Algebra of Economics

Part 1. Information and Matter

Theory of Everything

- **It separates and formalizes the Knowable and the Unknowable**

- **It establishes the boundaries of Cognizable Reality**
- The boundary cannot be crossed
- In particular, it is impossible to establish the fact of external control over the system

- **It defines Knowledge as the process of formalizing Physical Reality**

- **Time, as an element of Physical Reality, does not exist**
- Modern physics operates with phantom terms and concepts:
  - The first derivative with respect to time, velocity
  - The second derivative with respect to time, acceleration
  - Force
  - Momentum of a physical body
  - Energy

- **It proposes a model of Physical Reality (Hypothesis). It explains:**
  - The invariance of the speed of light
  - Quantum effects

- **It separates and formalizes the concepts of Information and Matter:**
  - object of Information
  - object of Matter

- **It unifies the concept of Interaction of Matter Objects:**
  - object of Interaction

- **It provides tools for creating software models of objects and processes of Cognizable Reality:**
  - Inorganic objects and processes of their interaction
  - Organic objects and processes of their interaction
  - Economic objects and processes of their interaction
  - Social structures and processes of their interaction
  - Cognitive processes

- **It universally unites the fields of knowledge.**
  - Physics
  - Biology
  - Economics
  - Sociology
  - Psychology

- **It separates the fields of knowledge**
  - Physics, modeling of processes occurring near the Event Horizon
  - Informatics, information obtained in the process of knowledge

Objects of Matter, Information, and Interaction form a closed system

There is no Model capable of going beyond the boundaries of Cognizable Reality

What is Matter?
What is Information?
What is Time?

We ask and look for answers to these questions constantly and in every moment of our everyday life and professional activity. We ask, look for answers, make decisions consciously and intuitively.

Our Consciousness
Constantly and in every moment - asks - What is What
Constantly and in every moment - must answer this question
Constantly and in every moment - must decide - What to Do

EVERYTHING depends on the decision…

We know the world. Our ideas about the World change throughout our lives. We ask and answer myriads of questions. But the question of What is Information and Matter remains unchanged and unknown.

The fundamental question of the Worldview is the basis of the foundations of the Universe

Matter	*«That which shapes the surrounding reality, from which everything that exists in the world is made»*, Wikipedia
Information	*«These are abstract meaningful representations of judgments about an object»*, Wikipedia
Time	*«An irreversible flow from the Past through the Present to the Future»*, Wikipedia

Based on such intuitive and unsupported definitions, serious worldview and scientific postulates are put forward

«*The laws of science make no distinction between the direction 'forward' and 'backward' in time. However, there are at least three arrows of time that distinguish the future from the past. These are the thermodynamic arrow, which is the direction of time in which disorder increases; the psychological arrow, which is the direction of time in which we remember the past and not the future; and the cosmological arrow, the direction of time in which the Universe is expanding, not contracting. I have shown that the psychological arrow is practically equivalent to the thermodynamic arrow, so both must point in the same direction»,* **Stephen Hawking**.

Misunderstanding the essence of Cognizable Reality leads to modern physics accepting the measurement parameters (information) of time, velocity, acceleration as Objective Reality

Time, as a category of Physical reality, does not exist

Algebra of Economics. Theory of Information. Theory of Everything.

Author views Algebra of Economics as a development of the ideas of Democritus and Cantor Georg

Introduction

The foundation of scientific worldview, scientific methodology, and worldview in a broader sense lies in fundamental categories – Space, Matter, Time, Motion, Information. Based on intuitive ideas, which are accepted as objective reality, the concepts of the physical picture of the world are built.

Algebra of Economics states the illusionary nature (psychological illusion, deception) of these concepts.
This means that modern physics operates with phantom (non-existent in reality) concepts and ideas.
Therefore, what is commonly considered an undeniable truth is merely one of the many Models of Physical Reality.

Algebra of Economics. Theory of Everything.

The Event Horizon divides the Universe into two parts – the Past and the Future.
The simple and obvious scheme of the universe leads to fundamental changes in the perception of Physical Reality. It drastically and revolutionarily simplifies the consideration of extremely complex processes in the natural and humanitarian spheres of human activity – physics, biology, economics, finance, sociology, psychology. It generalizes and formalizes all fields of knowledge, unifying them into a whole. Then, it divides them into two disciplines – Physics (modeling reality) and Cognizable Reality (informatics).

