проблемы ⟹ задачи

онтологическая работа

систематизация знаний

разработка средств

онтологические схемы и картины

средства

моделирование

модели I ⟺ модели II

системы общих знаний

методы

создание общих знаний

общие знания

разработка методов

наблюдение и измерение

эксперимент

опытные факты

экспериментальные факты

производственная практика

экспериментальная практика

Схема организации простейшего научного предмета

Схема 2

Therefore, we have to double these four blocks and place them – in another connection and in another co-organisation – also in methodology itself (first of all in its constructive and designing parts) and show by arrows that the main content of these blocks within scientific subjects is generated by their counterparts in the system of methodology (see Scheme 2). And approximately the same we find when studying the history of formation and development of engineering, organisational and managerial and other subjects.

But for the blocks of constructing and designing projects represented in the general scheme of the system-structural methodology (see Scheme 1) to work, one must still have at least two groups of special knowledge: firstly, various knowledge (constructive-technical, project-technical, natural-scientific etc.) of the objects that are created by constructive-technological and project-methodo-logical thought-activity [*1966a, (pp. 211-227); Dubrovsky, Shchedrovitsky, L, 1971; Development..., 1975, pp. 393-408*); it is an obligatory requirement of any productive work without prototypes: since the block of methodological construction and designing supplies to scientific, engineering and managerial subjects certain organisational scopes which further function according to the laws of these subjects, it is necessary for designing to know the purpose and functions of these organisa-tional scopes, the requirements for their morphology and the like [*1969 b, pp. 50-84; Dubrovsky, Shchedrovitsky L., 1971; Development..., 1975, pp. 299-302*]); second, the methods and conceptual tools of methodological construction and designing itself.

These two types of knowledge need to enter the 'body' of methodological construction and designing and be used as tools there; but clearly they need to be obtained somewhere before that.

We have already stressed above that methodological work cannot be reduced to mere construction an designing. It connects construction and designing with research. Therefore, besides the layer of methodological construction and designing, there should be at least one more layer of methodologi-cal work in the system of methodological work – the layer of research. By its structure, methodolo-gical research is a special type of research, because its objects are not physical, chemical, or biolo-gical phenomena, but scientific domains, i.e. knowledge from various sciences together with the

objects of this knowledge and with the activity of producing and using knowledge; therefore we should talk here about research, which differs from the natural science first of all by the specificity of its object. But the specificity of the object of study entails the specificity of the means and methods of research, and therefore we can and should also talk here about the specificity of the technology of methodological research.

In order to relate these statements to the discussions currently taking place within the systems movement, we recall the theses made by J. Clear and V. N. Sadovsky [*Trends..., 1972; Sadovsky, 1974*]: "general systems theory" (GST) is not a theory, but a metatheory; this means that the question of what is the object of the "general systems theory" thus understood must be and should be answered: *concepts, languages, methods, problems* of other sciences.

Leaving aside the question of the appropriateness and correctness of the term "metatheory" here and considering only the essence of the case, we can say that the main point here is felt and expressed: although GST is not natural science research, it is still research, and being research, it is very different from traditional natural science research.

In our opinion, J. Clear and V. Sadovsky are referring to methodological research; this research is entirely part of the system of methodological work – and this defines its specificity, but it by no means exhausts methodological work in general, nor even methodological analysis, for along with it in methodology there are other forms of analysis, which we will talk about below. And this form, called methodological research, is defined, firstly, by its orientation towards scientific, engineering, organisational-managerial, and other subjects, and, secondly, by its function of serving methodological, constructive and designing work.

Given the reflexive origins of research work, we need to present it as a block covering all that what is being researched (see Figure 1).

In addition, system-structural methodology must include at least one more layer of work, the purpose of which is to realize and systematize its own organization of methodological work in the systems domain: this block, therefore, organizes system-structural methodology as a whole, linking and uniting methodological system-structural construction and designing with all the system-structural knowledge and methodological system-structural research that serves it. Therefore, we can call it the "meta-methodology" layer, or, more precisely, the systemic autoreflection of methodology. This layer of work connects the system-structural methodology with broader, encompassing systems – the philosophy of dialectical materialism and the whole culture of humanity accumulated in the course of historical development. In essence, this is the layer of proper methodological reflection and methodological thinking, which covers all other components of methodological work and creates the specificity of the methodological organization of thinking and activity. We cannot characterize it so far through the specifics of language, concepts, and procedures of methodological thinking, but we have already grasped and expressed it in a certain way in the cooorganization and relations of the objects of methodological reflection and methodological thinking, and the next task will be to form the means and methods of methodological thinking as commensurate with the organization of its object domain, or the space of its objects.

