The Information as Absolute

Sergey V. Shevchenko[1], Vladimir V. Tokarevsky[2] and Alexandra S. Shevchenko[3]

[1]**Institute of Physics of NAS of Ukraine, Pr. Nauki, 46, Kiev-28, Ukraine**
[2]**Professor ret., Pr. Nauki, 46, Kiev-28, Ukraine**
[3]**I.I. Schmalhausen Institute of Zoology, vul. B. Khmelnytskogo, 15, Kyiv, Ukraine**

Abstract This article presents and grounds the informational concept ("the Information as Absolute" concept) in physics and philosophy. The concept defines the Information as ultimately common, real and fundamental "absolute" concept/phenomenon which exists as infinite set ("Information" Set) of elements (members) and informational (e.g., logical) links between the elements; where any element itself is some informational structure also. Correspondingly, for example, Matter as the substance, radiation, etc., is some development or realization of informational patterns, constituting a specific, and practically infinitesimal comparing to the Set, subset of the "Information" Set. The concept allows for the resolution, or at least for a consideration on a higher level of comprehension, of basic ontological and epistemological problems in philosophy and natural sciences; it clarifies basic meta-physical notions such as space, time, matter, etc.

Key words: Information, set, space, time, Matter, Consciousness, Universe, Absolute

1. Introduction

In Ancient times, two main ontological (and correspondingly, epistemological) philosophical concepts were formed, Materialism and Idealism. Both concepts were, and still are, based on beliefs in some transcendent fundamental Essences. In Materialism such Essence is some eternal "Matter", in Idealism a number of (also eternal and transcendent) Essences are considered, "Gods", "Spirits", "Ideas", etc.

As both concepts are no more then beliefs, it is impossible to prove the truth of any of them, though corresponding attempts, discussions, disputes (sometimes rather radical) took place over and over again within rather long time.

But in reality the problem of the transcendence, as well as many others, is resolvable because indeed fundamental Essence, which is the base of all and anything, namely the information, isn't transcendent and can be, in principle, studied. The substantiation of corresponding informational ("the Information as Absolute") concept in physics and philosophy is presented in this article.

The conception defines the Information as an ultimately common, real and fundamental concept/phenomenon, an "Absolute", which exists as an absolutely infinite set ("Information" Set) of elements (members) and informational (e.g., logical) links between the elements, where any element itself is some informational structure also. Correspondingly, Matter as the substance, the radiation, etc., as well as Consciousness, are some developments or realizations of information. They exist as specific and practically infinitesimal comparing to the Set, subsets of the "Information" Set.

The concept allows for the resolution or at least for a consideration on a higher level of comprehension, of the basic ontological and epistemological problems in philosophy and natural sciences.

2. On the concept of "Information"

It is rather interesting that the discussion "so what is the information?" in scientific, technical and philosophical literature goes on in many years already without any consistent results. [Abdeev/ Абдеев, 1994]:

> "Depending on a branch of science where an investigation was carried out, information got a large number of definitions: information is an indication of a content, obtained from external world in the process of adaptation to the world (Wiener); information is a negation of the entropy (Brillouin); information is the communication resulting in a decreasing of an uncertainty (Shannon); information is a transmitting of a diversity (Ashby); information is an originality, novelty; information is the measure of a structure's complexity (Moll); information is a probability of a choice (Yaglom); etc. Each of these definitions reveals one or another aspect of this polysemantic concept".

Here is no room for a detailed analysis of this discussion, we note only that its productivity turned out to be rather poor from what follows, for example, large number of existent definitions of information. Chernavsky [Chernavsky/ Чернавский, 2001] gives more then twenty different ones. Capurro and Hjørland [Capurro and Hjørland, 2003] quoted some dissertation where about 700 definitions were collected.

Let's consider some of the definitions (mainly cited in [Abdeev/ Абдеев, 1994]) that have essential semantic distinctions:

1. (Philosophical *encyclopedia*) "Information (lat. "informatio" – an examination, a notion, a concept): 1) a report, a notification about a state of affairs or about something else that is transmitted by a person; 2) decreased, removed uncertainty as a result of the communication obtained; 3) a notation inherently relating to a control; signals and their syntactic, semantic and pragmatic parameters; 4) transmission, reflection of the variety of any objects and processes (of alive and non-alive nature)".

2. "Information means some order, a communication, creation of the order from a disorder or, at least, increased regulation compared to that which existed before the communication was obtained".

3. "Information is the manifestation of the property of the objects of living nature to reflect in the form of some mental sensations the movement of the objects in surrounding world".

4. "Information… is a quality of the objects, phenomena, processes in the objective reality and of man-made controllers, which lies in the ability to conceive an internal state as well as the state and the impacts of an environment and to preserve, sometimes, the results; to transmit the data about the internal state and cumulative data to other objects, phenomena, processes".

5. "Information is a philosophical category that is considered along with such as Space, Time and Matter. In the most common form information can be presented as a notation, i.e. a form of some relations between a source which communicates and a receiver which obtains a notation".

6. "Information, as well as matter, exists and has always existed… information is some integral attribute of Matter and movement which realizes a certain way of Matter existence and presents some measure of the changes which follow all processes occurring in the World".

7. "The phenomenon of information is a multi-stage, irreversible process of coming into being of a structure in some open imbalanced system that begins at a random memorized choice which this system carries out when it transforms from chaos to an order, so the process is completed with a purposeful action according to an algorithm or program that are in accordance with the semantics of the choice." [Melik-Gaikaz'an/ Мелик-Гайказян, 1998].

8. "Information is some qualitative and quantitative characteristic of the level of reflection. Generally information is a quasi-force which is directed against disorder and chaos; in this sense it cannot be separated from structure and regularity of material systems" [Berg et Spirkin/ Берг и Спиркин, 1979].

9. (Weizsäcker 1959, quoted in [Yankov, 1979: 39] "Now many people begin to recognize that it is necessary to consider information as something third that differs from Matter and consciousness… This is Plato's Idea, Aristotelian Form, invested by such a way that the human of XX century assumes to know something new from it".

10. [Wiener, 1983] "Information is information, not Matter or energy. No materialism which does not admit this can survive nowadays".

11. [Landauer, 1999] "…Information is inevitably inscribed in a physical medium. It is not an abstract entity. It can be denoted by a hole in a punched card, by the orientation of a nuclear spin, or by the pulses transmitted by a neuron",

and, at last

12. "…If you are interested in the question "what is information?" and find corresponding definition in some book (which is, generally speaking, rather difficult, since the authors usually keep from giving such a definition), then in great likelihood other authors will not agree with this definition." [Petrushenko/ Петрушенко,1971].

It seems quite natural that the last author possibly had some grounds for such evident pessimism. However, as will be shown below, in reality the problem of the definition of the concept/ notion "information" can be solved, or at least can be evaluated in the general way, by using logical analysis.

Besides, note that all listed definitions have a common conceptual flaw, each of them is tautological: "information is information" (or "data", "algorithm", "communication", "evidence", etc.) Thus any attempts to define the concept/ notion "information" through something, which is more common and fundamental, turn out to be ineffective, whereas now in textbooks one can find a number of "information theories" such as Shannon's theory, a number of complexity theories, theories of algorithms and automata, etc.

3. On the concept of "the set"

Another fundamental concept that will be necessary to build this informational conception is the "set". It turns out that in attempts to define this concept in mathematics the same problem as at defining of information arises, since any definition becomes a tautology: the set is the set, ensemble, manifold, collection [of the elements], etc. The difference is practically only in that the mathematics has been evolving by way of maximal formalization and using rigorous logical rules/ limitations at creation of a next domains of this science, whereas the attempts to formalize concepts/ elements/ concatenations in the information theory were essentially lesser productive.

Now in a number of the set theories the notion of a "set" is taken as an *undefined primitive*, which can be defined only *restrictedly*, i.e. by *defining its properties in a limited system of axioms*. Though there are some set theories where the notions of the set are defined "completely" (e.g. [Vavilov/ Вавилов, 2007]) as well as the theories where some "more common" [relating to the set] notions are used, for example the notions of the categories and the toposes [Goldblatt, 1979]; [Baez, 1999]; [Marquis, 2003]. But such notions are only certain (sometimes not natural) natural extensions of classical G. Cantor's definition: "Unter einer Menge verstehen wir jede Zusammenfassung *M* von bestimmten wohlunterschiedenen Objekten in unserer Anschauung oder unseres Denkens (welche die Elemente von *M* genannt werden) zu einem ganzen" ("By a "set" we mean any collection *M* in a whole of definite, distinct objects *m* (which are called the "elements" of *M*) of our perception or of our thought").