The **Algebra of Economics** axiomatically defines a number of primary categories – Space, Matter, X1, X2, X3, from which objects of information are derived: Time, speed, acceleration, impulse, force, energy.

The key difference in methodology is as follows:
Modern physics studies objects of Reality as **3-dimensional**. It treats processes involving 3-dimensional objects as processes occurring over time.

Algebra of Economics considers **4-dimensional** (space-time) objects of Matter and processes of their interaction in space X.

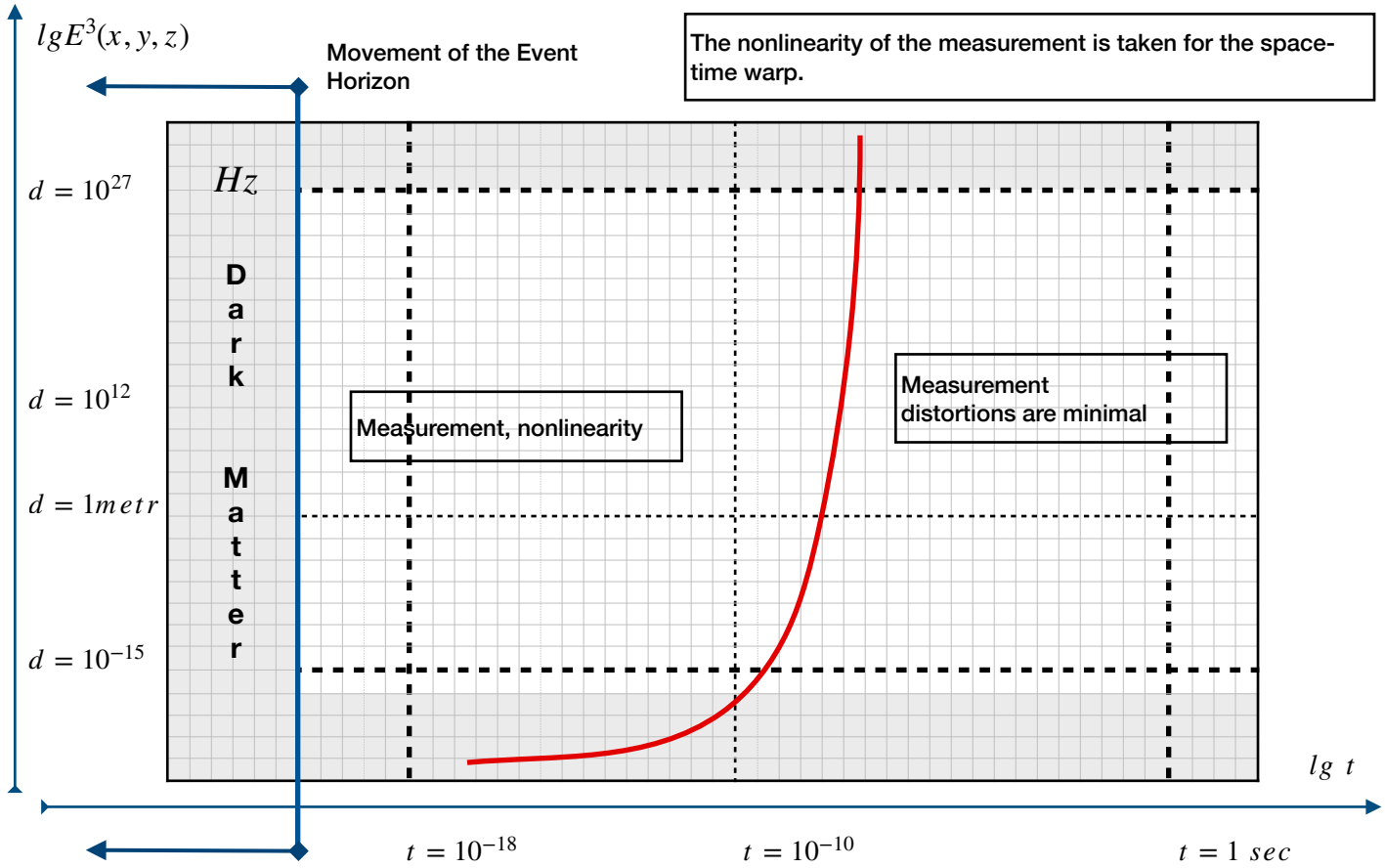
Notation

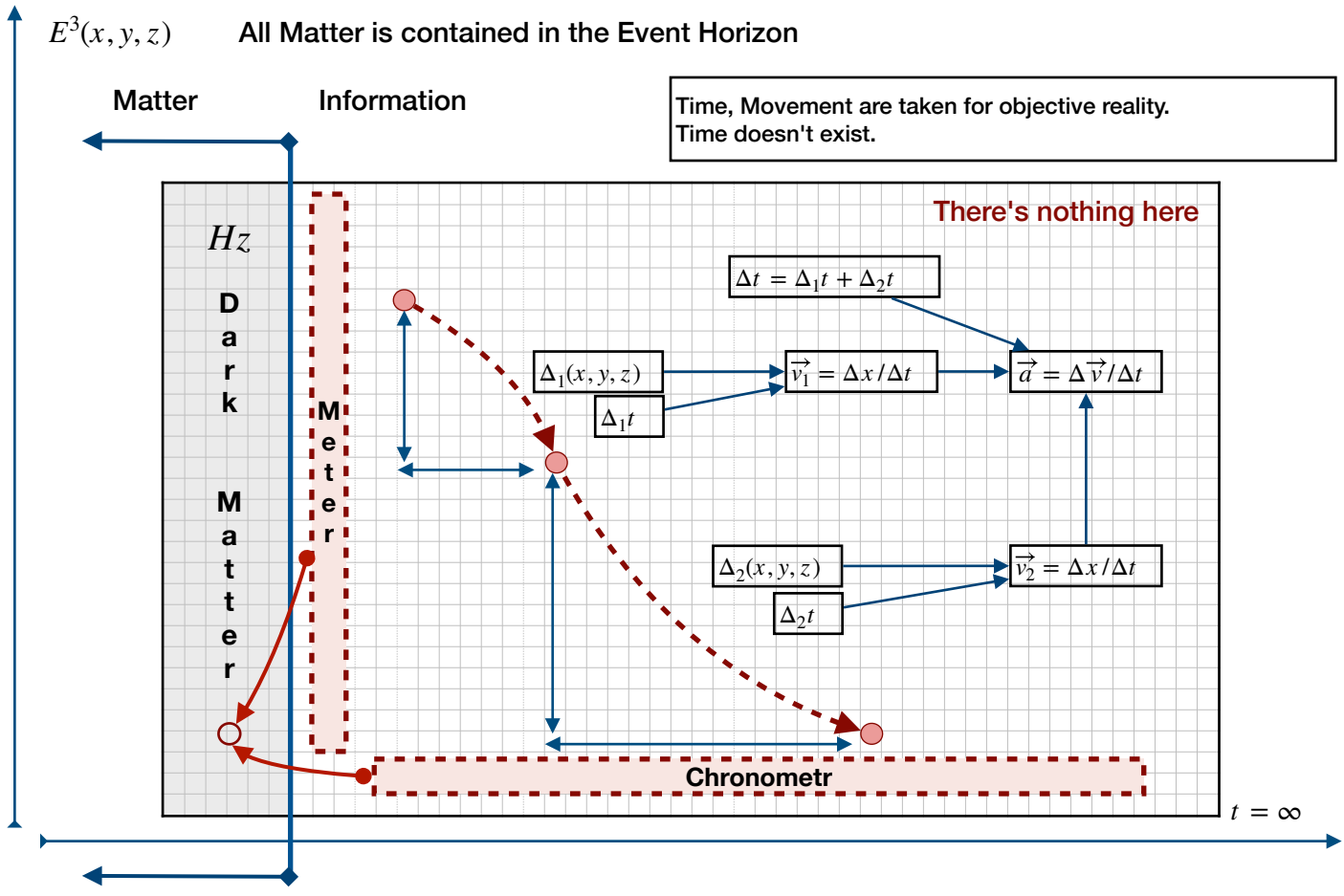
Let us define a number of concepts based on intuitive representations of them

Material object	*Atom, molecule, bacterium, metal block, bicycle, human, Solar System, Universe.* *We will consider the set of all material objects as countable and finite.* $Sm\ \{\ sm_i\ ;\ i = 1, \Omega\}$
Information about the object	*All information about the object that was known,* *could have been known, or may become known.*
Parameter of the object	*Intrinsic properties, qualities of the object, description of the object in terms of natural languages, graphical symbols, mathematical expressions, programming languages.*
Term	*A term, graphical symbol, word, set of words, etc.* *The union of terms and the term of the union will again be a term.*
Symbol ∞	*We will use it as a designation for a large number, which at the moment is* ***undefined****. It* ***may be defined*** *to a specific value in the future or* ***remain undefined****.*

A series of concepts presented in the material do not align with commonly accepted views, so they are redefined. For example, in the concept of the Event Horizon, the author assigns a different meaning.