Thus, the meaning of the whole scheme we have described can be summarised in one statement: If we want to consider and characterize the structure and forms of organization of the methodology of systemic-structural research, we should proceed not from the scheme of the scientific subject and its main functional units presented in Scheme 2, but from a quite different scheme of organization of

thought activity, namely the one presented in Scheme 1, and consider methodology as a super-subject structure covering both subjects and practices of different kinds and involving not only one single relation to them, but a mass of different relations – not only research, but also constructive, projectal, reflexive, organisational etc. relations.

By virtue of this, structural-systematic methodology turns out to be not just a complicated structure and complicated system, but a *heterogeneous* and *heterarchicalised* system that has both a level-hierarchicalised and a 'matryoshka' structure.

The basic "substance" (if only it is possible to put it that way) of this system is formed by the methodological reflection, which covers practices of different kinds and the subjects serving them or being independent of them – say, geotechnics and geology, electrical engineering and the theory of electricity, psychotechnics and psychology, etc.; In these practices and subjects of different kinds, the systemic-structural methodological reflection highlights systemic problems of different kinds, and then (according to different thought relations) is shaped into different kinds and types of systemic-structural thinking: programming, designing, constructing, researching, organisational, and so on.

All these various types of methodological thinking are identified, shaped and organized within reflection, out of its own substance and that of the practices and objects it captures. In addition, all these organisational scopes of methodological thinking are also co-organized with each other into certain cooperative structures, which correspond to the lines of circulation of their products in the space of methodology. Methodological programming supplies all the other branches of methodology with programs of thinking and practical work; methodological designing – projects of practices and subjects of various kinds; methodological designing – systemic-structural ontologies, tools of systemic-structural analysis, i.e., systemic graphics and concepts describing the use of this graphics in mental work, main categories, procedures and methods of systemic thinking, etc.; while methodological research – knowledge about the systemic-structural aspects of practical and subject-centered work.

For a proper understanding of all this organisation, it is very important to keep in mind that systems-structural methodological research is not aimed at systemic objects, but at systemic-structural thinking activity and describes its processes, mechanisms and structure; therefore, in addition to "systems scientists" working on various special subjects and materials of practice, there should be "pure systems scientists" or "systems methodologists" who carry out systems-structural methodological programming, designing and research and in these activities create and investigate what we call "structures in general" and "systems in general".

Generalising this point, which is already related to the difference in positions and types of work within methodology, we can now say that within systems-structural methodology there exist and should exist many different types and ways of thinking and mental work and, accordingly, many different positions and, one might even say, specialisations. These would be:

1 Organisation of systemic practices of various kinds.
2 Development of systemic problems within the special subjects of science, engineering, management and the like.
3 System-structural programming of research and development.
4 System-structural designing.
5 System-structural constructing.

6 Methodological systems-structural research describing systemic development within scientific, engineering and management subjects and practices of various kinds.

7 Methodological autoreflection of the whole field of systems-structural development in general.

And if we want to establish order on our "workbench" of systemic-structural methodology, we must take into account, on the one hand, the fundamental difference between all these types and activities, and on the other hand, their organic connection within the framework of systemic-structural methodology. If any of these areas is eliminated, there will be no systemic-structural methodology as a whole and, at the very end, systemic-structural research in scientific, engineering and organizational-managerial subjects and practice will be undermined and cease to be deployed.

IV. Organisation of methodological work and the challenges of building a systems approach

1.

All that we have said above and presented in Scheme 1 is a certain project of organization of methodological thinking and methodological work in the systemic field. And this begs the question: what does all this have to do with the systems approach, a systemic approach, which should give us specific systemic categories, systemic methods of analysis and systemic representations for different fields of practice and scientific research? And in this question at the same time there will swing a doubt that all told so far has direct and immediate relevance, that it sets and defines the specificity of the systemic approach: after all these are some general schemes of the organization of methodological work, and they seem to be not directly connected with special features of systemic-structural representations which, after all, obviously define and set a systemic approach itself; approximately in this way here the main objection will be formulated.

From a traditional naturalistic perspective, it is perfectly legitimate. It is so from a naturalistic point of view, based on the assumption that 'it already knows' what a systemic approach is, but not from a methodological and activity-based perspective, which are developing under the assumption that we do not currently have an adequate and effective systemic-structural perspective, that it still needs to be developed, obtained, and this, in particular, is the task of the systemic movement.