4. The relations of information and set

So in mathematics, there is a number of the information and set theories when corresponding notions aren't, in fact, defined.

To clear the problem let us recall the Cantor's definition of a set. In this definition the key is "*of definite, distinct* objects … of our perception or of our thought" i.e. to define a set turns out to be impossible without notions (terms) which relate to the notion "information". And, in turn, information appears if and only if alternative of some elements (that is, diversity) of some set appears. I.e. the system "a set + an information" exists always as a unity, the *set is a form (a mode) of existence of the information.* The notion "set" here, naturally, is used in a broad sense, i.e. not only as a "collection of some elements". On a set any informational connections (e.g., mathematical operations) between the elements can/ should be defined (see the definitions of the information above, definitions of the categories, the toposes, etc.) which define the set's (and the set's elements') specific properties by establishing a system of axioms.

It is already well known that complete set-theoretic axiomatic system is, very probably, infinite, and now we can conclude that the same inference is true for the informational theory. Nevertheless, recognizing the unity between the concepts of set and information allows us to build rather general and effective approach at further consideration of this informational concept.

5. Some properties of information

As was already mentioned, the notion "information" unlike the notion "set" is essentially less formalized; a rather poor system of axioms exists for the information. Current formalized theories – Shannon's (applications in the communication theory and physics), theories of complexity, algorithms, and automata (cybernetics) – reflect (allow to formalize) the properties of this concept/ notion only restrictedly. Such a situation follows from both infinite complexity of this notion and limited capability of the languages, including limited capability of individual (human's) interpretation of the words/ notions. Nevertheless we can formulate a number of common basic properties of the information in addition to the "definitions of information" in Sec.2 above, which, in fact, define only some certain specific properties of information.

Property I1. *Any information is objective and doesn't require existence of any "sentient being" to exist.*

Property I2. *Information can exist at least in two possible modes: 1) "fixed information",* e.g. a picture, a computer code listing, and 2) *"dynamic information"*, a changing picture, an execution of a program code in computer, etc.

Here we should make some "epistemological" remark. For further consideration, note that any *indeed new* information about the external [to a human] World can be obtained by a human's consciousness only as a result of some experiment, *any indeed new knowledge is empirical.* This new knowledge in a science becomes "axiom(s)", "postulate(s)", "Nature law(s)". Further, a human consciousness applies the axioms for more detailed analysis of specific natural processes, e.g., mathematical problems; creating theories or solving technical tasks.

Moreover, as it was proven by K. Gödel [Gödel, 1931], it turns out to be that there exists some limit for the complexity of a mathematical theory when the theory based on a consistent system of axioms becomes incomplete, i.e. when there are some true statements / propositions which cannot be proven in that theory. An example, possibly, is the fact of non-provability of the continuum – hypothesis in Zermelo-Fraenkel set theory which was proven by Gödel and Cohen [Gödel, 1940]; [Cohen, 1963].

The pointed above (the definitions 1-9, 11,12 in section 2, properties **I1, I2**) properties of the information, if claimed as some "postulates", *are some empirical data* also and in this sense these postulates by any means don't differ from, e.g., Newton's gravity law. However, there is the *fundamental difference* between the information's postulates and the postulates in Nature sciences ("Nature laws"). The latter, rigorously speaking, "have no right to be laws". In reality they always remain hypothetical since they are based on the necessary but insufficient criterion of the reiteration of given experimental results in given experimental conditions. From the fact that in *n* experiments some identical (in fact, nearly identical) outcomes were obtained, by no means follows that the outcome in (*n*+1)-th experiment will yield the same. Logically a physicist can only *believe* in that the next result will be "in accordance with the theory". For example, well-known Newton's statement "I do not feign hypotheses" is incorrect, and, e.g., Newton's gravity law (as well as any other Nature law, though) is no more then a hypothesis, though claimed as the postulate in physics.

In the case of information we have *entirely another situation. It is sufficient only once* to "discover in an experiment" an information, i.e. a language, some set, and a number of logical rules on this set [Shevchenko, Tokarevsky, 2007–2008], then at once it can be logically proven that for the information these rules including, for instance, the definitions and properties above *are always true.*

As **Property I3** is true, which we obtain as follows. Let us consider the notion of a "null (empty) set" that is introduced in any set theory: a null set is the set that contains no

members/elements (e.g. [Hrbacek, Jech, 1999]). This set, unlike any other sets, is unique – null set exists as the single set, irrelatively of how many and whatever sets exist anywhere (at that sometimes it is possible and useful to introduce the specific empty set for a specific set, though). And further, if we recall that any set is, generally speaking, a mode of existence of some information, then we must conclude that the null set contains all/ any elements of all/ any sets. Indeed, to define the null set is necessary to point out that this set doesn't contain this, this, this… and so on, down to "absolute" (the term "absolute" will be correctly defined below in this section, Property **I6**) infinity… element (set of elements); it turns out to be that the null set isn't so empty as it is adopted in mathematics.

The notion "null set" in the "informational" language one can formulate as the statement *"there is no anything"* (or "there is nothing"). And just as that was in the case of the null set's notion, we can conclude that the statement *"there is no anything" contains complete information about everything* about what exists, what can exist (as well as about what "cannot exist", but exists as a false information) in *the absolutely infinite set,* which we call here *"the Set "Information".*

However it is necessary to make an evident revision of this statement, since it is incorrect, as there exists the information that there is no anything. Correspondingly true will be *infinite cyclic statement ("Zero statement"): "there is no anything besides the information that there is no anything besides the information…"*. I.e. Zero statement is at the same time fixed and dynamic information.

Let's return to the definitions 1-12 (except, of course, Wiener's one) in section 2 above. Most of these definitions contain tacit assumption that for an existence of an information some storage device is necessary, a brain (e.g. a human's one), papyrus, computer, some thing with observable properties, etc. However, Zero statement containing absolutely infinite information exists when, by definition, there are no storage devices. From this follows:

Property I4. *For the existence of information there is no necessity in the existence of an external storage device, but since some storage device is, nevertheless, necessary, then only one possibility remains – when information itself is a storage device of information*. Though this implication could have been obtained earlier from the "experimental fact" that any definition of information appears to be a tautology: the facts that information can be defined only via information itself and that information is itself a storage device are, practically, the same.

Carrying out analysis similarly as it was in the case of null set again, we obtain

Property I5. *Any element of any set contains all/ any elements of all/ any sets, i.e. any element of any set contains the Set "Information" totally.* Indeed, to characterize (single out) some element from the Set, it is necessary to point out all/ any distinctions of this element from any other element; every element in the Set exists as a bit "I/not-I", where "not-I" section contains complete information about all/any other elements (including – about given element "in other times of its existence"); as negations, but these negations in all other respects are identical to the information relating to corresponding elements.

The list of information's properties is infinite, but even the properties **I1**- **I5** convincingly show the originality and fundamental nature of the information's concept/ notion. Besides, from these properties follows:

- (independent on anything) *existence* of absolutely infinite and fundamental "Information" Set, as well as introduced here informational concept;

- *completeness* of the informational concept, since in the "Information" Set exists no conceivable operation when some element of some set could quit the Set. Besides, the Set contains all/ any possible false information. And its amount possibly infinitely exceeds the amount of true information, though when we deal with "absolute" infinities, such a statement possibly requires some separate study;

- (self-) *consistence* of this informational concept. Indeed, the consistence of some theory/ concept in mathematics implies that in this theory it is impossible to prove truth of (at least two) logically inconsistent implications because one of the implications must necessarily be false. In other case the theory is inconsistent and therefore false. In the case of this concept such an interpretation becomes inapplicable, because obtaining false information does not lead out it from the Set;

- because of absolute *completeness* of the information concept we principally cannot go out of the concept in order to prove it's (and the Set's) *uniqueness*.

Note, also, some other basic properties of the information:

Property I6. *Since a process of transformation (e.g. determination) of some specific information reduces to enumeration of variants, the "Information" Set, in spite of its absolute infinity, is, very probably, discrete.*

Property **I6** (and the text above) contains at least two notions that call for additional explanation. First is the notion "*discrete*" applied here (though with a stipulation "very probably") to the Set totally, when there is, e.g., the notion of the continuum (continuum is, of course, a subset of the Set), which is by definition non-discrete. Secondly, in standard set theories it is often accepted that the "absolute infinite" set doesn't exists. If one assumes that such a set, X, exists, then it is possible to create power set of this set, 2^X, and the cardinality of the second set rigorously exceeds the cardinality of the set X. However it is known, that if the continuum hypothesis is true, then the cardinalities of the continuum set and of the "discrete" power set of the natural numbers set, $2^\aleph$, are equal, so the continuous and the discrete are in certain sense equivalent. Thus, e.g., infinity sequence of power sets for, e.g., natural number set: $Y_0 = 2^\aleph, \ldots Y_k = 2^{Y_{k-1}} \ldots, k \to \infty_A$ (when ∞_A means, in turn, "absolute infinite"), must have maximal cardinality (be "absolute infinite") since in this case the concept of "next power set" loses sense.

