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**Alexander Bogdanov's Tektology, Anticipating the Evolution
of Social Systems Control**

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ALEXANDER BOGDANOV'S TEKTOLOGY, ANTICIPATING THE EVOLUTION OF SOCIAL SYSTEMS CONTROL

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1 INTRODUCTION

Bogdanov is rightfully considered one of the founders of the theory of systems and the system approach in general (Loktionov, 2016). In his "Teknologiya", he examines in detail a number of stages of the emergence, functioning and destruction of systems, as well as the concept and various types of systemic crises. Bogdanov, insisting on a creation of tektology as a "universal organizational science" (Bogdanov, 1989a, p. 57), is probably one of the first thinkers who directly linked the functioning of systems with crises that occur on a permanent basis – and this was one of the thinker's important contributions to the research of systems' development.

We believe that the system studies of the early 20th century, at the origins of which Bogdanov stood, laid the foundation for the further development of the sciences of control and organization of complex social systems, which are already largely related to our time. For all this, it was necessary to transfer system approaches from philosophy to the sphere of practical applications, as Bogdanov tried to do.

Bogdanov is a systemist, in his own way no less than Hegel whom he criticizes, although he refuses to be called a philosopher, striving to remain only a scientist. The very attempt to create tektology is an extremely ambitious project to form a universal system science that would be applicable to all systems, and as such, would be able to unite all the different scientific disciplines.

However, consistently defending the isomorphism of system laws, Bogdanov was one of the first thinkers to face a problem that the system movement could not overcome later. Bogdanov postulates that "the task of tektology is to systematize organizational experience; it is clear that this is an empirical science and should get its conclusions by induction" (Bogdanov, 1989a, p. 127). Then it was supposed to "explain them, i.e. give abstract schemes of their trends and patterns" (Ibid.). The problem is already obvious from what has been said. Firstly, of course, the explanation is by no means reduced to the formulation of some abstract schemes. Secondly, the collection of empirical data may give some grounds for trying to systematize this data somehow, but it does not replace a clearly formulated hypothesis that these facts would be supposed to confirm or refute.

Here lies the main problem – the assumptions formulated by Bogdanov did not include such explanatory models that could act as verifiable or refutable hypotheses. Bogdanov, for example, states the existence of similar features in various natural and social systems, but does not offer a satisfactory explanation of what properties of the systems themselves, their elements or structural relationships could be responsible for this

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5 similarity. Except, perhaps, the subordination of everything to the very universal system
6 laws that needed to be justified. So, there is a certain logical circle here.
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8 Later, L. von Bertalanffy faced similar difficulties, and with approximately the same
9 result. However, this does not negate the fact that many of Bogdanov's ideas, and later
10 also von Bertalanffy's and other theorists' of the system movement, pointed to a number
11 of empirical facts that were of great importance for both the social sciences and the
12 control sciences – even if an explanation for a number of these facts had yet to be found
13 (Schwaninger, 2006).
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16 Bogdanov, as if anticipating the critical remarks that the theory of systems would later
17 meet, repeatedly compared his tektology to logic and mathematics. He called tektology
18 a new science, but at the same time emphasized the formal nature of its principles and
19 mechanisms (Bogdanov, 1989a, pp. 144-145), which, as it seems to us, could bring
20 tektology closer to methodology rather than a fully developed scientific theory.
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23 Perhaps it was the dominant methodological orientation of Bogdanov's works that
24 allowed him to anticipate the main trends in the development of approaches to control
25 and managing social systems.
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27 The main goal of our work is to prove that Bogdanov's ideas anticipated the trends in
28 the development of the problems of control and organization of social systems. To reach
29 this goal we formulate the following research questions.
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- 32 1) What are the basic trends in the development of the problems of control and
33 organization of social systems?
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- 35 2) How do Bogdanov's ideas correlate with these trends?
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37 For the purpose of our study, we use the systemic approach to the analysis of the
38 Bogdanov's ideas impact on the control science. First of all, we give a brief review of
39 the literature on the subject in Section 2 following the introduction. Then, in order to
40 answer the first question, it is necessary to use a framework suitable for the task of
41 identifying and analyzing the trends we mentioned. That we propose to conduct in
42 Section 3 of our work in the context of the development of ideas about scientific
43 rationality and the corresponding stages of the development of cybernetics. After that in
44 Section 4 we examine Alexander Bogdanov's ideas that anticipated some of the existing
45 trends in the development of social systems control – making a correlation between the
46 ideas and the trends. Finally in the conclusion of this work we provide a view on the
47 meaning of Bogdanov's ideas for the contemporary state of control and organizational
48 studies in the light of the urgent need to include in said studies the ethical and
49 humanistic aspects – as an avenue for future research.
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55 **2 THE EVOLUTION OF SCIENTIFIC RATIONALITY CONCEPTS AND THE** 56 **IDEAS OF ALEXANDER BOGDANOV – A LITERATURE REVIEW** 57 58 59 60

