General mathematical model for energetic and informatic evaluated over natively producing surrounded systems

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Abstract. Some joint (synthetic) closed in itself idea about the world and its being is expounded in the paper, which gives the opportunity to invent the parallel definitions of the energy and the information not exceeding the bounds of the united world. This allows us to introduce some sufficiently general notion of the evaluated (over natively) producing (transmission stream conservatively-dynamic) surrounded system, described by the proper system of evolutional equations. In the capacity of important partial cases of such systems the proper notions of the energetic evaluated producing surrounded system and the informatic evaluated producing surrounded system are introduced. The explicitly analyzed earlier examples of the model of heating stove (as the energetic evaluated producing surrounded system) and the model of personal computer (as the informatic evaluated producing surrounded system) expose the applicability of proposed idea to a generalized and formalized description of some wide class of over native systems really existing.

1. Introduction
Informatics reached extraordinary heights in its development. However a satisfactory solid theoretical foundation for this science has not been established until now. The reason is the absence of satisfactory general definitions of the notions of information and informatic system.

The distinguished peculiarity is inherent not to Informatics only. In Physics despite of its longer existence the situation with the solid theoretical foundation gets on in the same way: there are no satisfactory general definitions of the notions of energy and energetic system. In 1964 the outstanding American physicist Richard Feynman in his famous lectures in §1 of Chapter 4 wrote: «It is important to realize that in physics today, we have no knowledge of what energy is. We do not have a picture that energy comes in little blobs of a definite amount. It is not that way. However, there are formulas for calculating some numerical quantity, …» [1].

The following conclusion may be done from this apparently not random coincidence: the cause of the described situation is founded not in Informatics itself and not in Physics itself, but in the absence of satisfactory general solid theoretical conception of the world and its being, in which the notions of information and energy might appear in some natural deductive way.

The paper is intended to try to fill this gap in the scientific world outlook. It continues the author papers [2, 3]. The paper consists of three parts. The first part sets out the general united (synthetical) closed in itself conception of the world, which allows us to formulate some parallel definitions of the notions of energy and information, without going beyond the bounds of this world.

In the second part of the paper on the basis of the conception set forth in the first part, some sufficiently general notion of the (over natively) producing (transmission stream conservatively-

* This unusual word is used here deliberately in capacity of a new useful science term reflecting the parallelism between energy and information presented in the paper.
dynamic) surrounded system, described by the proper system of evolitional equations, is introduced. In the capacity of important special cases of such systems, some notions of the energetic producing system and the informatic producing system are introduced.

In the third part of this paper the examples of the heating stove (as some energy producing system) and the personal computer (as some information producing system) are analyzed in detail. This exposes the applicability of proposed conception for the generalized and formalized description of a wide class of systems that exist in reality.

2. The parallel conceptions of energy and information

2.1. Synthetical character of the world

The «mankind» is the totality of all human beings lived or living on our planet. The «united (i.e., material (substantial) or mental) world» (at the given time moment) is the totality including in itself: 1) the «native world» (material or mental) of the Earth and the Universe; 2) the «over native world» (material or mental) created by the mankind in the process of its being. The mankind itself is a part of over native world.

Mental (native and over native) world includes in itself the mental world of the living creatures of the Earth and, in particular, the mental world of people.

2.2. Synthetical character of world objects

Any mentally marked by people at a given time moment part of the united world will be called a «(world) object» (at a given time moment). This general notion includes in itself objects indicating the being other objects, such as a phenomenon, a state, a well-being, a balance, and so on.

In some objects there is the «material (component) part» and the «mental (component) part»; they can be called «synthetic or material-mental objects». An example is any material object created by man, because it has the mental part, showing some circumstances of inventing and creating this object. This example shows that even the mental world of people is not only in people's heads.

In some subjects there is only the material (component) part; they can be called «purely material objects». An example is any inert, i.e. non-living, native object.