Another approach at the consideration of the "absolute infinite" problem follows from the zero's notion. Though practically any arithmetic contains "0" and in most cases zero is used as some number, it is not a usual number and is introduced in arithmetics by some additional rules. In realty zero indeed *is not a number*, it is the specific empty set: "there is no numbers". Therefore in arithmetic it is permitted the division of any quantity by any infinitesimal quantity, but the division by zero is prohibited, since its result is "absolutely uncertain". Here we can say that the absolutely infinite set can be considered as the result (an axiom?) of the division of some "usual number/ quantity" by the zero.

Property I7. *(At least true) information in the "Information" Set, as well as in any of the Set's limited (by some attributes) subsets, can be "absolutely exact".* For example two identical texts contain absolutely identical implications.

Property I8. *From that Zero statement, which contains all data about everything, is expressible in practically any human's language rather possibly follows that any information from the "Information" Set can be expressible in practically any language.*
If this language (or maybe more correctly, if a corresponding consciousness is capable) is capable for infinite development, though…

6. Application of the concept. Matter and Consciousness

It seems rather evident that "What is Matter?", "What is Consciousness?", "From where (how) did they appear to be?" are main questions in ontology and epistemology. Under *necessarily empirical* (see section 5) approach, which a human's consciousness applies to

perceive the External, it is impossible to obtain the answers on these questions. The evidence for such a conclusion is longtime co-existence of two main competitive philosophical concepts, Materialism and Idealism. Both concepts have held the in fact futile dispute for a number of thousands years, and this long experiment practically unambiguously shows that both concepts are nothing but beliefs, it is impossible to prove the truth of any of them.

Materialism's foundation is "the system of Nature laws"; however, as that was pointed out above, any Nature law is essentially empirical and so can only be postulated, in other words, be taken without a proof as something fundamental. Thus, Materialism is nothing else than a belief in the Great Materialistic Principle "That is so because of that is so". Correspondingly Materialism, e.g., is not capable of answering the main epistemological questions "What is Nature (Matter, Universe)" and "Why do Nature laws exist at all?"

Idealism is more epistemologically grounded, it states that a sentient Creator established Nature laws when He created this Nature. However, as early as in 18th century I. Kant [Kant, 1787] showed that it is impossible to prove the existence/ non- existence of the Creator. Besides, to create Nature "from nothing" Creator must be omnipotent, when, as it was proven yet in Middle Ages, any omnipotent being is logically contradictory. Correspondingly in Idealism some "materialistic" questions appear, for example from where and how the Creator happened to be?

Presented here informational concept allows to clear up the situation essentially. As it was proven above, any information exists always, or "in an absolutely infinite long time"; it fundamentally, logically, cannot be non- existent. For existence of information nothing is necessary besides (outside) the information itself; there is no necessity in an existence of so strange thing as "non-informational Matter". Indeed, though we cannot prove the uniqueness of the "Information" Set, and so cannot exclude some external Creator, Who created the Set (and thus should exist "in a longer time then always", though that is possible in principle), it seems quite evident, that, even if something External to the Set exists, *then this External cannot be represented as some information*, whereas the properties of Matter are expressible in any (including, e.g., in mathematical) language.

Moreover, there is also Consciousness besides Matter, evidently "immaterial" and expressible/ working by using information. From this follows rather reasonable conjecture that both Matter and Consciousness are in reality some specifically organized (and practically infinitesimal comparing to the Set) sub-sets of the Set.

More specifically the concepts of Matter and Consciousness will be considered below, however, because in the variety of philosophical doctrines these concepts have a variety of the interpretations, in this section we introduce a simple common attribute by which in this paper the objects/ processes/ phenomena, etc., are subdivided into material and non-material. Since Matter and Consciousness are rather different (e.g. that follows from the fact of inapplicability of physical laws to the processes in Consciousness), specifically organized subsets of the Set, take here that *any process/ object/ phenomenon is a member of subset "Matter" if it interacts with other processes/ objects/ phenomena exchanging by exclusively true information. If a process/object/ phenomenon is capable to produce and/or to apprehend false information, then it is non-material and thus an element/ member of another, "non-material" subset.* Now we know three comparatively autonomous subsets: "Matter", "Alive", and "Consciousness" (the last two subsets contain also any possible living and conscious beings besides Earth/ humanity*),* which constitute the subset "our Universe". Since the subsets have common origin, they can, of course, intersect (subsets' elements can interact). Experimentally that follows, for example, from the fact that human's consciousness controls by some (unknown now) way the human's body, which is, first of all, a material object.

Let us consider these fundamental subsets (further, sometimes, "sets") more specifically.

6.1. Matter

So, Matter is a set of some elements – elementary particles, including mediating particles producing the interactions (fields), some systems of the particles and the fields (subsets of the main set), etc., where all elements interact using exclusively true information. I.e. Matter is somewhat similar to the computer. The premise that Matter is some logically organized system isn't, of course, new. It is enough to recall, e.g., Pythagoras's "All from number" and Plato's "All from triangles" doctrines. A number of specific hypotheses that our Universe is a large computer appeared practically at once with the appearance of usual computers (see, e.g. [Zuse, 1969]; [Penrose, 1971]; [Fredkin, Toffoli, 1982]; [Tegmark, 1998]; [Lloyd, 1999]; [Schmidhuber, 2000]; [Lloyd, 2002]; [Margolus, 2003]; [Gershenson, 2007]; [Tegmark, 2007]; [McCabe, 2008]; though this list can be much longer).

An assumption that Matter (Universe) is some set ("ensemble") exists at least since 1998 [Tegmark, 1998].

In philosophy corresponding concept is known as "Informational Realism" [Floridi, 2004]:

> "…Informational realism (IR) is a version of structural realism. As a form of realism, it is committed to the existence of a mind-independent reality… it is suggested that an ontology of structural objects for OSR (*ontic* structural realism) can reasonably be developed in terms of informational objects… outcome is *informational realism*, the view that the world is the totality of informational objects dynamically interacting with each other".

However, all these suggestions are nothing more than hypotheses, surmises based, first of all, on the remarkable adequacy of languages, especially mathematical, to external reality. Including the suggestion that the information is a base of Matter is Wheeler's *"it from bit" doctrine* [Wheeler, 1990]:

> "…It is not unreasonable to imagine that information sits at the core of physics, just as it sits at the core of a computer. It from bit. Otherwise put, every 'it'—every particle, every field of force, even the space-time continuum itself—derives its function, its meaning, its very existence entirely—even if in some contexts indirectly—from the apparatus-elicited answers to yes-or-no questions, binary choices, bits. 'It from bit' symbolizes the idea that every item of the physical world has at bottom—a very deep bottom, in most instances—an immaterial source and explanation; that which we call reality arises in the last analysis from the posing of yes-no questions and the registering of equipment-evoked responses; in short, that all things physical are information-theoretic in origin and that this is a participatory universe."

Except, though, C. F. von Weizsäcker's 1950-54s idea of the quantum theory as of a theory of binary alternatives ("UR- theory"), which has rather weighty reasoning. Weizsäcker ([Lyre, 2003]) "…Mathematically, … had just stumbled…" about a well-known fact that any vector in 3-D space can be represented also by some combination of two-dimensional spinors, from what follow at least two important consequences: (i) – three-dimensionality of the "position space" (i.e. the space here), and (ii) - any object which in quantum theory is represented by a Hilbert space can be described in a state space which is isomorphic to a subspace of tensor products of two dimensional complex spaces.

Now we can say that in the informational concept such suggestions obtain logical grounds when in the adequacy of the languages (if applied correctly, of course) at describing, e.g., Matter, there is nothing surprising since it is inwardly inherent for the information to form logical connections.

6.1.1. Space and Time

Space and Time are defined in *encyclopedia* as some "universal forms of Existence of Matter, its prime attributes", which characterize "extension/ length" and "duration" of the Existence. It is rather easy to note that these definitions contain some evident flaws. The concept "Space" is defined through, rigorously speaking, non- defined concept "extension", "Time" is similarly explained by "duration". Though the concepts of the extension and of the duration can be, to some extent concretely, determined empirically, the same questions remain: from where/ how did these "forms of Existence" appear?