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5 At present, the crisis of the problems of control in social systems is quite reasonably
6 recognized. To a large extent, this crisis is caused by the use of inadequate tools in the
7 control of social systems, when these tools are automatically transferred from technical
8 cybernetics (Espejo & Lepskiy, 2021).
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10 The philosophy of science has accumulated a rich reserve about the types of scientific
11 rationality. A system of paradigms has been developed, in which each subsequent
12 development includes the previous ones as particular “smaller” paradigms. These ideas
13 are based on developments in philosophical, methodological and psychological research
14 in convergence with natural science approaches (Nicholas, et al. 2019). Three types of
15 scientific rationality were identified: classical, non-classical, and post-non-classical
16 (Stepin, 2005), which made it possible to systematize at the macro level the evolution of
17 the problems of control sciences and cybernetics as fields of scientific knowledge.
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21 Classical scientific rationality has determined the development of first-order
22 cybernetics, non-classical – second-order cybernetics, post-non-classical – third-order
23 cybernetics of self-developing poly-subject environments (Lepskiy, 2018). It is
24 fundamentally important that such an idea of the development of cybernetics and
25 control issues in general is based on the systematic organization of accumulated
26 knowledge. Each subsequent type of scientific rationality is considered as a framework
27 construction in relation to the previous one, which allows it to be included in the general
28 system of ontologies. Post-non-classical scientific rationality includes non-classical and
29 classical rationality, respectively, third-order cybernetics includes first- and second-
30 order cybernetics.
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34 The analysis of the ideas of Alexander Bogdanov, in particular his work "Tektologia"
35 allows us to conclude that they were ahead of their time and corresponded to the basic
36 ideas of post-non-classical scientific rationality. The latter takes into account the
37 correlation of the obtained knowledge about the object not only with the properties of
38 the means and operations of activity, but also with the value and target structures of the
39 subjects of cognition and control. This takes into account the relationship of intra-
40 scientific goals with non-scientific, social values and goals (Stepin, 2005).
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43 This conclusion is justified in the article through the analysis of the correspondence of
44 Bogdanov's ideas to trends in the evolution of the concepts of the social systems control.
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48 **3. CONCEPTUAL FRAMEWORK AND METHODOLOGICAL STRATEGY:** 49 **BASIC TRENDS IN THE EVOLUTION OF SOCIAL SYSTEMS CONTROL** 50

51 Classical cybernetics of the first order corresponds to the basic provisions of classical
52 scientific rationality. The ideas of philosophical positivism, the “subject-object”
53 paradigm, and the activity-approach dominate here. The application of the ideas and
54 models of the first-order cybernetics to the control of social systems made it possible to
55 identify fundamental limitations that were impossible to overcome within the
56 framework of classical cybernetics (Novikov, 2016). This served as the basis for the
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5 further development of cybernetics on the other philosophical and methodological
6 grounds.
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8 Second-order cybernetics corresponds to the basic provisions of non-classical scientific
9 rationality. The ideas of philosophical constructivism, the "subject-subject" paradigm,
10 the subject-activity and network approaches dominate. Second-order cybernetics helped
11 to overcome a number of limitations of first-order cybernetics in the control of social
12 systems, however, its applications also revealed a number of new fundamental
13 limitations (Umpleby, Medvedeva & Lepskiy, 2019).
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16 Third-order cybernetics corresponds to the basic provisions of post-non-classical
17 scientific rationality. The ideas of the humanistic interpretation of philosophical
18 constructivism and constructive realism (Lektorsky, 2015), the paradigm "subject –
19 meta-subject" (self-developing poly-subject environment), subject-oriented and
20 environmental approaches dominate. Third-order cybernetics allows us to overcome the
21 limitations of first- and second-order cybernetics in the control of social systems
22 (Lepskiy, 2018a). Perhaps, with a wide introduction into practice, new limitations will
23 be discovered, which will require further development.
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27 The systematization of the stages of the development of cybernetics in its relationship
28 with the development of scientific rationality gives grounds for the classification of
29 trends in the control of social systems.
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31 The philosophical and methodological analysis of the evolution of cybernetics and the
32 problems of control science, including the control of social systems, allowed us to
33 identify the basic trends and organize them in the context of the types of scientific
34 rationality and cybernetics:
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- 37 • philosophical approaches;
 - 38 • control paradigms;
 - 39 • observer positions in control;
 - 40 • approaches to the presentation of control activity and its subjects;
 - 41 • types of activity of control entities;
 - 42 • representation of control objects;
 - 43 • types of control;
 - 44 • models in control;
 - 45 • control mechanisms;
 - 46 • reflexion;
 - 47 • ideas about knowledge in control;
 - 48 • ethical regulators in control;
 - 49 • approaches to the integration of knowledge areas and subjects in control.
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55 The considered socio-humanitarian trends in control (Table 1) allow us to form a
56 holistic picture of the evolution of problems of control in social systems and an idea of
57 the specifics of third-order cybernetics of self-developing poly-subject systems. In this
58 paper, for the first time, an expanded composition of trends in the problems of control in
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5 social systems is presented and the binding of these problems to the types of scientific
6 rationality and types of cybernetics is given.
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8 The analysis of Bogdanov's ideas allows us to conclude that he anticipated the
9 development of ideas about the evolution of the control of social systems according to
10 its main trends. He made a great contribution to the formation of first-and second-order
11 cybernetics, and also laid the foundations for the construction of third-order cybernetics
12 (self-developing poly-subject reflexive-active environments) that was developed in
13 accordance with the ideas of post-non-classical scientific rationality (Lepskiy &
14 Sleptsov, 2018).
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17 Next, we will consider the connection of Bogdanov's ideas with individual trends in the
18 evolution of approaches to control in social systems.
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22 **4 IDEAS OF ALEXANDER BOGDANOV, ANTICIPATING TRENDS IN THE** 23 **DEVELOPMENT OF SOCIAL SYSTEMS CONTROL** 24