Finally, in some objects there is only the mental (component) part; they can be called «purely mental objects». An example is any object, not directly detectable by human senses, such as a supernatural being, a soul, a number, etc.

With the object at a given time moment some mental objects, called «properties or capabilities of the object», are mentally connected by people. An object with the property marked by people is called the «property-having object».

At any time moment, the object has the property called the «state of the object at a given time moment». Accordingly, we can consider the «state of the material part of the object at a given time moment», and the «state of the mental part of the object at a given time moment». States of objects are changed in time under the influence of other objects, called «internal and external stimuli». The phenomenon of transition of a system from one temporal state to another temporal state for all time moments of some temporal interval will be called the «system staying on this temporal interval».

With two objects at a given time moment another object can be connected, called the «connection between the objects».

Comment. It follows from the definitions presented above, that properties of world objects themselves are the world objects. Generally it can be said that the division of the world onto the material and mental parts gave the opportunity to make the conception of the united world closed in itself.

2.3. Energy and information as the reflection of the synthetical character of world objects

The synthetical conception of the world gives us the opportunity to define uniformly the notions of energy and information as the special properties of world objects, arising out of their synthetical character.

The capacity at some time moment of some objects to act on other objects and to induce a change in the state of their material parts at this time moment is called the «energy». And the capacity at some time moment of some objects to act on other objects and to induce a change in the state of their mental parts at this time moment is called the «information». The indicated acting objects shall be called the
«energetic object» and the «informative object», respectively. It is clear that they are special cases of
the property-having objects.

It follows from these definitions, that the energy and the information, being capacities, are the
mental objects.

Separating different types of acting objects and different types of their effects on other objects,
observers allocate special kinds of the energy of these objects and specific kinds of the information in
these objects. For all this the observers mark that the given object has this special kind of energy or
this special kind of information.

2.4. Object containments (embeddings)

Any mentally marked by people at a given time moment part X of a given object U will be a
subobject of the object U. A subobject X having some property π will be called the «π-property
subobject of the object U». The set \( P(U, \pi) \) of all π-property subobjects of the given object U will
be called the «π-property containment (embedding) in the object U».

Among all these containments we distinguish two principal kinds of acting containments. The set
\( P(U, \varepsilon) \) of all energetic subobjects of the given object U will be called the «energetic containment
of the object U». The set \( P(U, t) \) of all informatic subobjects of the given object U will be called the
«informatic containment of the object U».

A containment \( V^\pi_X(t) \) of an object X will be called «Boolean» if the totality \( V^\pi_X(t) \) is a Boolean
lattice with the operation union, intersection, and relative supplement for members of the containment.

A real-valued non-negative bounded monotone and finitely additive function \( c^\pi_X(t) \), defined on the
Boolean containment \( V^\pi_X(t) \), will be called a «Boolean evaluation on the Boolean containment»
\( V^\pi_X(t) \). Let \( c^\pi_X(t)P \) denotes the numerical value of a member \( P \) of the containment \( V^\pi_X(t) \) at a given
time moment \( t \). The number \( W^\pi_X(t) \), equal to the supremum of the numbers \( c^\pi_X(t)P \) over all members
\( P \) of the containment \( V^\pi_X(t) \), will be called the «evaluated containment of the kind \( \pi \) of the object X at
a time moment \( t \».

2.5. Streams of containment

For three above-indicated kinds of containments we consider three kinds of the «transmission stream
(or movement) of subobjects from one object into another object at a given time moment»: 1) the
stream of π-property subobject («π-property stream»); 2) the stream of energetic subobjects
(«energetic stream»); 3) the stream of informatic subobjects («informative stream»).

The totality \( R^\pi_{XY}(t \Delta t, t + \Delta t) \), consisting of all objects \( P \) such that \( P \) belongs to the totality
\( V^\pi_X(t \Delta t) \), and \( P \) does not belong to the totality \( V^\pi_X(t - \Delta t) \), and \( P \) does not belong to the totality
\( V^\pi_X(t + \Delta t) \), and \( P \) belongs to the totality \( V^\pi_Y(t + \Delta t) \), will be called the «transmission stream on the
time interval \([t - \Delta t, t + \Delta t]\) from the object M into the object N of objects of the kind \( \pi \».