In this informational concept (more see [Shevchenko, Tokarevsky, 2013, 2013a, 2015] *Space* and *Time* are defined as some *universal logical rules/ possibilities, which are*

necessary to single out (to discern) different elements in the whole "Information" Set. As well "length" (or "space interval") and "duration" (or "time interval") also exist in the Set.

At that, *Space* allows to discern the *fixed information* constructing the elements (system of the elements), when Time controls dynamic changes of the elements and their systems up to whole system/ Set "Information", where the space has infinite number of dimensions (and, of course, up to the sub- system/ sub-Set "Matter", where the space is 3- dimensional) as a whole; as well as the interactions between Matter's elements should be discrete (quantized) also.

A human (by human's senses) does not directly perceive Space as a logical condition, but is capable to perceive fixed information and so sees distinct elements (objects) in Space as "lengthy" or separated by "extension/ length".

To define *Time* there are a lot of approaches now, up to the statement that Time does not exist (see, e.g., [Rovelli, 2009]). J. A. Wheeler [Wheeler, 1986] wrote about Time in a similar way as in *encyclopedia:*

> "…But time: how is time to be reduced to more primitive concepts? Explain time? Not without explaining existence…. Explain existence? Not without explaining time. To uncover the deep and hidden connection between time and existence … is a task for the future."

Nevertheless there is well known Wheeler's paraphrase of the writer Rag Cummings's "definition" of Time: "time is what prevents everything from happening at once… [when] space is what prevents everything from happening to me". That was rather probable a joke to some extent (and note that really in the Set everything has happened and is happening at once "always" fundamentally), but this joke contains a lot of truth. And it becomes indeed correct if stated as *"Time is a logical rule preventing cause-effect (dynamic) events from happening at once."* An effect logically must be after a cause. *Something* is necessary for realization of cause-effect logical events being different. In the Set and, of course, in Matter, this "something" between cause-effect events even can be infinitesimal, but *it never can be equal to zero exactly*; this something we call "time interval".

As well to separate different fixed information, "something" is necessary in the Set, it can be infinitesimal also; this something we call "space interval", when, analogously to time intervals, space intervals between fixed information patterns never are equal to zero exactly.

As the possibilities Space and Time form some "empty container" where fixed and dynamic informational patterns/systems of patterns can be placed, i.e. to exist at all, the corresponding possibilities are realized in concrete informational systems as the systems' spacetimes. Thus in the system "Information" Set the possibility "Space" has, very probably,

at least infinite number of spatial dimensions; the Possibility "Time" in the Set has, very probably a limited number of dimensions, both these premises should be studied more at studying of the phenomenon "Information".

Now it seems we know only that the system's "Matter" spacetime is [5]4D Euclidian manifold (and practically nothing know – what is the human's consciousness' spacetime, besides, of course that this spacetime has "true time dimension"), where the dimensions of the 4D sub-spacetime correspond to 4 main fundamental degrees of freedom at changing material objects' states – three for at changes of spatial position and one (coordinate time) for changes of the objects' internal states. All these dimensions always exist in the Set, thus Matter, in certain sense, "forms" own spacetime by using in it some concrete dimensions for existence and evolution.

The real space in absolute Matter's spacetime is similar to certain extent to the Newton's definition of the space and time [Newton 1686]

> "…Absolute, true and mathematical time, of itself, and from its own nature flows equably without regard to anything external, and by another name is called duration: relative, apparent and common time, is some sensible and external (whether accurate or unequable) measure of duration by the means of motion, which is commonly used instead of true time";

but the definition of the time

> "…Absolute space, in its own nature, without regard to anything external, remains always similar and immovable. Relative space is some movable dimension or measure of the absolute spaces; which our senses determine by its position to bodies: and which is vulgarly taken for immovable space ... Absolute motion is the translation of a body from one absolute place into another: and relative motion, the translation from one relative place into another"

principally isn't completely correct. The time principally cannot flow somewhere, either as the rule or the possibility. The illusion of the "time flow" appears because of the fact that, because of the energy conservation law every material objects and the system "Matter" as a whole uninterruptedly change their internal states and/ or spatial positions, and this continuous process is obligatorily accompanied by continuously increasing the true and (for T-objects) the coordinate time intervals. As well as a number of "arrows of time" are illusions also – systems of material objects and Matter as a whole simply change their states from a given states to a next maximally probable states, including, for example, deterministic changes by no means differ in this sense from stochastic ones – simply in this case the probability of next states is equal to the unity.

6.1.2. Matter as "computer"

Thus Matter in our Universe is some analogue of a computer, in which an always rather simple, as noted in many researches, program code operates (see, e.g. [Lloyd, 1999]; [Fredkin, 2000]; [Schmidhuber, 2000]; [Lloyd, 2001]; [Margolus, 2003]. This follows from the fact that (fundamental) Nature laws are comparatively simple, the number of the laws is not large; at that, the laws (as well as the elementary particles, or more correctly their taxonomy, which is relevant to the particles' structure) can be reduced to a number of the groups of high-level symmetry.

To build a computer, as is well known, some simplest controlled logical elements allowing realizing main logical operations in the computer are necessary. So it is plausible to suggest [Shevchenko, Tokarevsky, 2007] that the computer "Matter" is built on a base of such elements, which we further call "fundamental logical elements" (FLE) that are in a way analogs of Weizsäcker's "Urs". The FLEs constitute a dense FLE lattice in the spacetime, some analogous of Penrose's "spin-network units" [Penrose, 1971], and "causal set" [Sorkin, 1991], "Space-time points in causal space" [Finkelstein, 1969], etc.

The FLEs themselves are naturally some informational structures also. Since in the "Information" Set every of Its elements is always connected with all other ones by some informational relations, to make up some stable structures from the FLEs, the FLE might have the property that informational connections inside the FLEs and between FLEs, including dynamic ones, in the informational structure "Matter" must be much stronger then any other FLE connections in the Set.

A human does not observe structures of the FLEs directly and does not read "primary information". Similarly he, e.g., doesn't observe flipping of logical elements in a PC and only sees the pictures on the display. Nonetheless, he sees (measures by the instruments) some results of the work of "operation systems" developed by (or for?) Nature.

As in the case of usual computer, for the FLE it is sufficient to have, at the minimum, two possible states ("0" and "1"), i.e. to have a possibility to form 1 bit of information, and to have some control inputs to flip the FLE by an external signal. So simplest cause-effect (dynamic) operation in Matter is the flipping of a FLE that is carried out during the minimal time interval   . If we assume, also, that the minimal length in Matter is the length of the FLE

, then maximum speed of propagation of an information in Matter will be: .

In this concept it is premised that minimal intervals are Planck time and Planck length; correspondingly maximum speed of propagation of information is equal to speed of light.

A movement, for example in space, of a particle under an impact of a force (of the cause) or after the impact, i.e. mechanically, is a cause–effect process. Since material particles are constituted from the FLEs, it is reasonable to conjecture (for more, see [Shevchenko and Tokarevsky, 2015]) that the particle's movement can be reduced to a process of sequential flipping with a substitution/ shift of "material" and "spatial" (or "etheric") FLEs (or, what seems as much more possible, there exist etheric FLE only). So for material objects to exist, to move and to change what one observes in Matter, is necessary for some system to exist where these processes could be realized. Such a system is "Matter's spacetime". In this space-time the rules/ possibilities "Space" and "Time" have a number of specific traits. As the rules they operate universally, as in the whole Set. As possibilities they constitute, rather possibly (one of main premises in the informational physical *model*; for more see [Shevchenko and Tokarevsky, 2013]) some (at least very large according to recent observations) 4-dimentional Emptiness. In this Emptiness a dense lattice of "ether" FLEs is placed. The FLEs have 4 degrees of freedom to flip and can cause flips of neighbor FLEs.

These 4 dimensions are: 3 spatial + 1 "temporal". Here the term "temporal" is in quotes, since strictly speaking corresponding dimension isn't temporal. In reality, in Matter two "times" act (or the rule/ possibility "Time" is "two-faced"): "true time" and "coordinate time", thus real Matter's spacetime is [5]4D Euclidian manifold. "True" time is universal in the Set, including in Matter (and in dynamical also informational system "the consciousness"). Every step, change, etc., even if it occurs in spatial points only is always accompanied by a "true" time interval and so this interval is not specifically directed relating to any of the four dimensions, pointed above. So the true time interval is always positive logically, principally. However there exist, and for Matter that is critical (see refs. above), some reversible logical sequences/ algorithms, which can evolve in two, "± time directions". Just to realize such sequence, in Matter's spacetime there is fourth, "temporal", dimension. Corresponding rule is in certain sense an analogue of the "true" time. For example, if a particle doesn't move in a spatial direction in the spacetime and so moves in the "temporal" direction only, the "true time interval" and "temporal interval" are equal. But for antiparticle at rest these intervals have equal absolute values, but different signs. So this non-spatial dimension is called here as "coordinate time".