25 **4.1. Bogdanov's basic idea about the relevance of the formation of third-order** 26 **cybernetics** 27

28 Creating an image of the future science of organizing systems of various types,
29 Bogdanov identifies fundamentally important aspects related to the meta-subjectness of
30 systems, taking into account the influence of ideological orientation and culture, the
31 triune organization of things, people and ideas. In fact, he sets the basic foundations for
32 the formation of third-order cybernetics.
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35 "It is easy to see how the new task is incommensurable with all that have been set and
36 solved so far. The entire sum of the working forces of society — tens and hundreds of
37 millions of variously differentiated units — will have to be harmoniously connected into
38 one collective and precisely coordinated with the entire available sum of the means of
39 production — the totality of things at the disposal of society; moreover, in accordance
40 with this gigantic system, the sum of ideas dominating social environment must also be
41 located, otherwise the whole would be unstable, mechanical unity would turn into an
42 internal struggle. This triune organization — of things, people and ideas — obviously
43 cannot be built otherwise than on the basis of strict scientific planning, namely, the
44 entire organizational experience accumulated by mankind. But it is also clear that in its
45 current form, fragmented, torn into special sciences, it is insufficient for this. It is
46 necessary that it itself be organized holistically and harmoniously, otherwise its
47 application is not able to go beyond fractional, partial tasks. Therefore, a universal
48 organizational science is necessary." (Bogdanov, 1989a, pp. 106).
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54 The considered ideas of Bogdanov give grounds to assert that the trends he anticipated
55 in the development of the problems of control and organization of social systems also
56 correspond to the third-order cybernetics approaches. Of course, we have to admit that
57 not all of the aforementioned approaches of the Table 1 can be rooted in Bogdanov's
58 works. But our examination of the treatise "Tektologia" gave enough material for us to
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5 prove that at least five individual trends corresponding to the third-order cybernetics can
6 be traced back to him. These are:

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- 8 • “subject – meta-subject” paradigm among the control paradigms;
- 9 • self-developing environments as control objects;
- 10 • control through environments among the types of control;
- 11 • active knowledge of real and virtual subjects as an idea about knowledge in
- 12 control;
- 13 • transdisciplinary approach to the integration of fields of knowledge and subjects
- 14 in control.
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18 The foundations of these trends found in Bogdanov’s will be shown in the following
19 section.

20 21 22 23 **4.2. The integrity of the organizational system and the “subject – meta-subject”** 24 **paradigm**

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26 On many pages of "Tektologia" Bogdanov identifies a number of properties and
27 features inherent, as he believes, to all systems without exception. We will be
28 particularly interested in the following organizational mechanisms identified by him:
29 conjunction, ingression, disingression, egression and degression. It is they, as Bogdanov
30 shows, that determine the very essence of system processes, the conditions and results
31 of the passage of certain stages of development by the system. When considering his
32 "tektological mechanisms", Bogdanov, which is also worth noting, does not divide them
33 into creative and destructive, which would imply some meaningful characteristics.