For different objects X and Y the evaluations \( c^\pi_X \) and \( c^\pi_Y \) will be called «coordinated for the
transmission stream» \( R^\pi_{XY}(t \Delta t, t + \Delta t) \) if for every object \( P \), such that \( P \) belongs to the totality
\( V^\pi_X(t \Delta t) \) and \( P \) does not belong to the totalit \( V^\pi_X(t + \Delta t) \), we have the equality
\( c^\pi_X(t - \Delta t)P = c^\pi_Y(t + \Delta t)P \). For such evaluations we can consider the number \( S^\pi_{XY}(t \Delta t, t + \Delta t) \), equal
to the supremum of the numbers \( c^\pi_X(t + \Delta t)P = c^\pi_Y(t + \Delta t)P \) over all objects \( P \) of the stream
\( R^\pi_{XY}(t \Delta t, t + \Delta t) \). The number \( S^\pi_{XY}(t) = \lim(S^\pi_{XY}(t \Delta t, t + \Delta t)/2\Delta t \Delta t \rightarrow 0) \) will be called the
«evaluated stream at the time moment t from the device M into the device N of objects of the kind \( \pi \».

In order to avoid the use of loop transforming streams of subobjects with changing properties, we
distinguish among all objects some singular mental objects \( \infty \), called the «imaginary surroundings». It
gives the opportunity to consider, instead of one loop stream, which simultaneously is coming from
the fixed object and entering into this object (this is the insuperable obstacle in composing evolution equations for the object (see further)), two (pseudo) transmission streams: the «extermination stream of some $\pi$-property subobjects from the object into the imaginary surroundings $\infty$» and the «production stream of other $\pi$-property subobjects from the imaginary surroundings $\infty$ into the object».

This allows us the extermination and production of containment in the object to consider as partial types of the transmission of containment between different objects. The object with the extermination stream of subobjects will be called «exterminating», and the object with the production stream of subobjects will be called «producing».

2.6. The temporal succession of containments
Further, we shall take into account some limitations of possibilities of changing containments in time. We introduce them in the form of some axiom.

«The axiom of temporal succession of containments»: any new $\pi$-property containment in the given over native producing object can be produced only by: 1) the extermination of some part of the old energetic containment at least in one energy-significant exterminating object, and 2) the extermination of some part of the old information containment at least in one information-significant exterminating object. In this axiom the exterminating object is called «significant for the producing extermination of some part of the old energetic given producing object can be produced only by:»

We associate with the system $U$ some finite collection ($A_f \mid f \in F$) of objects $A_f$, called «input surroundings for the system $U$», and some finite collection ($B_g \mid g \in G$) of objects $B_g$, called «output surroundings for the system $U$». The triple $S$ consisting of the system $U$ and collections ($A_f \mid f \in F$) and ($B_g \mid g \in G$) of input and output surroundings will be called a «surrounded system». For surroundings we shall also separate theirs names from any theirs proper containments.

A surrounded system $S$ will be called «conservatively-dynamic on a time interval $T$», if: 1) the names and connections of devices are not changed in the interval $T$, but theirs proper containments are changed in the interval $T$; and 2) the names of surroundings and theirs connections with devices are not changed in the interval $T$, but proper containments of surroundings are changed in the interval $T$.

3. Energetic and informatic evaluated producing surrounded systems

3.1. Conservatively-dynamic surrounded systems
We will consider further only over native systems with compound details.

In such a system $U$ we distinguish maximal compound details $M$, i.e., such compound details that are not details of other compound details. They shall be called «basic devices» or «subsystems of the system». The word "basic" we shall omit. We shall consider further only systems with a finite number of devices. The set of all devices of the system $U$ will be denoted by $\text{max} U$. For each device of the system we shall separate its name from its $\pi$-property containments for any property $\pi$.