So in the informational model it is premised that there is no specific "material" FLEs, though we cannot fully exclude such a possibility. Any of material ("massive" or, further, "T-particles") particles that constitute material objects are some specific cyclic disturbances of the ether FLE lattice, which appears after impacting on a lattice's FLE with transmitting to this FLE some momentum in the coordinate time direction. After a spatial impact on the particle, it starts moving in space. If the [initial] momentum is spatially directed, then an "S-

particle", e.g., a photon, appears. So for photons the lattice is something like Huygens–Lorentz "luminiferous aether". But there is essential difference: that aether was a 3-D medium for spreading of 3-D electromagnetic waves; when in reality every particle, including photons, is a 4-D algorithm. But, since this algorithm can be observed in space and *true time* only, its corresponding 3-D spatial projection is observed as some (EM or de Broglie) wave. So one can say that the lattice is, in fact, an "everythingferous" aether. Besides, note that after a particle's creation, every material particle's (and, of course, any material object's) algorithm never stops. Thus   all what one observes as Matter always moves in true time and in the 4D lattice with 4D speed of light and so all material objects in our Universe exist always in one true time moment (possibly inside the Planck time interval) simultaneously. The last inference means however that all, at least observable by humans, Matter was in some time created inside the Planck time interval. If the duration of Beginning of our Universe was longer, then there exist some other Matters that constitute the Universe, but they cannot be detected by existent on Earth instruments which are capable to interact only with the objects that are within the true time moment where the instruments are.

Every material object *can* exist in space-time individually, so Matter is, essentially, a set of some self-sufficient automata, which are uninterruptedly running. However, because all objects in Matter are also uninterruptedly reciprocally interacting, at least through the gravity, that constitutes some intricate hierarchical structures of the elements; up to the informational structure ("computer") "Matter" as whole.

Since in depth every material object is built and changes basing on universal identical FLE, Space and Time, as the rules/ possibilities are fully universal for Matter, so processes in Matter are highly standardized and physical and other theories universally using the spatial and temporal variables quite adequately translate onto human consciousness's (e.g., mathematical) language the primary Matter's program code that operates in reality on the FLE lattice.

6.1.3. The problem of Beginning and evolution of Universe

Ad interim let us make a couple of introductory remarks:

(i) – from the properties of information follows that any Set element contains the Set totally in the "not-I" part; i.e. as the negation, where the information is maximally compressed. However, there are some other types of more specified information compression when a fixed information contains in some tacit form possible corresponding dynamic information completely. An example: all information that can be obtained in some theory, or more correct, almost all information, if we recall the incompleteness theorems, is contained in

the theory's axiom system. All further development and applications of the theory (theorems, tasks, calculations, etc.) do not create any new information including dynamic one in addition to the information that the axioms tacitly contain. L. Wittgenstein wrote: "Proof in logic is merely a mechanical expedient to facilitate the recognition of tautologies in complicated cases." [Wittgenstein, 1921: point 6.1262]. In reality not only proof of something provable [e.g. of theorems] is "a mechanical expedient"; "a mechanical expedient" is the formulation of any provable (for given system of axiom) problem, e.g. of a theorem itself;

(ii) – to transform an information requires (more see below) to spend some energy ; to start computer it is necessary to connect up the computer to some power supply. However in the works of C. Petri, T. Toffoli, E. Fredkin (see [Petri, 1967]; [Toffoli, 1980]; [Margolus, 2003] and references in these papers) it was shown that some information can be transformed without energy dissipation, if in corresponding device the logical elements have specific reversible structure (e.g., so called "Fredkin-Toffoli logical gates") are used. Just to support reversal operations/ algorithms the coordinate time exists in Matter's spacetime.

From (i) follows that fixed true information, in form of "up to Beginning statement" *"there is no this Universe, as well as Its evolution"*, existed in the "Information" Set "always", "absolutely long before" the Beginning. And this "Book of Fates" for our Universe formally consisting of only one sentence contained all and absolutely exact data about the Universe, including data about the cause and the method of Creation, as well as about everything what in corresponding time will happen with every element of the set "our Universe", with every elementary particle and system of particles, including every human being and every human's thought. From (ii) follows, that it was sufficient to impact on some primary informational structure with some starting energy and further there will be no necessity in additional energy for the impacted structure's, i.e., in this case, for further Matter's, evolution (this fact reveals itself as the energy as the conservation law); or, at least, this additional energy is minimal; the evolution reduces to some redistribution of the initial energy portion. Possibly this fact was rather important for a thrifty Creator of our Matter.

That is, our Universe was not created "from nothing" as some "Big Bang of some singularity" [Weinberg, 2008]. And the main problem of Big Bang hypothesis (or any other hypothesis in traditional physics) that is a shortage in starting energy of 10^{85}-10^{90} MeV, in the informational conception becomes, in certain sense, of course, inessential. The logical singularity of "up to Beginning statement" was quite sufficient for the creation of Matter as the result of a "Big Logical Bang".

Both Creation and further Evolution of the Universe were only a realization of the "always" ready scenario; similarly start and work (evolution) of a program on a computer take place, for example calculation of infinite sequence of decimal digits of number "π" by a

known algorithm. What was this start? A "computer user" could do that (the "Creator" in traditional formulation), then Idealism is correct. With, however, an important addition. Now a Creator *ought not be omnipotent* and transcendent; in this case, our Creator simply knew some necessary (for us now unknown) alphabet and words. On another hand, whereas the program code in our Universe (at least in Matter) is rather simple, we cannot exclude a materialistic scenario when both necessary primary code and the start of corresponding program happened "accidentally".

It seems worthwhile to mention here an additional remark, relating to the Beginning. There are, in principle, no objections to suggest [Shevchenko, Tokarevsky, 2010] that at the Beginning Matter was firstly created as a huge number of so called hypothetical "Planck T-particles", i.e., the particles having masses that are equal to the Planck mass ($m_P = \dfrac{\hbar}{l_P c} \, \Box \, 10^{19} \, Bev$). These particles contain and their algorithm works on the "u-FLE"s (see the reference above), which are absolutely symmetrical and so this algorithm is utmost short and simple. Further interactions between these particles resulted in the appearance of the now observed Matter. Such particles have at least two possibly rather interesting properties: (i) – since the particles interact with anything only by gravity force, they could be the particles which have not interacted at the Beginning totally and thus they can now constitute at least partially so called "dark matter", and (ii) – since for absolutely symmetrical algorithms it is impossible to choose a direction in the coordinate time (the reversible process isn't defined), it is *logically permissible* to suggest that they all move in the Matter's spacetime in the positive temporal direction only, i.e. all the primary Planck particles were "particles", and, correspondingly, at Creation in Matter there was no antimatter, what is at least in the observed now part of Matter.

Besides in the informational approach becomes be possible to make seems rather rational version of Matter evolution at Beginning that is consistent with a couple rather probably reasonably grounded assertions on recent cosmology – that after Beginning there was a very short period when Matter's dimensions expanded to its cosmic size, and that Matter' spatial structure is uniform in any direction – "there is no observable center of Universe", which at first glance could exist after Big Bang .

These points could be at Beginning if the informational system "Matter" appeared as a small set of primary "big FLE"s, which all had algorithm with: (i) – every FLE is programmed to divide itself, at least on two "lesser FLEs" and (ii) after some number of the segmentations have happened in the last FLE version a program of creation of Planck mass particles starts.

Thus the exponential expansion was in the limited "space volume that was occupied by big FLEs", when Matter's space, which we observe now is seemed so large because of FLEs in recent logical lattice that fills the space are extremely small comparing with the primary FLEs.

Since the algorithms in every primary FLE were identical and the inflationary epoch was very short, the creation of Planck particles happened practically simultaneously in whole Matter's cosmic size, as well as practically simultaneously interactions of Planck particles created uniform in any direction and having no "center" distribution of "usual" material particles, further – objects, etc. in Matter.