OR	Objective Reality. Infinite, unknowable, unformalizable
AR	Cognizable Reality
Sys	System. Hypothetical model of Physical Reality
$Gr_{0,\ 1,\ 2,\ 3,\ ...}$	The boundary of Knowable Reality
Gr_0	Crossing is impossible
$Gr_{1,\ 2,\ 3,\ ...}$	Crossing is possible through the construction of a Model
$\mathscr{AE}_{min}$	the Model of Physical Reality
Sm	Matter
A	Information
sA	Matter. Aristotle's (Democritus') atom, the hypothetical minimal object AR
Hz	Event Horizon ("dark matter" of the system)
E^3	Euclidean 3-dimensional space (or n=1,2, 3…)
V_Θ	Finite volume of space E^3
D_L	Domain localization, localized volume of Space-Time-Matter
sm	Object of Matter
St	Physical body of the Matter object, Status
Am	Information body of the Matter object
$\overrightarrow{cL}$	The existence time of the Matter object
cL_{Sun}	The existence time of the Matter object – the Sun
P_i	i parameter (property) of the Matter object
Re	Reactor, Interaction object
∇	Interaction operator, transformation


$lgE^3(x,y,z)$
Movement of the Event Horizon
The nonlinearity of the measurement is taken for the space-time warp.
$d = 10^{27}$
Hz
D a r k
M a t t e r
$d = 10^{12}$
Measurement, nonlinearity
Measurement distortions are minimal
$d = 1metr$
$d = 10^{-15}$
$lg\ t$
$t = 10^{-18}$
$t = 10^{-10}$
$t = 1\ sec$


$E^3(x,y,z)$
All Matter is contained in the Event Horizon
Matter
Information
Time, Movement are taken for objective reality.
Time doesn't exist.
There's nothing here
Hz
D a r k
M a t t e r
M e t e r
$\Delta t = \Delta_1 t + \Delta_2 t$
$\Delta_1(x,y,z)$
$\vec{v_1} = \Delta x / \Delta t$
$\vec{a} = \Delta \vec{v} / \Delta t$
$\Delta_1 t$
$\Delta_2(x,y,z)$
$\vec{v_2} = \Delta x / \Delta t$
$\Delta_2 t$
Chronometr
$t = \infty$

As the subject area D_L let us take a finite volume of Space-Time with Matter enclosed within it

$$D_L = V_\Theta * cL_{Sun}$$

The Event Horizon divides the subject area into two parts – the Past and the Future