We assume that between some devices of the system there are connections, and all devices of the system are connected by these connections, i.e., the system $U$ has no isolated devices.

We associate with the system $U$ some finite collection ($A_f \mid f \in F$) of objects $A_f$, called «input surroundings for the system $U$», and some finite collection ($B_g \mid g \in G$) of objects $B_g$, called «output surroundings for the system $U$». The triple $S$ consisting of the system $U$ and collections ($A_f \mid f \in F$) and ($B_g \mid g \in G$) of input and output surroundings will be called a «surrounded system». For surroundings we shall also separate theirs names from any theirs proper containments.

A surrounded system $S$ will be called «conservatively-dynamic on a time interval $T$», if: 1) the names and connections of devices are not changed in the interval $T$, but theirs proper containments are changed in the interval $T$; and 2) the names of surroundings and theirs connections with devices are not changed in the interval $T$, but proper containments of surroundings are changed in the interval $T$.

3.2. Evaluated conservatively-dynamic surrounded systems
Further we shall assume that the conservatively-dynamic surrounded system $S$ with the system $U$ and the surroundings $A_f$ and $B_g$ has proper containments of different particular kinds, and the names of all these kinds compose a finite «set of names of containments» $\text{ind} S$. Subsets of the «names of containments» of a device $M$, a surroundings $A_f$, and a surroundings $B_g$ will be denoted by $\text{ind} M$, $\text{ind} A_f$, and $\text{ind} B_g$, correspondingly.

Containments of devices and surroundings of corresponding particular kinds at a given time moment $t$ from the time interval $T$ will be denoted by $V^i_{M}(t)$ for $i$ from $\text{ind} M$, by $V^i_{A_f}(t)$ for $i$ from
ind \ A_f\), and by \ V^i_{B_g}(t)\ for \ i \ from \ ind \ B_g, correspondingly. We shall assume that these containments are Boolean lattices. Further the indication of time moment \ t\ will be omitted.

According to the called earlier proper containments may be transmitted from some devices and surroundings into other devices and surroundings, and in devices themselves they may in addition be exterminated or produced. Remind that the use of the imaginary surroundings \ \(\infty\) allows us to consider the extermination and production of containment as partial types of the containment transmission.

We shall assume that for the system \ S\ there are Boolean evaluations \ c^i_M(t), c^i_{A_f}(t), and \ c^i_{B_g}(t)\ on the Boolean containments \ V^i_M(t), V^i_{A_f}(t), and \ V^i_{B_g}(t), correspondingly. Then the corresponding evaluated numerical containments \ W^i_M(t), W^i_{A_f}(t), and \ W^i_{B_g}(t)\ can be calculated.

We shall assume also that for every pair of components \ X \ and \ Y \ of the system \ S\, for which there is some transmission stream \ R^{ii}_{XY}(t-\Delta t, t+\Delta t)\, the corresponding evaluations \ c^i_X\ and \ c^i_Y\ are coordinated for this stream. This assumption gives the opportunity to calculate the corresponding evaluated transmission stream \ S^{ii}_{XY}(t)\ at the time moment \ t\ from the component \ X\ in the component \ Y\ of the numerical containment of the kind \ i\.

3.3. Evaluated transmission stream surrounded systems
Further the indication of the time moment \ t\ will be omitted on the whole.

The evaluated conservatively-dynamic surrounded system \ S\ will be called an «evaluated transmission stream surrounded system» if it has the following properties:

1) for some connected pairs \ A_f \approx M, M \approx N, \ and \ N \approx B_g\ there are the «evaluated input streams» \ S^{ii}_{AiM}\ for \ i \ in indA_f \cap indM, \ the «evaluated transmission streams» \ S^{ii}_{MN}\ for \ j \ in indM \cap indN\ and \ M \neq N, \ and the «evaluated output streams» \ S^{kk}_{NB_g}\ for \ k \ in indN \cap indB_g; \n
2) for some devices \ M \ there are the «evaluated extermination streams» \ S^{ii}_{Mi\infty}\ for \ i \ in indM; \n
3) for some devices \ N \ there are the «evaluated production streams» \ S^{ii}_{\infty Ni}\ for \ j \ in indN.