6.1.4. Zeno aporias

Zeno aporias, e.g., [Dowden, 2010] are well known near 2500 years already, but aren't resolved on a satisfactory level. It is not surprising, since the aporias relate to properties of the notions of the space and the time; when any Meta-physical notion can be analyzed substantially only in framework of presented here informational conception. There are a number of aporias, but in fact all of them arise from the fundamental logical inconsistence of the notion a "change", if a system changes continuously: any given state of the system must be simultaneously as past, present, and future state, when the states are different by definition (except, in certain sense, "the Achilles" aporias). So here we consider only two aporias – "the Achilles" and "the Arrow".

The Achilles. Briefly the aporia is as [Dowden, 2010]:

> "Achilles, who is the fastest runner of antiquity, is racing to catch the tortoise that is slowly crawling away from him. Both are moving along a linear path at constant speeds. In order to catch the tortoise, Achilles will have to reach the place where the tortoise presently is. However, by the time Achilles gets there, the tortoise will have crawled to a new location. Achilles will then have to reach this new location. By the time Achilles reaches that location, the tortoise will have moved on to yet another location, and so on forever. [So] Zeno claims Achilles will never catch the tortoise."

There are a number of "resolutions" of this aporia, including, e.g., one, which is based on the mathematical inference that the series of successive space and time intervals here are convergent and so Achilles will catch the tortoise in a finite time interval. This "resolution" is evidently incorrect, for example it is clear that even the distance between both runners goes to zero, nonetheless for Achilles is logically prohibited to overtake the tortoise. When he overtakes it, of course.

To solve the aporia make some additional remarks. According to the informational model [Shevchenko, Tokarevsky, 2007-2008] any particle is some cyclic algorithm, a closed loop

of sequentially switching each other's FLEs. Depending on by which impact a particle was created, directed along a space or the co-time axes, two types of particles exist. If the impact is directed along co-time direction (along t-axis), then "usual material" particle ("T-particle" above) occurs. An impact in space directions results in occurrence of other sort of particles, "S-particles", for example of photons. T-particle at 3D spatial rest in the absolute spacetime/lattice moves along t-axis only, when the projection of "flipping point" (of flipping FLEs) trajectory on a space plain is, as it is reasonable to suggest, at least as a first approximation, a circle. A spatial impact on T-particle results in additional 4D circular motion (a 4D helix) of this point (the helix's 3D spatial projection is observed as de Broglie wave), but this motion contains reverse section because of the always-existent T-particle's spatial projection of its "own" circle.

Besides, note that in the aporia the critical point is that both runners move forward only. But if their motion contains some reversal sections, something as "two steps ahead, one step back", then there was no problem: for T-body "Achilles" it is enough only once to appear ahead of the T-body "tortoise" when tortoise steps back, and further no logic prohibits him to be in advance.

Photons move in space only, and photon's flipping point trajectory is a 4D helix also, projected on 3D space as the 3D EM wave. But their motion contains no reversal sections and so if two photons were radiated simultaneously in different space points, the back photon never overtakes the other one, as well as any T-particle cannot catch a photon.

The Arrow. Again as [Dowden, 2010]:

> "Zeno's Arrow Paradox takes a different approach to challenging the coherence of our common sense concepts of time and motion. As Aristotle explains, from Zeno's "assumption that time is composed of moments," a moving arrow must occupy a space equal to itself during any moment. That is, during any moment it is at the place where it is. But places do not move. So, if in each moment, the arrow is occupying a space equal to itself, then the arrow is not moving in that moment because it has no time in which to move; it is simply there at the place. The same holds for any other moment during the so-called "flight" of the arrow. So, the arrow is never moving. Similarly, nothing else moves. The source for Zeno's argument is Aristotle (*Physics*, 239b 5-32).
>
> The Standard Solution to the Arrow Paradox uses the "at-at" theory of motion, *which says motion is being* at *different places* at *different times and that being at rest involves being motionless* at *a particular point* at *a particular time*."

It is evident that it seems non-satisfactory. The "at-at theory" is practically nothing more then usual evident description of a motion and does not add anything new to the well known but incomprehensible fact that the arrow of course flies out the bow. Or it does not fly, is motionless, if it is in a quiver.

In the informational concept the arrow aporia is considered as a next realization (a formulation, concretization) of the global fundamental "Change problem" above (which is, correspondingly, "the Time problem" also) that any change logically contradicts with attempts to define explicitly given state of changing object, which is at each state in some unity of former, this and next states (or it is in past, present and future times) that are all different by definition. So the Time rule/possibility is, formally, logically inconsistent, in contrast to the Space one. Complete definition/ description is possible for any fixed object only.

At that in the concept the Change/Time problem seems as unsolved completely till now. But it seems evident that the resolution will be grounded on the properties of information above, first of all **I5** which states that any element including the element *"given object in given state"* of any set contains all/ any elements of all/ any sets in the Set, including the elements *"given object in all/every other states"*; and **I6**, which states that the Set, in spite of its absolute infinity, is, very probably, discrete. Any future state does not arise "from nothing" or as "future state used for its building some materials absent in previous state". Since all information including that which is necessary for occurring of (all) new states, always exists in each instant object's state. Including all arrows flied out their bows through an absolutely infinite sequence *of discreet* arrow's states, when every of the states exist "in absolutely infinitesimal time interval".

But this solution [probably] exists in fundamental depth, on the Set' level, when the Change/Time problem cannot be "solved" by any non- absolutely infinite dynamic system. Correspondingly all changes in such systems proceed deterministically only limitedly, on some level of changes scale the system's states become uncertain, in Matter this uncertainty is observed as Heisenberg uncertainty principle. Zeno, in fact, predicted quantum mechanics, including the solution of "Achilles" aporia above can be redundant – the succession of intervals Δx between runners isn't infinite since on some step the intervals become small so that the spatial positions of both runners become uncertain in accordance with Heisenberg formula $\Delta p \Delta . x \geq \hbar$.

Besides, to change something is necessary to spend something what in physics is called "Energy", which acts in every dynamical informational pattern/ system of patterns in the Set, from what follows rather rational suggestion that the notion/phenomenon *"Energy"* is, as the notions/ phenomena "Space" and "Time" above, a next member of the set of fundamental rules/possibilities "Logos" that define – how something must be formed to be some information and, besides, how information can change.

6.2. Consciousnesses

Here remains, however, the problem of creation and functioning of another, till now uniquely known "[practically!] non-material" subset in Universe, of human's consciousnesses: was the origin of consciousnesses some "mechanical" (and unavoidable) product of the evolution of Matter (this problem relates to subset "Alive" also), or was it not?

And if that was so then is it possible that a tendency to a self-organization of at least some subsets, which can be singled out by a certain way from the Set, is an inherent property of information? Humans' experience provides the evidence that the consciousnesses of the humans are stable, i.e. (practically) any informational "human's consciousness" structure from main informational "[humans'] Consciousness" system (set) is stable. As that was already mentioned for Matter, to be stable in the Set for any informational structure is necessarily to be constituted from some primitive sub-structures when the logical links between the sub-structures must be much stronger then the links of them with all other elements in the Set. In Matter this condition is valid as a result of: 1) using stable FLEs, and 2) because of that in any interaction of material objects only true information is used, e.g., as in a usual computer. The logical gates constituting a computer are also always impacted by gravity, by external chemical compounds, by radio waves, etc., but these impacts are much weaker then electric connections between the elements, besides a computer can stably process only true information.

A computer, of course, is a "purely material" dynamic informational structure, however it operates with the information created by a consciousness, which (i.e. the information) "is imposed" upon material informational exchange between elements of computer, including, e.g., the electrons of atoms, constituting the computer. At first sight the consciousness of a human works similarly to the computer, however there are essential differences. First of all, when working up a false (for example, non-consistent) or "non- understandable" information, i.e., information that requires additional data as an explanation, the consciousness unlike a computer does not "buzz". Moreover, any computer in principle cannot go out of a given strictly prearranged mathematical model (even inside "Gödel's limits" for this model), while the consciousness is capable to empirically perceive and further cognize quite new things, though at birth a human has no, or, at least very little, supraliminal knowledge about the External and the capability of human's brain to store and to work up well-defined information is much weaker then that of a computer's one.

Besides, in spite of evident scantiness of the human's capability for storing and working up "usual", "Shannon-wise" information, a consciousness is *really* capable to work with much larger data arrays comparing with the arrays that can be worked up in any computer. That turns out to be because consciousness operates with *notions/ concepts*, when a computer

operates with large but fundamentally finite data arrays defining a given notion in a given computer. Any notion, however, is always an element of the Set, so to be defined it requires absolutely infinite (including "Shannon-wise") data contained in the Set.