But if these latter assertions are plausible, then we can only have two strategies: 1) get down immediately to "business" and start constructing systemic-structural notions without knowing how to do it and what the result should be, or 2) design and create such an organisation, or "activity machine", which in the process of its functioning would start processing the current germs of systemic-structural notions into a coherent and consistent system of systemic views and systemic developments. There is no third strategy, although there is always a way (by the way, the most massive and most widespread) of re-negotiating and reformulating already existing perceptions created by others, but it does not give genuine contributions to culture.

So, there are two possible strategies for productive work itself. The first strategy cannot suit us for purely professional reasons (although we are well aware that no work can do without it or its elements, including the most refined methodological constructions). Therefore, without denying the importance of the first strategy, we choose the second to organize our work. Our task is to create a special "machine of thinking activity" that will produce systemic-structural representations; and

this, in our opinion, is the essence of the methodological approach to the development of a systemic-structural methodology.

For a naturalistic worldview, as already mentioned, such a move seems unreasonable. Methodologists are constantly asked: do you have schemes or plans of those systemic-structural representations which this "machine" should create? After all, if you don't know these products, you can't construct the "machine" either! In fact, the task here is as follows: Give us systemic-structural representations and we will construct a "machine" corresponding to them. We answer: if we already had systemic-structural ideas, we would not need to build this "machine"; this is the point – we do not yet have these ideas and, moreover, we do not even know what they should be, and to somehow get out of this hopeless for a "naturalist" situation we build a "methodological machine" that will produce the systemic-structural ideas we need. That they will be systemic-structural representations is guaranteed by the fact that the "machine" will be oriented to systemic problems and will process the material of the systemic domain, and that they will be methodological representations is guaranteed by the methodological structure of the "machine" itself. The design of the "machine" and the character of the material it processes should, therefore, guarantee us the necessary quality of the resulting products.

Here, however, the following question arises (and the answers to it may be very different): what exactly is the material of the systemic domain and how should this "methodological machine" be oriented or directed? But in our opinion, the answer is already given by the scheme we propose for the organisation of methodological work. If someone thinks that methodological thinking, like scientific thinking, is directed at natural objects, he will naturally consider the systemic representation of natural objects as such material; if someone thinks that methodological thinking is directed at scientific subjects and knowledge, he will consider systemic knowledge and problems as the main material of the systemic approach; and who considers procedures, methods and techniques of research and project work as the subject of methodological analysis, will naturally bring their systemic analysis to the forefront. All these variants are equally acceptable to us in the framework of the idea of methodological organization of systemic-structural research and development: they all fit into the proposed scheme of organization. And this seems to be the main thing.

An important advantage of this organisation of systemic-structural research and development is that it does not reject any of the existing variants of subject-centered and methodological work, accepts them all and shows the place, role and necessity of each of them. But it also takes them in their connections and relations to one another, in their involvement with the whole and in their dependencies on the whole, and on this basis additionally deepens and develops each of these types of work.

In addition – and this is very important for understanding the essence of the case – this scheme establishes a special relationship between the structure (or layout) of the "methodological machine" and the material it captures. The character of the "machine" is determined at least by both; the material it includes influences the nature and quality of its product as much as the structure itself (or the order and sequence of processing the material by the corresponding forms); and, moreover, the material itself, through the specific layout of this "machine" (especially through the operation of the autoreflection unit) is always pressing on the machine's layout, always being processed into the machine's layout, into its forms.

And if we dwell on the question of why the proposed project of organization of a systemic-structural methodology and all the ideas associated with it seem usually strange and raise many objections, we should point first of all to this solution to the question of the relationship between the design of the "machine" and the material it captures: in our proposed project of systemic-structural methodology, the construction of the "machine" is designed not only to process the material it captures, but also to imitate and reproduce the morphology of this material (in fact, this principle is a further generalization of the principle of the content-awareness of logical forms as basically for a content-aware genetic logic); specifically, this relation is realized in the "methodology machine" through methodological reflection and a unit of methodological research of systemic work in all kinds and types of human activities.

2.

Finally, there is another basis for the objections usually raised against our proposed framework for organising systemic-structural methodology.