3.4. Composing evolution equations for stream systems
Remind that the number \ W^i_M(t) = \lim(W^i_M(t+\Delta t) - W^i_M(t-\Delta t)) / 2\Delta t \mid \Delta t \to 0\ is called the «speed of changing (evaluated) containment of the kind \ i\ of the device \ M\ at the time moment \ t;\n
The «system of evolution equations of the stream system \ S» is composed according to the following «principle of conservation»: in each device \ M\ for the containment of each kind \ i \ in indM\ the speed of changing containment of this kind in this device at the time moment \ t\ is equal to the sum of all input streams of objects of this kind into this device at the time moment \ t\ minus the sum of all output streams of objects of this kind from this device at the time moment \ t.\n
3.5. Evaluated (over natively) producing surrounded systems
Based on the axiom of temporal succession of containments from 2.6 we shall introduce one important class of systems.

The evaluated transmission stream surrounded system \ S\ will be called an «evaluated (over natively) producing surrounded system» if it has the following additional properties:

4) there is necessarily at least one «evaluated input-transmission-extermination chain of energetic streams» \ S^{ii}_{A_fL_0}, S^{ii}_{L_0L_1}, ..., S^{ii}_{L_{p-1}L_p}, S^{ii}_{L_p\infty}\ for \ i \ in indA_f \cap indL_0 \cap .. \cap indL_p, \ \ L_0, ..., L_p \in \max U, \ and \ p \geq 0;
5) there is necessarily at least one «evaluated input-transmission-extermination chain of informatic streams» $S_{A_g}^{ij}M_0$, $S_{M_0M_1}^{ij}$, ..., $S_{M_{q-1}M_q}^{ij}$, $S_{M_q}^{ij\infty}$ for $j \in \text{ind}A_g \cap \text{ind}M_0 \cap ... \cap \text{ind}M_q$, $M_0,...,M_q \subseteq \text{max}U$, and $q \geq 0$;

6) there are necessarily at least one chain of over native devices $N_0,...,N_r$ and at least one «evaluated production-transmission-output chain of $\pi$-property streams» $S_{B_0}^{kk}$, $S_{B_0B_1}^{kk}$, ..., $S_{B_{r-1}B_r}^{kk}$, $S_{B_r}^{kk}$ for some property $\pi$ and for $k \in \text{ind}N_0 \cap ... \cap \text{ind}N_r \cap \text{ind}B_h$, $N_0,...,N_r \in \text{max}U$, and $r \geq 0$;

7) for every chain of kind 6) there is some chain of kind 4) and there is some chain of kind 5) such that without every of them the given chain of kind 6) disappears.

Consider important special cases of producing systems.

3.6. Energetic and informatic evaluated (over natively) producing surrounded systems

An evaluated (over natively) producing surrounded system will be called «energetic», if among all production-transmission-output chains of streams there are (one or more) chains of energetic streams, and namely they are intended to be principal in activities of the system. An evaluated (over natively) producing surrounded system will be called «informatic», if among all production-transmission-output chains of streams there are (one or more) chains of informatic streams and namely they are intended to be principal in activities of the system.

4. Examples of energetic and informatic evaluated producing surrounded systems

In order to show the applicability of the conceptions developed above for the generalized description of systems that exist in real life, we shall distinguish two widespread real systems and give for them the generalized and formalized descriptions on the presented above conceptual language.