Certainly, a computer can operate using a program code containing some functions of an adaptation and self–learning, e.g. an "artificial intelligence" code. However any code no more then fixes (in the best case) the state of rational knowledge of the programmer at the time when the code was developed, and the computer isn't capable to go out further of this state. As to the consciousness, it (at least sometimes) uninterruptedly reads and analyzes more and more of new data on the notions from the Set. And here **Property I7** of the information becomes especially important; from it follows in this case that *a small change* in "Shannon quantity" of information (or, for example, in an algorithm) can lead to *cardinal informational (conceptual) changes*. The examples in a human language are widely known – the texts containing commas in different positions can have cardinally different meanings, when their realizations in a computer as a sequence of bits (of the states of electronic gates) at that can be practically identical. So a reading from the Set of a new, rather limited in "Shannon" or "algorithmic" senses, and so perceivable by the consciousness information can lead to cardinal changes, for example, in scientific ideas concerning external World. The development of science (real development; as we remember, logical development of any theory and its applications in practice do not add any new information to that already found experimentally and introduced in the theory as postulates, axioms, Nature laws) is, as a rule, a bifurcated process.

A computer cannot determine and select *essential* bifurcations, except for those that were already determined/ chosen by a [programmer's] consciousness, it cannot go beyond the limits of the set "Matter". "Materialistic" analysis of the meaning of some bifurcation, that is, an elucidation of its importance/ impact on some informational system, e.g. on science, calls for infinite "material" informational capacity and processing power of the computer, even if one does not take into account that there are infinite number of "useless" bifurcations that should be excluded from consideration "at a glance".

The consciousness, as the practice shows, turns out to be capable on such analysis, in particular (and possibly mainly) by using the intuition. It seems rather probable that the intuition is just a specific capability of the consciousness*,* which allows for the consciousness to *be oriented in infinite weave of informational connections* between the elements of the Set, including outside sub-Set "Matter", which are "written", by the same token on some unknown infinite languages; and "decode" this information, further representing it in a rationally understandable language.

Therefore it seems again that the sets "Matter" and "Consciousness" are fundamentally distinct and overlap in a comparatively small region. Though they are similar in some sense, which is not surprising considering their "common origin" from the "Information" Set, both, Matter and Consciousness, consist of separate informational structures. In Matter the structures are elementary particles, systems of particles, for example, human body or a Galaxy. In Consciousness the structures are humans' consciousnesses, thoughts, possibly consciousnesses and thoughts of some another sentient beings in the Universe. Though both sets use the same fundamental logical rules/possibilities to single out different structures, i.e., Space and Time (but exist and change in at least partially different spacetimes), the rest of operations of material and conscious structures are qualitatively different. The rule "Space" in [at least human's] consciousnesses works in a quite different way then in Matter. Nobody can say where in [Matter's] spacetime a thought is placed. Yet another example, when all material processes are sequential in time from the past to the future, a consciousness is capable, at least limitedly, to walk in time remembering and modifying mental events in the past and to forecast the future to some extent. It is unknown also how many "times" act in the set "Consciousness", besides the fundamentally universal "true time" rule/possibility that acts in every dynamic element/system of the Set, of course. Next example: in the "Consciousness" in contrast to Matter there seemingly are no "conservation laws" whatsoever. If somebody separates a part of material object, the object becomes lesser. If somebody separates some his thought, he does not loose it; etc.

As it is pointed above, like for the material objects, for stability of separate conscious structures it is necessary for them to be built on a base of some "immaterial" fundamental logical elements (c-FLEs), which, similarly to material FLEs, must be sufficiently stable in the Set. However, we have no information about the consciousness's FLEs till now, when this point becomes be critical for consciousness since it interacts with (and produces) new, uncertain, and false information, in contrast to material objects. Therefore the consciousness's FLEs must be essentially stronger logical patterns then the Matter's FLEs, when that seems as rather questionable assertion, since in this case important condition of rigorous logical links isn't held at processing undetermined information – when material FLEs simply don't react in such cases. Thus it seems as rational to suggest that separate consciousnesses, at least on low levels of their development, as human's consciousness, can operate stably only using a stable material matrix, it seems as rather probable that the human's consciousness's residence is mostly the brain.

Generally speaking, we cannot exclude that a global set "Consciousness" contains a number of subsets: that is the subset where human consciousnesses exists / operates, some subsets where the consciousnesses which are considered by existent religions operate, etc. And, if any consciousness can operate only on a stable material matrix, then what is the Matter in our Universe?

7. Discussion and conclusion

The base of proposed here informational ("The Information as Absolute") concept is the rigorous proof of that everything what exists (can exist, "cannot exist") is/are some elements of absolutely infinite "Information" Set. The Set, in turn, is some unity of some set of "inert" elements and of "active" set of Rules/Possibilities "Logos" that "make something uncertain into information", though to separate notions "inert" and "Logos" is impossible. They are complementary, both are defined only in a unity; besides any "active" element – a motion, a change, etc., as well as any logical rule, are informational elements also.

The concept possibly seems as some next version of Neoplatonism, however, that is not fully correct. There are no, in certain sense, "active" Ideas and "inert" Matter, both exist "parallel" to each other. Ideas are more "descriptions" then "active instructions". The concept includes also other philosophical and religious conceptions in some similar way as it includes existent information and set theories (as well as all other sciences, though); in some similar way but not identically. Existent information theories, i.e. Hartley–Shannon's, complexity and automata theories, logics, language theories, etc., correspond only to some specific properties of the information. These properties (for example, the possibility to measure the "quantity of information" by using the values of logarithms of the probabilities of possible outcomes) rather probably correlate with some very common "rules of existence and interactions" of the elements in the Set "Information" in Logos, besides these theories are rigorously formalized and developed in compliance with criteria of truth, consistency, completeness, etc. Thus the existent information and set theories, as well as the mathematics as a whole (which in reality eventually is the information theory), are directly involved in this concept and can be directly applied at least at investigations of Matter.

On higher, Meta-mathematical, level of consideration the mathematics itself calls for the substantiation, though. K. Gödel defined the purview of the set theory as (quoted in [Maddy, 2005]: [if the concept of set] "…is accepted as sound, it follows that the set-theoretical concepts and theorems describe some well-determined *reality*..." The concept suggested here clarifies *what* is this "well-determined reality", which, in fact, mathematics studies.

In contrast to mathematics, the subject domain of philosophical and religious conceptions cannot be formalized practically, first of all because these conceptions consider the problems

of existence [of the elements and systems] of information outside the set "Matter"; where, including yet in consciousness, the verity relation at interactions of the informational structures becomes not rigorously necessary. Correspondingly, philosophical and religious postulates become comparatively uncertain; and to ground this uncertainty, in religions (in fact, in Idealism also) the principal impossibility of the cognition [at least by human's consciousness] of the divine design is postulated tacitly or not. Materialism, as a rule, considers this problem rather superficially, though (or may be since) the conception of the existence of some eternal Matter is absolutely equally mystical and transcendent as the conceptions of, for example, eternal God in Christianity or eternal Spirit in Hegelian philosophy.

In the informational concept any philosophical and religious postulates and "designs" turn out to be cognizable. In turn, studying the Set's properties, Materialism obtains some possibility to study rationally materialistic versions of the Universe's Beginning and evolution. In Idealism now there is no necessity for Creator being as an omnipotent (and thus transcendent) essence, etc.

In the conception till now we cannot exclude a tendency to self-organization for (at least of some) subsets that are singled out by a certain way in the Set "Information", is inwardly inherent to the information; though this tendency seems as rather probably impossible; for example there are no corresponding observed facts in Matter besides the life phenomenon on Earth. This assumption, probably, is rationally analyzable, though here a possibility exists that some problems, similar to those that occur during attempts to prove the uniqueness of the conception, can appear. But the assumption can be important when solving of, e.g., the problem of the appearance of living and, further, sentient, beings on Earth. Possibly one can note here a probable non–trivial likeness of the Set "Information" and of the Alive (including – of conscious Alive) – as in the Set every element of the Set contains full information about the Set; the DNA of practically every cell of an organism contains full information about the organism. Though here evident difference exists, when in every Set's element full information about the Set "is maximally compressed" in the "not-I" section, in a DNA the compression is much lesser and data can be "really decompressed" as a new clone of an organism.

Returning to ontology, if a self–organization is an intrinsic property of information, then the Set as a whole can be, in principle, classified as some "Prime Creator", Deo, as, e.g., G. Cantor said (quoted in Wikipedia): "…The actual infinite arises in three contexts: first when

it is realized in the most complete form, in a fully independent otherworldly being, *in Deo*, where I call it the Absolute Infinite or simply Absolute…"

But, on another hand, here a problem appears – can we consider an Essence rational, when this Essence *is always absolutely complete* and so cannot change anything in Himself? Insofar as even the Essence will attempt to change something, for example to begin evolving of an Universe, It must absolutely exactly follow the scenario of this change, since this scenario exists "always", including "absolutely far before" the Beginning; with the evolution of anything, of every element of the Set, including, e.g., of every human, that follows to some always-existent scenario also.