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36 The basis and the first mechanism, without which, according to Bogdanov, everything
37 else is impossible, is the "connection of complexes" or conjunction (Bogdanov, 1989a,
38 p. 144).

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41 Considering conjunction, he identifies three possible scenarios, which, in turn, will
42 already depend on the content of the connected complexes. These complexes can, for
43 example, mutually strengthen each other, partially strengthen or weaken or completely
44 destroy due to oppositely directed activity. All these features (as well as the rest)
45 Bogdanov, following the spirit of universality of tektology declared by him, seeks to
46 extend to absolutely all examples known to him from the natural and humanitarian
47 sciences and even everyday practice.

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50 The method of "ingression" or "entry", which is focused on the assembly of elements
51 into an integral system, is also of fundamental importance (Bogdanov, 1989a, pp. 158-
52 160).

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55 Bogdanov calls the phenomenon opposite to ingression, respectively, disingression.
56 However, he notes that this is not just the destruction of organizational relationships. In
57 an effort to discover the mechanism of such destruction, he may be coming close to
58 those discoveries that will later be made within the framework of synergetics. So, he
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5 writes that "full disingression " is a complete mutual neutralization activity of the forces
6 acting within the system, but then there is the external environment that can shift the
7 balance in one direction or another (Bogdanov, 1989a, pp. 161-164).
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9 Two other types of organizational activity that Bogdanov highlights, he calls egression
10 and degression. Their action determines the formation and preservation of any system,
11 according to him.
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13 Bogdanov here, again, is not so much trying to find out the reasons for the emergence of
14 systems for each individual case, as to identify universal system principles. The author
15 of "Teknologija" believes that at least two forces should act in any system – one of them
16 will be aimed at forming a certain system center, and the other – at preserving the
17 peripheral boundaries of the system, which do not allow it to disintegrate.
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20 According to Bogdanov, egression is the effect of a certain centering force that brings
21 the system together. An element that has this ability of egression can influence other
22 elements surrounding it in such a way that they seem to tighten around it – that is, it is
23 able to set the structure-forming principles – in each particular case, different,
24 depending on which individual system is being discussed.
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27 Here Bogdanov also sees the natural limits of egression, again citing not so much
28 physical and biological, but mainly social examples. An increase in the number of links
29 in a centralized management pyramid leads, according to Bogdanov, sooner or later to
30 the accumulation of errors, the weakening of links between higher and lower levels, and
31 eventually to a decrease in efficiency.
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34 Bogdanov also draws attention to the fact that with such an excessive overcomplication
35 of the system, each of its parts, becoming as specialized as possible and strengthening
36 its main function in the system, can weaken or even lose the other functions that were
37 originally inherent in it and could ensure its somewhat autonomous existence. Thus,
38 each element of a complex system turns out to be extremely dependent on the other
39 elements, which is good only in conditions of stable existence, but with any sudden and
40 significant changes (for example, crises), excessively differentiated elements will not be
41 able to change their functions and position in the system, which will completely lose
42 plasticity and adaptability because of this.
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46 Such ideas, especially regarding management structures and their strengths and
47 weaknesses, later could be found in a number of management theorists of the XX
48 century, in particular, in the works of Peter Drucker and his followers; as well as in the
49 concepts of post-industrial and information society, for example, the ones of Manuel
50 Castells (Malakhova E.V. et al. 2018).
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53 At the same time, Bogdanov insists that the centering system-forming principle of
54 egression is not sufficient in itself for the long-term existence of the system. It also
55 needs forces that would protect the system both from aggressive influences of the
56 external environment and from the destruction of its own internal relations. Bogdanov
57 calls these "preserving" processes degression. Degression, from his point of view, on
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5 the one hand, keeps the system intact, not allowing it to crumble and spread out. On the
6 other hand, these same processes limit the system in its growth and development.
7 Bogdanov sees the reasons for this in the fact that if the egressive center of the system
8 has the greatest plasticity as the ability to grow and develop, then its peripheral
9 degressive parts are not so highly organized, less plastic, and due to this they begin to
10 "lag behind" in development, and along with them the entire system limited by them
11 gradually stops developing.
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14 Considering egression, especially in societies, Bogdanov makes an interesting and far-
15 reaching conclusion that under equal conditions for the center and the periphery of the
16 system, the differences in their "egressive potentials" will only gradually increase,
17 which in human collectives leads first to the centralization of power, and then to its
18 increasing differentiation. These ideas of Bogdanov are very close to the trend of
19 representing systems as meta-subjects, and to the ideas of post-non-classical scientific
20 rationality.
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26 **4.3. Self-developing environments as control objects**