4.1. The heating stove as an energetic evaluated producing surrounded system

4.1.1. Devices and surroundings of the stove and theirs contains. In the heating stove $U$ in the capacity of devices we distinguish the «furnace» ($M$) and the «heated passageway» ($N$). In the capacity of external input surroundings for the stove we distinguish the «woodshed» ($A_1$) and the «air environment» ($A_2$). In the capacity of external output surroundings for the stove we distinguish the «yard» ($B_1$), the «tube» ($B_2$), and the «home premises» ($B_3$). Consider the indicated surrounded system $S$.

The set ind $S$ of names of kinds of contains of the system $S$ consists of the following names: the wood chemically-energetic containment (1), the air chemically-energetic containment (2), the flame heat-energetic containment (3), the ash containment (4), the smoke containment (5), the wood number-informatic containment (6), and the radiation heat-energetic containment (7).

To simplify the notation we shall replace the names of contains by the «numeric codes of names of contains», which are put in parentheses to the right of names.

The set ind $M$ of names of kinds of contains of the furnace $M$ consists of the following names: the wood chemically-energetic containment (1), the air chemically-energetic containment (2), the flame heat-energetic containment (3), the ash containment (4), the wood number-informatic containment (6).

The set ind $N$ of names of kinds of contains of the heated passageway $N$ consists of the following names: the flame heat-energetic containment (3), the smoke containment (5), and the radiation heat-energetic containment (7).

The set ind $A_1$ of names of kinds of contains of the woodshed $A_1$ consists of the following names: the wood chemically-energetic containment (1) and the wood number-informatic containment (6).

The set ind $A_2$ of names of kinds of contains of the air environment $A_2$ consists of the following names: the air chemically-energetic containment (2).

The set ind $B_1$ of names of kinds of contains of the yard $B_1$ consists of the following names: the ash containment (4).

The set ind $B_2$ of names of kinds of contains of the tube $B_2$ consists of the following names: the smoke containment (5).
The set ind $B_i$ of names of kinds of containments of the home premises $B_i$ consists of the following names: the radiation heat-energetic containment (7).

4.1.2. Streams in the system. In the system $S$ there are the following streams of subobjects. The input stream $S^1_{A_1 M}$ of the wood with their chemical energy from the woodshed into the furnace. The input stream $S^6_{A_2 M}$ of billets of the wood with their wood number-information from the woodshed into the furnace. The input stream $S^2_{A_3 M}$ of the air with its chemical energy from the air environment into the furnace. The extermination stream $S^{11}_{M_{6\infty}}$ of burning out the wood with the extermination of theirs chemical energy. The extermination stream $S^6_{M_{6\infty}}$ of burning out billets of the wood with the extermination of theirs numerical information. The extermination stream $S^2_{M_{6\infty}}$ of burning out the oxygen with the extermination of its chemical energy. The production stream $S^{33}_{\infty M}$ of forming the flame with its heat energy. The production stream $S^{44}_{M_{B_1}}$ of forming the ash in the furnace. The output stream $S^{55}_{M_{B_1}}$ of the ash from the furnace into the yard. The transmission stream $S^{33}_{M_{N}}$ of the flame with its heat energy from the furnace into the heated passageway. The extermination stream $S^{33}_{N_{6\infty}}$ of disappearing the flame in the heated passageway with the extermination of its heat energy. The production stream $S^{55}_{N_{\infty}}$ of forming the smoke in the heated passageway. The output stream $S^{55}_{N_{B_2}}$ of going out the smoke from the heated passageway into the tube. The output stream $S^{77}_{N_{\infty}}$ of forming the heat radiation with its heat energy in the heated passageway. The output stream $S^{77}_{N_{B_3}}$ of transmitting the heat radiation with its heat energy from the heated passageway into the home premises.

4.1.3. Evolution equations for the system. The considered system $S$ is an energetic producing system for the home premises $B_i$ because it contains: 1) the input-extermination chains of energetic streams $S^1_{A_1 M}$, $S^1_{M_{6\infty}}$ and $S^2_{A_2 M}$, $S^2_{M_{6\infty}}$; 2) the input-extermination chain of informatic streams $S^6_{A_1 M}$, $S^6_{M_{6\infty}}$; 3) the production-output chain of energetic streams $S^{77}_{\infty N}$, $S^{77}_{N_{B_3}}$.