Proposed   concept also allows studying on a higher level of understanding the problems in natural sciences. An epistemological example was mentioned above, i.e., the problem of remarkable adequacy of languages of scientific theories in describing and analyzing of material objects and their interactions. Until now most radically this problem was solved by P. Dirac in his famous "postulate": "shut up and calculate!" Now we can say practically without any doubts "be calm and calculate", because Matter is an informational system and so it is not startling if that material processes turn out to be logically (mathematically) analyzable when some formal system of postulates of some science is applied. If decoding of the corresponding information is correct, of course.

Another example is the development of so called "Theory of Everything" (ToE) that should "unite" four known now "fundamental" (gravity, electromagnetism, weak and strong) forces, which became popular in physics in last few decades. Some attempts to create such a theory appreciably revived after the theory of electro-weak interactions (which united two fundamental forces), and Standard model (some unification electro-weak and strong force was made) were developed.

However, even without taking into account the informational concept, it seems evident that such a theory cannot be the ToE. Besides that not all in physics can be reduced to those forces (for example, it is very probable that there exists an interaction which realizes the Pauli principle for fermions) one can, e.g., note that experimental science (which is unique source for indeed new information – see above) will develop resulting with a large probability in a discovery of new "fundamental" forces requiring the development of "Theories of new Everythings". But from this informational concept follows that eventually a true Theory of Everything will be a theory of some informational structure "Matter", which is singled out by some way in the Set. But taking into account, nonetheless, that Matter continues to be a part of the Set and material objects interact with every element including some ordered systems of elements of the Set, and so Matter remains an open system.

The informational concept can already be applied in physics now more specifically. For instance, one of fundamental postulates in quantum mechanics (QM) about identity of all particles of the same type becomes quite natural (see Property **I7**) – the information is unique thing that can have identical copies, so elementary T-particles of the same type with great probability are the clones of a corresponding informational structures (algorithms). As a next example we can mention experimental fact that (practically) every elementary particle has own specific partner, the antiparticle. This very possibly follows from the thesis that for energy conservation the algorithms of material particles principally must be based on reversible FLEs and also should be reversible. Then the particles are the algorithms with direct sequence of the commands, and the antiparticles have the reverse sequence. S-particles, e.g., photons, don't move in coordinate time (aren't controlled by corresponding rule) and thus have no antiparticles. Note, though, that there are no antiparticles for Planck T-particles because their algorithm works on the FLEs, which are absolutely symmetrical.

Another QM principle, that at the evolution of some QM system its parameters are uncertain, becomes understandable as well. Indeed, since Matter is a computer, the situation here is very similar to the situation when a program code runs in a PC. It is not impossible that, for, e.g., spatial variable, a particle "obtains" a specific position relating to external Matter at least only when the particle's algorithm at least a nexr FLE flips. Between these moments the position (and possibly some other properties of the particle) are uncertain for the external – analogously in a computer the state of a running code becomes uncertain on the time interval need for some electronic gate to flip. Moreover, if a code contains some subroutines, the state of the code becomes uncertain on the time interval need for next subroutine to carry out its calculations.

The notions of Space and Time are fundamental for physics, they are Meta-physical. The understanding of these notions as fundamental absolute rules/ possibilities, which are universal in the Set, and of course in Matter and thus do not depend on any process in Matter or on any "reference frame" allows, for example, to understand why the (at least) "special relativity theory" is incorrect when it negates existence of absolute space-time and postulates the equivalence of all inertial reference frames and so turns out to be inconsistent. More about the application of the informational conception in physics see [Shevchenko, Tokarevsky, 2015].

In biology the Meta-biological problem of the transition "Matter → Alive → Consciousness" also seems more understandable. It is well known that it is very difficult to explain the appearance of life on Earth as a result of some random, purely physical-chemical,

processes. The probability of corresponding chain of reactions is too small for life to appear here in observed 1-2 billion years. But, though material things and living (as well conscious) beings are evidently different and belong to different subsets in Universe, all they have the common base since all they are, ultimately, informational structures. So material, "living" and "conscious" structures indeed can interact by using some still unknown forces, and that is indeed so, as follows e.g. from everyday facts, when conscious actions transform into a material action, for example when a human's consciousness controls his material body. Thus at least primary physical-chemical processes, resulting in creation of some protein macromolecules and DNA (RNA), could be controlled by some primitive *non-material*, "virtual" informational structure, which rather probably developed eventually in the human's consciousness and which built at that to herself a comfortable house, a body. Though we cannot exclude, that in computer evolution some sensors, sensible enough to be controlled by consciousness surely including directly by thoughts, will be developed. Then a variant is possible when human consciousness someday will move to a new residence, obtaining a stable and well reparable iron organism which does not require for its existence biological food. Though such "humans" will, possibly, with greater pleasure drink benzine that was seasoned, say, 40 years in an oak tun.

  Above we considered mainly ontological and epistemological aspects that relate, first of all, to Nature sciences, but the concept can be applied in humanitarian domains of philosophy also. Here seems worthwhile to make some remarks relating to main existent idealistic and materialistic doctrines that consider ways of future evolution of the humanity. The idealistic (first of all, religious) ones usually consider this evolution as fatally controlled by some mighty external forces. Materialistic, first of all Marxism, doctrines contend that the evolution is controlled by some "materialistic" ("historical materialism") economical laws; in a society "the [material] Being controls the [individual and social] consciousness".

    Though Marxism, as it seems, turns out to be correct explaining the social evolution on passed historical period ("primitive communism – capitalism" succession of social systems), in the informational concept this doctrine seems to have, very probably fundamental, limitations. This conclusion follows from – as that grounded in the conception – that human's consciousness principally is not material. The consciousness's evolving scenario with great probability has not finished on "the human consciousness" state, it contains sequels where the greater complexity of the consciousness and its capabilities to apprehend new information and to control more and more regions/ structures in the Set will be realized. When current human's material needs, though important for the consciousness, including for its existence, will become, (including as a result of parallel technological development), some minor components in human's life. So it seems rather reasonable to suggest that in new social

systems the rule "the [individual and social] consciousness controls the [material and social] Being" will act. When Marxism remains an instruction how to make capitalism; as that was made thoroughly by Marxist communist parties in former socialistic countries.

As a result, it seems as rather probable, that observable now in our Universe evolution "Matter → Alive → [human] Consciousness" will continue as "…[human] Consciousness → "[human?] Consciousness-1" → "Consciousness-2"…; where "Consciousness-n" mean next subsets in the Set basing on other and probably arranged by qualitatively another way corresponding primitive ("fundamental") Consciousnesses' logical elements.

In "The Problems of Philosophy" [Russell, 1912: ch. 2] B. Russell wrote: "…but whoever wishes to become a philosopher must learn not to be frightened by absurdities". Now we can say, that this is not so. There isn't any absurdity in the Set "Information" and Its specific realizations. The realizations can be very complicated, paradoxical or highly paradoxical, but cannot be absurd; whereas all in our Universe (and outside) are the "words", and everything, elementary particles and Galaxies, men and women are merely some informational structures.

On another hand Russell was in certain sense right, for his time. Indeed, philosophy was a rather strange science. When "usual" sciences study some principally non-provable, but at least testable problems using logical or experimental methods, it became clear after Kant that the philosophy "studies" the problems which, at least the ontological and epistemological are principally non-provable and non-testable. So in philosophy one indeed sometimes can meet now with those absurdities.

Now any problem becomes, at least in principle, cognizable. As well as, e.g., ontology of Space, Time, and Matter, rather probably becomes "nature" science, some subject branch of physics. However, not every informational structure in the Set can be studied by nature science methods, for example if a false, uncertain or bifurcating information is essential at/for some structure's existence/evolution. In such cases the structure becomes too complex for description by a formalized theory having a limited number of postulates. Besides as already mentioned, any separate structure cannot be separated in the Set totally; every structure is, more or less, an open system.

It seems rather possible that such situations henceforth will be studied by the "non-natural" science, philosophy, which obtains now ultimately fundamental subject of investigation, the "Information" Set. Which, in spite of Its ultimate complexity, is a conceivable, non-transcendental object, and for Its studying there exist already now a number of instruments – the set and language theories, cybernetics, theory of bifurcations (synergetics), other sciences, including, of course, natural ones, though.

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