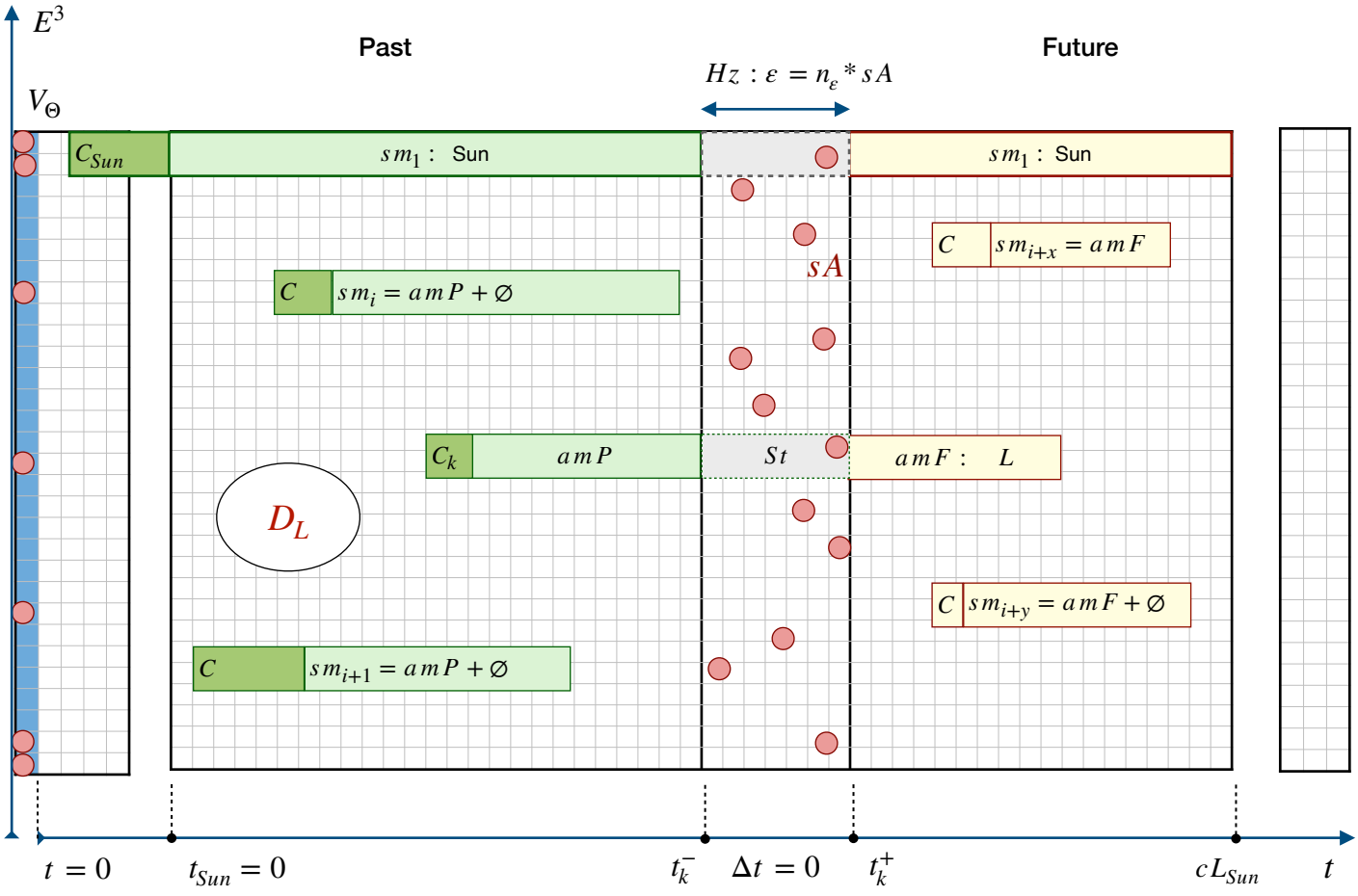
$$Hz \begin{cases} \varepsilon = N_{Hz} * sA \\ \Delta t = 0 \end{cases}$$

◇ 1

Matter All matter St is concentrated within the event horizon Hz

Information Phantom objects of physical reality amP , amF
«existing» in the Past and Future will be called Information A

$$A \supset \bigcup_{Sm} amP + \bigcup_{Sm} amF$$



Hz event Horizon sA Atom of Aristotle $V_\Theta = const$ in E^3 C Creation time L Estimated time

A finite set of Matter objects located within the subject area is considered D_L

$$Sm\ \{sm_i\ ;\ i = 1, \Omega\ \}$$

◇ 2

The Matter object occupies a volume in Space-Time

$$V_t = V * \Delta t$$

$V_t = V * 0$	object does not exist
$V_t = 0 * \Delta t$	object does not exist

there is Δt he existence time of the Matter object (a 4-dimensional object)

Let us represent Δt as	$t =$ Past + Present + Future
or as a "vector" of existence time	$\overrightarrow{cL} = pL + rL + fL$
"multiply" the Matter object by the existence time	$sm * \overrightarrow{cL} = sm * pL + sm * rL + sm * fL$

States of the Matter object

$0 = sm(\ \emptyset, \emptyset, \emptyset\ )$	Impossible object, Null object of Cognizable Reality
$sm(\ \emptyset, St, \emptyset\ )$	unknown object
$sm(\ amP, \emptyset, \emptyset\ )$	the object existed in the past
$sm(\ amP, St\ , \emptyset)$	the object is being liquidated at the present moment
$sm(\ \emptyset, St\ , amF\ )$	the object is being created at the present moment
$sm(\ \emptyset, \emptyset\ , amF)$	the object may exist in the future
$sm(\ amP, amF, St)$	the object existed, exists, and may exist in the future
$sm(\ amP, \emptyset\ amF\ )$	Forbidden state – the denial of the continuity of existence (phoenix), as well as the prohibition of the state of Rest