27 The basic object of research in post-non-classical scientific rationality is "self-
28 developing human-like systems" and their organization. Bogdanov focuses on the
29 organization of such systems. "In the general scheme, the entire content of human life
30 has unfolded before us, and now we can sum up the results. The old teacher of scientific
31 socialism, F. Engels expressed them with the formula: the production of people, the
32 production of things, the production of ideas. The concept of organizing action is hidden
33 in the term "production". And we will make the formula more precise: the organization
34 of external forces of nature, the organization of human forces, the organization of
35 experience. What turned out to be? Humanity has no other activities except
36 organizational, no other problems but organizational." (Bogdanov, 1989a, p. 71).
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40 Bogdanov described the principles of operation of systems, especially social, in fact,
41 much ahead of his time, as the whole XX century in practice showed the process and the
42 consequences of committing the mistakes which Bogdanov quite clearly warned
43 against.
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46 Bogdanov's arguments about the degressive processes of recession in the culture of
47 society, expressed by him even before the appearance of the well-known concept of
48 Ogburn's cultural lag, were very interesting, and again partly ahead of their time.
49 Bogdanov criticizes ideological dogmatism in all possible areas, as hindering their
50 development through the use of ideas that have already lost touch with practice, but
51 remained rooted in the structures of language, and through it in culture as a whole.
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54 The degressive potential of any system, according to Bogdanov, first ensures its
55 strengthening and survival, but then – inertia and resistance to changes, even necessary
56 ones. Similar properties of a number of social systems, such as organizations, for
57 example, were repeatedly described in later works of the XX century, from Parkinson's
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5 to Adizes'. As well as the difficulties that all those who are inside this system and want
6 to change something in it face in such cases were shown.
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8 It is from the binding role of the degressive processes in relation to the inevitable
9 development of systems (including social ones) that Bogdanov largely deduces the
10 inevitability, repeatability and even the necessity of periodically occurring crises.
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12 Bogdanov believes that another factor in the disorganization of the system, which in the
13 future can lead to its crisis, is the presence of not one, but two or more egressive centers
14 in it, whose functions may overlap or coincide, thereby causing rivalry and conflicts.
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17 **4.4. Control through environments**

18 The fact that systems can be controlled not only from within, but also from outside, and
19 not in directive way, but indirectly, affecting not the system itself, but the elements of
20 its environment – this idea is extremely ancient. It can be found for example in ancient
21 Chinese military and political treatises.
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24 However, Bogdanov raised the problem of the influence of the environment in a new
25 way not only on social systems, but also on all other ones without exception. He
26 emphasized that the environment could be different for different elements of the system,
27 and even more so for different systems, because the environment is something
28 surrounding each specific system, and so these surroundings also differ. That is, when
29 studying, and even more so when using the influence of the environment on the system,
30 it is necessary to take into account at the same time the ways in which this system
31 interacts with its own, "individual" environment. Bogdanov writes that the environment
32 "is a set of external influences under which the system is located, but taken precisely in
33 relation to it. Therefore, another system – a different environment" (Bogdanov, 1989b,
34 p. 110). That is, there is no "environment in general" for Bogdanov. The environment is
35 always considered as a kind of context in which the system can exist, have certain
36 boundaries and interact only with those external elements that it is able to perceive and
37 assimilate due to its characteristics, that is, with those that are complementary to it.
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42 From here, we can draw many interesting conclusions, some of which are indicated by
43 Bogdanov himself. Thus, he points out that "the environment can never be quite the
44 same for the center and for the peripheral complexes: since they differ structurally, they
45 "perceive" its actions differently, so to speak, under the conditions that are otherwise
46 equal " (Bogdanov, 1989b, p. 111). Thus, for the control center and the peripheral part
47 subordinate to it, due to their own characteristics, there is a completely different
48 external environment, which, accordingly, has a different impact on them in terms of
49 content and consequences. This, in turn, as Bogdanov believes, leads to an increase in
50 differences between the controlling and controlled parts of the system, which in the
51 even more distant future may weaken the system and even lead to its decline. Bogdanov
52 illustrates this idea with examples from the history of prehistoric, slave-owning and
53 feudal societies (Bogdanov, 1989b, pp. 111-113), believing that their internal problems
54 could be caused by the fact that the governing and controlled social groups developed
55 unevenly, which created imbalances, increased the gap between them and eventually led
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5 these societies to crises. Concretizing his vision of the causes of such social crises, in
6 particular, the revolutions of his time, as well as the conquest or collapse of ancient
7 states, Bogdanov points out that "every life in general, and especially social, is an
8 elaborate complex of various specific activities. Conditions that are particularly
9 favorable for the development of some of these activities may not be at all favorable for
10 others" (Bogdanov, 1989b, p. 111), therefore, in a situation where different social
11 groups have unequal access to both consumption and production, they gradually
12 develop some skills and lose others. This, of course, in turn, increases their dependence
13 on the system as a whole and prevents them from adapting to new conditions, especially
14 if the changes are fast and significant.