All above listed containments and streams are connected by the following system of evolution equations:

\[ W^1_M = S^1_{A_1 M} - S^{11}_{M_{6\infty}} \]  
\[ W^2_M = S^2_{A_2 M} - S^{22}_{M_{6\infty}} \]  
\[ W^6_M = S^6_{A_2 M} - S^{66}_{M_{6\infty}} \]  
\[ W^3_M = S^{33}_{\infty M} - S^{33}_{N_{6\infty}} \]  
\[ W^4_M = S^{44}_{\infty M} - S^{44}_{M_{B_1}} \]  
\[ W^3_N = S^{33}_{M_{N}} - S^{33}_{N_{6\infty}} \]  
\[ W^5_N = S^{55}_{\infty N} - S^{55}_{N_{B_2}} \]
\[ W_N = S_{\infty}^{77} - S_{NB_3}^{77} \] – the equation for heat radiation in the heated passageway. 

4.2. The personal computer as an informatic evaluated producing surrounded system

4.2.1. Devices and surroundings of the personal computer. The personal computer is a multifunctional system capable of operating in various modes determined by the user. A mode is determined by the choice of program. In the chosen mode only some subsystem, composed of some set of possible (basic) devices, is acting.

Enumerate possible (basic) personal computer devices: a keyboard, a mouse, a scanner, a microphone, a modem (with telephone, optical fiber, radio communication channels), drives with disks, flash drives with connectors, a visual camera, a monitor, a printer, speakers, a fax, store information devices, a main processor for processing information, local processors for processing information in input and output devices, a power supply.

Further, we shall consider the personal computer work in user only in the «mode of typing a text by a user by means of the keyboard and displaying it on the monitor».

In this mode the personal computer \( U \) uses the following devices: the «keyboard» \( (G) \), the «memory» \( (M) \), the «processor» \( (N) \), the «monitor» \( (H) \). In the capacity of external input surroundings for the computer \( U \) we distinguish the «user with the imaginary panel of the keyboard in his consciousness» \( (A_1) \) and the power supply \( (A_2) \). In the capacity of external output surroundings for the computer \( U \) we distinguish the «user with the imaginary screen of the monitor in his consciousness» \( (B_1) \) and the «air environment» \( (B_2) \). Consider the indicated surrounded system \( S \). The power supply will be considered only for the processor, since the power supply of the other devices of the computer is made exactly in the same way.

4.2.2. Containments of devices and surroundings. The set \( \text{ind} S \) of names of kinds of containments of the system \( S \) consists of the following names: the containment of keyboard sing states \( (1) \), the containment of keyboard digital states \( (2) \), the containment of monitor digital states \( (3) \), the containment of monitor light states \( (4) \), the containment of differences of electronic potentials \( (5) \), the radiation heat-energetic containment \( (6) \). Note that these indicated states are informatic subobjects of the devices and surroundings.

To simplify the notation we shall replace the names of containments by the «numeric codes of names of containments», which are put in parentheses to the right of names.

- The set \( \text{ind} G \) of names of kinds of containments of the keyboard \( G \) consists of the following names: the containment of keyboard sing states \( (1) \), the containment of keyboard digital states \( (2) \).
- The set \( \text{ind} M \) of names of kinds of containments of the memory \( M \) consists of the following names: the containment of monitor digital states \( (3) \).
- The set \( \text{ind} N \) of names of kinds of containments of the processor \( N \) consists of the following names: the containment of keyboard digital states \( (2) \), the containment of monitor digital states \( (3) \), the containment of differences of electronic potentials \( (5) \), the radiation heat-energetic containment \( (6) \).
- The set \( \text{ind} H \) of names of kinds of containments of the monitor \( H \) consists of the following names: the containment of monitor digital states \( (3) \), the containment of monitor light states \( (4) \).