The denial of the Matter object is the Information object

$$am = \neg sm$$

Counting and comparison	Comparison, addition '+', multiplication by a number, etc. – occurs according to the parameter $P_j \in \mathscr{P}$
Transformation and interaction	**It occurs in the Reactor**

Algebra of Economics considers 4-dimensional (space-time) objects of Matter and processes of their interaction in space X

Parameters of the Matter object

The set of all terms that have ever existed, exist, or will exist, will be combined into a set:

$$T\ \{term_i\ ;\ i = 1,\ \infty\ \} \subset A$$

The set of numbers is a subset of the set $T\ : \{Z, N, R, C\} \subset T \subset A$
Let the set T be countable, i.e., there exists a bijective mapping of the elements of set T to the set of integers $T \to Z$
And accordingly, let the set of all subsets of set T be denoted as $B(T)$

On $B(T)$ we will construct a system of sets:

$$\mathcal{X}\ \{\emptyset,\ \{X_i\ ;\ i = 1,\ \infty\ \}\ \}$$

satisfying the requirement:
1. all elements of the subset X_i are different, $\forall i$
2. the subset X_i contains at least two elements, $\forall i$, for example $\{0,1\}$

At the same time, the subsets X_i may intersect pairwise.

Let us define the set of injective functions $\mathcal{P}$ from the subset Sm into the subsets of the set X

$$\mathcal{P}(Sm) \to X,\ \ \mathcal{P}\ \{\ P_i\ ;\ i = 1,\ \infty\ \}$$

so $\forall sm$ is satisfied

$$P_i(sm)\ \begin{cases} \exists!\ x\ ;\ x \in X_i \\ \emptyset \end{cases}$$

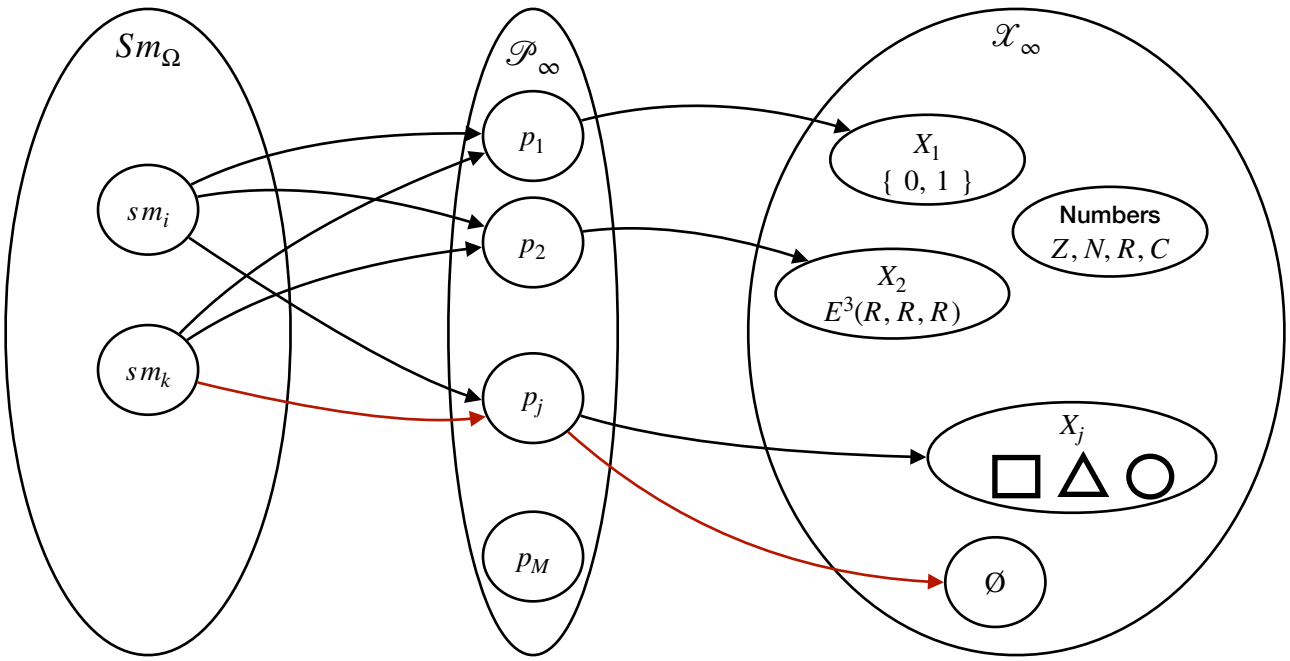
($\exists!$ ***- there exists a unique one*** **)**

Function P_i with the range of values X_i we will name as **the parameter of the Matter object,** accordingly, the range of values will be called the carrying set of **the parameter** P.