It has to do with a misunderstanding, in our view, of the processes of history and the mechanisms of development of human activities. It is often asked how it can be justified that the proposed system of methodological work will solve the set of problems that currently exist in various fields of science and practice, usually characterized as systemic-structural problems. However, the essence of our point of view is precisely that the whole system of methodological work described above is not created and organized in order to solve *today's* problems referred to as "systemic-structural" ones (although in the process it should solve or most often remove these problems, too); the system of methodological work is created in order to develop the whole set of thinking and human activity. The immediate reason for its creation are today's problems, but if we limited our goals and tasks to them, it would be a largely empty or, in any case, ineffective work. Therefore, the real aim of the systemic-structural methodology should not be to eliminate and overcome one or another group of particular problems, but to ensure a constant and continuous systematic development of activities. At the same time, of course, emerging problems should be continuously identified and fixed.

But it would be a mistake to think that tensions and discontinuities in activities (or problems) unambiguously determine directions and ways of resolving them, or, in other words, transitions to tasks. Not at all. In the abstract possibility there is always an infinite number of solutions to each problem, and in practical terms a sufficiently large number of substantially different solutions. If we combine problems and look for one solution for each of these combined groups, it is of course harder to find a practically meaningful solution than for each individual problem, but still there can always be several different such solutions. Thus, a tension, disruption or problem in thought-activity does not yet determine unambiguously the task of thought-activity; to a great extent, the task is determined by the means we use, and the means are always the result of our "depravity", our individual contribution to history, and they determine how and with what constructions a particular set of difficulties, disruptions and problems in activity will be overcome and resolved.

All of this applies fully to the systemic movement as well. One cannot ask whether the proposed organisation of systemic-structural methodology will produce the systemic-structural representations we need, for no one can say in advance what kind of systemic-structural representations are needed. There is a certain set of tensions, difficulties and problems in activity that we consider to be systemic-structural.

But this is only *a reason* for creating a systemic approach and a systemic-structural methodology, and when the latter is created, the representations and means of analysis it produces will be systemic-structural in the exact sense of the word.

Thus, the criticism proceeds from the assumption that the specificity of systemic-structural representations and the systemic approach can be given without reference to the means we use to create these representations, while we, on the contrary, argue that it is unthinkable that the character of systemic-structural representations and the systemic approach in general will be determined primarily by the character of the means we use and therefore suggest that appropriate systemic-structural representations are those that will be produced by our "machine" of systemic-structural methodology.

This approach follows directly from the characterisation of the systemic movement we have given above: there is an attitude to systemic developments, but what is "system" and "systemic" is unknown; at any rate, representatives of different groups in the systems movement understand it all differently. These differences stem from differences in means and value attitudes. Therefore, we must first catalogue and define these means and attitudes. For our part, we propose the concept of methodological organisation of systemic work. And for us, therefore, it is very natural to assume that genuine systemic-structural representations will be those produced by this organisation, just as it is natural for representatives of other groups to assume that genuine systemic-structural representations will be produced by the models they propose.

At the same time, we do not consider the path we have outlined to be the only one; we only consider it to be the broadest and most effective in terms of the idea of continuous development of thought activity. Every rupture in the historical situation must be filled with a construction, but there is no requirement that only a single construction is possible, and, as we now understand it, there cannot be a single one in history. Figuratively speaking, we can go in different directions from the ruptured situation, and where we should most appropriately go is not determined by this situation, but by the perspectives of the trajectories of our further movement.

Our program is to create a new formation of thinking, which we call methodological, and new forms of organization of thought activity that will produce, like "machines", new systemic-structural notions. And if we are asked whether this thinking and these forms of organization of thought activities will correspond *to the old* situations (from which we start), to *the old* problems and to the ideas emerging in these situations, then we answer that, of course, they will not: what is the sense in creating new thought formations and new "machines of activity" in order to return in the end to old systems and old problems*?*

3.

Thus we once again arrived, but with different ideas, at the major and decisive point in the contemporary debate. The development of a systemic approach is not and cannot, in our view, be self-contained.

The systemic approach in the current socio-cultural situation can be created and will be effective only if it is included in the more general and broader task of creating and developing the tools of methodological thinking and methodological work. And this way, as we have sought to show, corresponds to the conditions of the emergence of the systemic approach and the traditions of its development. The converse statement is also true. We believe that the systemic approach is one of the most important points in modern methodological thinking and contemporary methodological

work, without it methodology today can neither be formed, nor exist. Therefore, the most important socio-cultural task at the present stage is to combine the systemic approach with the methodological approach and its various variants, such as activity-based, normative, typological approaches, and vice versa – to enrich and develop the methodological approach and all its various variants by the specific means of the systemic approach. And this two-way task can be solved, in our opinion, with the help and within the framework of the methodological organisation of systems of thought-activity described above.