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18 Thus, we can say that Bogdanov, having raised the question not only about the influence
19 of the environment as a whole on individual groups, but also about its difference for
20 them within the same society, in particular, for different social strata, shows that it is
21 necessary to take into account their position as elements of a more general system,
22 which forms their own unique environment for them.

23 24 25 **4.5. Active knowledge related to specific real and virtual subjects**

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27 This trend in the development of concepts about the control of social systems can be
28 associated with Bogdanov's ideas about crises in social systems.

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30 A significant part of Bogdanov's "Tektologia" is devoted to the issues of organizational
31 dynamics, and in particular, to such a phenomenon as crises. Despite the fact that he
32 was interested, first of all, in the search for universal patterns of the emergence and
33 course of crises, as far as the social application of these ideas is concerned, his work
34 partly anticipates the research that was conducted later in the framework of
35 conflictology, in particular, in Coser and Dahrendorf.

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38 Bogdanov considers the crisis precisely from a systemic point of view, as one of the
39 possible, and sometimes even necessary states of existing, adapting and developing of
40 systems. In the first approximation, he calls organizational crises "the break of the
41 tektological boundary between two complexes ... from which they cease to be what they
42 were ... and form some new system". Also, the formation of a border becomes a crisis,
43 which creates "new separations from this system" (Bogdanov, 1989a, p. 176).

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46 In the most general form, the crisis for Bogdanov is a "change in the organizational
47 form of the complex" (Bogdanov, 1989b, p. 209). At the same time, Bogdanov
48 postulates the relativity of any crisis – as a dependence on organizational complexes
49 that are the topic of research. Thus, Bogdanov points out that depending on how
50 comprehensive or, conversely, private ideas about systems as organizational structures
51 we use, the idea of crises will also change. What will be a crisis in a particular system or
52 subsystem, in a higher-order system will be just one of the stages of its existence,
53 perhaps even insignificant. That is, whether we consider crises as a constant chain of
54 events or as something that happens with a certain periodicity, depends on the scale of
55 the system we have chosen – and not least, on its scale relative to us, as observers.

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5 Bogdanov, in his consideration of the nature of crises, proceeds precisely from their
6 systemic characteristics, which could be common to the phenomena of nature and
7 society – therefore, for him, the crisis initially loses all axiological and teleological load
8 in itself and cannot have it, as a phenomenon considered from the point of view of the
9 ideals of scientific knowledge.
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12 Bogdanov, trying to find out the organizational nature of crises, writes that a change in
13 the organizational form (that is, a crisis) is a break in the connections between the
14 elements that form the system. Moreover, this gap can both completely destroy the
15 original system and create a new one. Breaking the boundaries between two or more
16 systems with their merger leads to a crisis no less than the collapse of the original
17 system into subsystems or individual elements. Thus, Bogdanov distinguishes crises of
18 connection or "conjunction," and crises of separation, "disjunction", however,
19 immediately stipulating that in reality, each crisis is most often accompanied by both
20 these processes to one degree or another. The crisis for Bogdanov is both a violation of
21 the equilibrium state of the system and its desire for equilibrium at a new level
22 (Bogdanov, 1989b, p. 218).
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26 On the basis of his systemic understanding of crises, Bogdanov suggests, in particular,
27 the possibility of analyzing social crises, which also includes revolutions. Here,
28 Bogdanov's work also surprisingly anticipates the studies of political transformations
29 conducted in the 1960s – 1970s under the leadership of G. Almond as part of the so
30 called Stanford Project.
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33 In the last volume of his "Tektologia" Bogdanov writes that in order to foresee the
34 consequences of a social revolution, the observer needs to mentally decompose the
35 social system into elements, taking into account their functions, structural relationships,
36 historical continuity – all that, according to Bogdanov, their "viability" will consist of in
37 the face of what he himself calls a catastrophe. The collapse of the system will
38 inevitably have to end with the restoration of its equilibrium at a new level – based on
39 Bogdanov's previous postulates, in particular, that structures (egressive centers) that
40 strive to fulfill the same powers in any sphere will inevitably compete, and those that
41 demonstrate more flexibility and plasticity in response to the existing demands of the
42 environment will eventually win.
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46 In the end, Bogdanov postulates the universality of crises for any system that changes
47 over time, that is, changes its organizational structure, passing through a series of small
48 and large crises. Thus, equilibrium becomes a special case of crises for Bogdanov, and
49 not vice versa. However, only on the basis of such a vision of crises, it is possible not
50 only to describe and evaluate them, but also to explain and anticipate, and in some cases
51 use their potential to make changes in the system in the right direction.
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54 The presented considerations of Bogdanov about crises in social systems give reason to
55 believe that he insisted on the inseparable connection of knowledge with specific
56 elements of organizations and actually anticipated the possibility of the existence of
57 active forms of knowledge.
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4.6. Ideas of a transdisciplinary approach in the organization of social systems