The set \( \text{ind} A_1 \) of names of kinds of containments of the user with the imaginary panel of the keyboard \( A_1 \) consists of the following names: the containment of keyboard sing states \( (1) \).

The set \( \text{ind} A_2 \) of names of kinds of containments of the power supply \( A_2 \) consists of the following names: the containment of differences of electronic potentials \( (5) \).

4.2.3. Streams in the system. In the system \( S \) there are the following streams of subobjects. The input stream \( S_{\infty}^{11} \) of keyboard sing states from the imaginary panel of the keyboard of the user into the keyboard. The input stream \( S_{NB_3}^{55} \) of differences of electronic potentials from the power supply into the processor. The extermination stream \( S_{G\infty}^{11} \) of erasing keyboard sing states in the keyboard. The production stream \( S_{G\infty}^{22} \) of forming keyboard digital states in the keyboard. The transmission stream
$S_{\infty}^{22}$ of keyboard digital states from the keyboard into the processor. The extermination stream $S_{\infty}^{22}$ of erasing keyboard digital states in the processor. The production stream $S_{\infty}^{33}$ of forming monitor digital states in the processor. The transmission stream $S_{NM}^{33}$ of monitor digital states from the processor into the memory for storing. The transmission stream $S_{NH}^{33}$ of monitor digital states from the processor into the monitor. The extermination stream $S_{H\infty}^{33}$ of erasing monitor digital states in the monitor. The production stream $S_{H\infty}^{44}$ of forming. The output stream $S_{HB_1}^{44}$ of monitor light states from the monitor into the imaginary screen of the monitor of the user. The extermination stream $S_{\infty}^{55}$ of expending differences of electronic potentials in the processor. The production stream $S_{\infty}^{66}$ of forming heat radiation with its heat energy in the processor. The output stream $S_{NB_2}^{66}$ of transmitting heat radiation with its heat energy from the processor into the air environment.

4.2.4. Evolution equations for the system. The considered system $\dot{S}$ is an informatic producing system for the user (with the imaginary screen of the monitor in his consciousness) $B_1$, because it contains: 1) the input-extermination chain of energetic streams $S_{A_2N}^{55}$, $S_{N_\infty}^{55}$; 2) the input-extermination chain of informatic streams $S_{A_2G}^{11}$, $S_{G_\infty}^{11}$; 3) the production-output chain of informatic streams $S_{A_2G}^{44}$, $S_{H\infty}^{44}$.

All above listed containments and streams are connected by the following system of evolution equations:

$$\dot{w}_G^1 = s_{A_2G} - s_{G_\infty}^{11} \quad \text{the equation for keyboard sing states in the keyboard.}$$

(9)

$$\dot{w}_G^2 = s_{A_2G}^{22} - s_{G_\infty}^{22} \quad \text{the equation for keyboard digital states in the keyboard.}$$

(10)

$$\dot{w}_G^3 = s_{A_2G}^{22} - s_{N_\infty}^{22} \quad \text{the equation for keyboard digital states in the processor.}$$

(11)

$$\dot{w}_G^4 = s_{A_2G}^{33} - s_{NH}^{33} \quad \text{the equation for monitor digital states in the processor.}$$

(12)

$$\dot{w}_G^5 = s_{A_2G}^{33} - s_{HB_1}^{33} \quad \text{the equation for monitor light states in the monitor.}$$

(13)

$$\dot{w}_G^6 = s_{H\infty}^{44} - s_{HB_1}^{44} \quad \text{the equation for heat radiation in the processor.}$$

(14)

Note that the input energetic stream $s_{A_2N}^{55}$ is larger than the output energetic stream $s_{NB_2}^{66}$. The difference between them indicates the quantity of old energetic containment that is exterminated under the forming the new informatic containment in the processor (see «The axiom of temporal succession of containments» from 2.6).

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