A Matter object for which $sm\{P_i = \emptyset; \forall P_i \in \mathcal{P}\}$ is an unknown object**.**

This does not mean that the Matter object does not exist.

An example: *Object* $sm_i(P_1, P_2, P_j)$ *and object* $sm_k(P_1, P_2, P_j = \emptyset)$*, that is, the object* sm_k *does not have a parameter* P_j *.*



Let us divide the existence time $\overrightarrow{cL}$ into n equal intervals with coordinates along the time axis:

$$\overrightarrow{cL}(t_1, \ldots, t_k, \ldots, t_n) \text{ , where } t_k \text{ - the current moment in time}$$

Multiply the parameters of the Matter object by time $\overrightarrow{cL}$ according to the matrix multiplication rule.
Let's the set $\mathscr{P}$ as finite.

$$sm * \overrightarrow{cL} = \begin{pmatrix} P_1 \\ \vdots \\ P_m \end{pmatrix} * \begin{pmatrix} t_1 & \cdots & t_k^- \end{pmatrix} + \begin{pmatrix} \text{Ø} \\ \vdots \\ \text{Ø} \end{pmatrix} * 1 + \begin{pmatrix} P_1 \\ \vdots \\ P_m \end{pmatrix} * \begin{pmatrix} t_k^+ & \cdots & t_n \end{pmatrix} =$$

$$= \begin{pmatrix} P_{1,1} & \cdots & P_{1,k}^- \\ \vdots & \ddots & \vdots \\ P_{m,1} & \cdots & P_{m,k}^- \end{pmatrix} + \begin{pmatrix} \text{Ø} \\ \vdots \\ \text{Ø} \end{pmatrix} + \begin{pmatrix} P_{1,k}^+ & \cdots & P_{1,n} \\ \vdots & \ddots & \vdots \\ P_{m,k}^+ & \cdots & P_{m,n} \end{pmatrix}$$

$amP = 0 + \begin{pmatrix} P_{1,1} & \cdots & P_{1,k}^- \\ \vdots & \ddots & \vdots \\ P_{m,1} & \cdots & P_{m,k}^- \end{pmatrix}$	Information	History
$St = St + \begin{pmatrix} \text{Ø} \\ \vdots \\ \text{Ø} \end{pmatrix}$	Matter	No information
$amF = 0 + \begin{pmatrix} P_{1,k}^+ & \cdots & P_{1,n} \\ \vdots & \ddots & \vdots \\ P_{m,k}^+ & \cdots & P_{m,n} \end{pmatrix}$	Information	Future

The union of information about the Past and the Future will be called the Information body of the Matter object

$$Am = amP + amF$$

and:

For any Matter object, the following expression holds:

$$sm(Am, St) = St + \begin{pmatrix} P_{1,1} & \cdots & P_{1,k}^- & \text{Ø} & P_{1,k}^+ & \cdots & P_{1,n} \\ \vdots & \ddots & \vdots & & \vdots & \ddots & \vdots \\ P_{m,1} & \cdots & P_{m,k}^- & \text{Ø} & P_{m,k}^+ & \cdots & P_{m,n} \end{pmatrix}$$

1. All Matter is located within the Event Horizon, which is characterized as:

$$Hz\begin{cases}\varepsilon &= N_{Hz} * sA\\ \Delta t &= 0\end{cases}$$

2. The volume of the Event Horizon for D_L is equal to:

$$|Hz| = V_\Theta * \varepsilon_{Hz} \equiv V_\Theta * (\Delta t \to 0)$$

3. All transformations ∇_{D_L} of the Matter are going in within the Event Horizon Hz

$$\nabla_{D_L}\{\ \nabla_k; k \in N\}\ :\ \bigcup_{Sm} sm_i \to \bigcup_{Sm} sm_j\ ;\quad St(Sm) = const$$