The high methodological complexity of the organization of interdisciplinary approaches gives reason to assert that it is very difficult to achieve significant results within the framework of traditionally established ideas about interdisciplinary communication. The solution involves going beyond the limits of individual disciplines and conceptual directions to attract external specialists from other disciplines armed with fundamentally different types of knowledge and special socio-humanitarian technologies (Lepskiy, 2018a).

Bogdanov anticipated the problem of transition from an interdisciplinary to a transdisciplinary (in methodological interpretation) approach. Moreover, he considered this problem at the technological level, through the description of communication mechanisms of representatives of different fields of knowledge, different system positions in control. We are speaking here about the method of "ingression" or "entry", by which systems that could not connect to each other by themselves or even could mutually destroy each other still are connected with the help of an "intermediary". It is through ingression, according to Bogdanov, that it is possible to establish connections between social complexes, including individuals and groups, forming arbitrarily complex forms of organizing their activities. At the same time, Bogdanov sees ingression as a much broader concept, applicable, as he believes, to denote the found (and probably not initially obvious) connections between any elements, including the ones in scientific theories, logical and mathematical proofs (Bogdanov, 1989a, pp. 158-160).

5 CONCLUSIONS

So, we see, that anticipating the non-classical and even post-non-classical concepts, Bogdanov fundamentally and consistently parts from the classical concept of control, in which the key elements are the manager (control system) and the object of control. He puts forward the idea of the interaction of elements that are represented as various forms of activities. These interactions of elements determine the forms and consequences of the organization of the system. In fact, he considers the interaction of diverse observers-actors who determine the vital activity and development of the system.

"So, for tektology, the first, basic concepts are the concepts of elements and their combinations. The elements are activities – resistances of all possible kinds. Combinations are reduced to three types: organized, disorganized and neutral complexes. " (Bogdanov, 1989a, p. 125). This idea can be understood as a proposal to consider self-developing systems. The scientific heritage of Bogdanov is therefore of particular importance in the modern conditions of the organization of hybrid reality environments (subjectness, digital, physical) that can only be formed and managed through the post-non-classical trends in control, specifically, the third-order cybernetics.

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5 In "Teknologija" Bogdanov anticipated the actual modern problem of the organization of
6 hybrid reality environments, subjectness and physical, that can be considered indirectly
7 also digital, as well as the Internet of Things. This is reflected in his statement: "The
8 same applies, to varying degrees, to other means of production. Consequently, the task
9 here is to organize the working forces and means of production into a systematically
10 functioning system; this is the organization of people and things into a purposeful
11 unity." (Bogdanov, 1989a, p. 70).
12
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14 So, what should be the subject of further research on the influence of Bogdanov's legacy
15 on the development of systemic approaches in the post-non-classical tradition? We
16 believe that at the moment, when we are speaking about complex self-developing
17 reflexive-active systems, for them the inclusion of normative, primarily ethical, issues in
18 the analysis seems not only justified, but necessary, since these systems are capable of
19 independently setting goals and evaluating the results achieved, possessing the
20 fundamental property of subjectness.
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23 For such self-developing complex social systems, it is of utmost importance to include
24 humanistic, ethical dimension in their advancement. On the one hand, one could say that
25 Bogdanov was not specifically interested in ethics and even, moreover, distanced
26 himself from it. He writes that "For tektology, morality is only a subject of research, as
27 an organizational form among others; it considers the moral connections of people from
28 the same point of view as the connections of cells of an organism, parts of a machine,
29 electrons in an atom, etc. It is as alien to morality as mathematics" (Bogdanov, 1989a, p.
30 141). Nevertheless, when it comes to human collectives, Bogdanov still had to touch on
31 moral issues, although in his own peculiar manner – emphasizing instrumentality.
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35 In order to explain the emergence of connections between the elements of a system, he
36 introduced the concept of "ingression" as the emergence of a certain intermediate link or
37 organizing complex connecting disparate elements together (Bogdanov, 1989a, p. 158).
38 For people or groups, such a link can be a common goal that will unite them and help
39 organize joint activities (Bogdanov, 1989a, p.155). According to Bogdanov, moral
40 norms also serve as such unifying complexes that help to establish communication, and
41 through it also cooperation.
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45 Sometimes Bogdanov can look like a consistent mechanist in terms of his ideas of
46 system functioning. However, his mechanicism is by no means absolute, but represents
47 a fairly well-thought-out part of his worldview. Thus, he writes (Bogdanov, 1989a, p.
48 99) that "whenever it is possible to explain any of the functions in a living organism,
49 this is already considered as "mechanical". ... The "mechanism" is an understandable
50 organization, and that's all. The machine is therefore "nothing more than a mechanism"
51 because its organization is carried out by people and, therefore, is fundamentally known
52 to them."
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55 That is, for Bogdanov, understanding the essence of any phenomenon, natural or social,
56 explaining the principles of its existence and functioning is the representation of the
57 studied object as a mechanism. It is important to understand that Bogdanov's
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5 mechanicism is by no means a simplification of reality, but the identification of the
6 organizational relationships found.
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8 Bogdanov consistently promotes the idea of the formation of the unity of humanity, the
9 formation of a meta-subject of development. "As for the social anarchy that has arisen
10 from the division of labor, competition, the struggle of man against man, then, it also
11 loses its dividing influence as the working class develops, because in the environment of
12 this class such influence is actually eliminated. The comradely connection in work, the
13 community of interests in relation to capital generate the unity of the proletariat into
14 various class organizations, which step by step, with fluctuations, but inevitably lead it
15 to unite into a world collective. " (Bogdanov, 1989a, p. 108).
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18 Bogdanov's ideas have stood the test of time, and they are currently a valuable potential
19 for improving the control mechanisms and organization of social systems.
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21 Despite Bogdanov's attempts to distance himself from philosophy, his ideas organically
22 fit into modern philosophical ideas about the development of scientific rationality
23 (classical, non-classical, post-non-classical). They also anticipated the evolution of
24 cybernetics of the first, second and third order.
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27 This article substantiates the close connection of Bogdanov's ideas with the basic trends
28 in the development of the problems of control and organization of social systems, which
29 confirms the relevance of his ideas for contemporaries.
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31 The most important comment on Bogdanov's ideas is that he admits the fact that
32 heterogeneous elements of systems have various forms of activity, are able to think
33 independently, learn and, most importantly, unite to defend their interests ("resist").
34 These considerations are becoming extremely relevant in the modern conditions of the
35 organization of hybrid reality (subjectness, digital, physical).
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38 It can be reasonably argued that Alexander Bogdanov was a thinker who aspired to the
39 future of mankind.
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TABLE 1. Socio-humanitarian trends in the control of social systems

Trends	First-order cybernetics (classical rationality)	Second-order cybernetics (non-classical rationality)	Third-order cybernetics (post-non-classical rationality)
Philosophical approaches	Positivism	Philosophical constructivism	Humanistic interpretation of philosophical constructivism and constructive realism
Control paradigms	Subject – Object	Subject – Subject	Subject – Meta-subject
Positions of the control subject (actor)	External observer-actor	Parity observer-actor	Submerged observer-actor

Approaches to the representation of control activity and its subjects	Activity-based	Subject-activity based	Subject-oriented
Types of activity of control subjects	Operational	Communicative	Reflexive
Representation of control objects	Complex systems	Active systems	Self-developing environments
Types of control	Classical	Reflexive, manipulative, etc.	Control through environments
Models in control	Analytical	Simulation, Multi-agent	Human-sized
Control mechanisms	Feedback Hierarchical structures	Communications Network structures	Environmental interactions Self-developing environments
Reflexion	Personal supra-situational reflexion	Communicative reflexion	Meta-reflexion, reflexion of strategic subjects
Ideas about knowledge in control	Information	Personal knowledge, subject-related knowledge	Active knowledge of real and virtual subjects
Ethical regulators in control	Ethics of goals	Communicative ethics	Ethics of strategic subjects
Approaches to the integration of fields of knowledge and subjects in control	Monodisciplinary	Interdisciplinary	Transdisciplinary