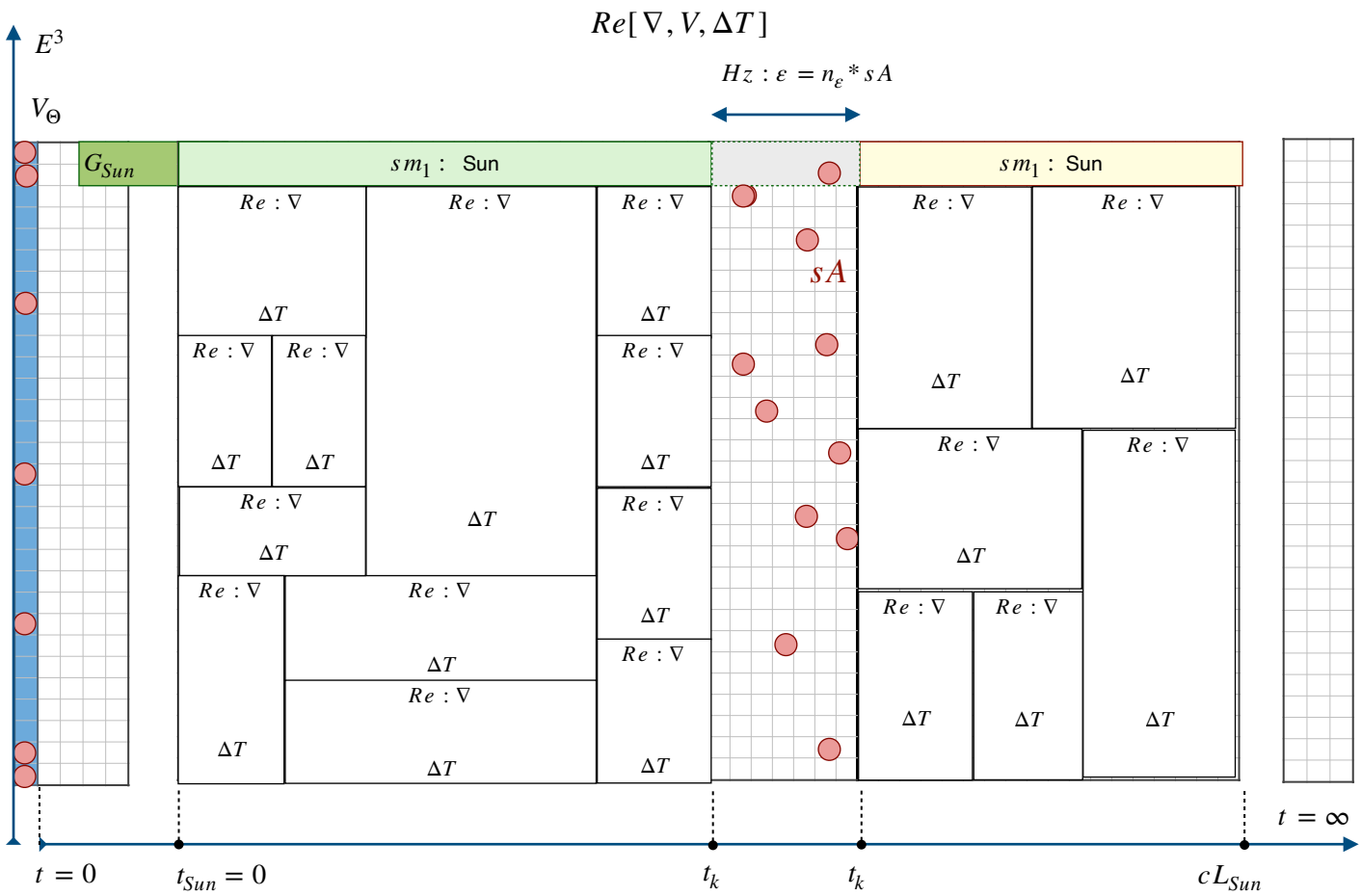
4. The amount of Matter and its associated Motion remain unchanged.

The state of rest is prohibited, $\forall D_L$

Let us partition the area D_L (in the first approximation – coverage D_L)

$$\mathscr{D}^k\ \{D_i\ ;\ i = 1, k\}\ ;\ D_i \cap D_j = \emptyset\ ;\ \forall i, j$$

Element D_i , $k-$that partition will be called the Interaction Object - **Reactor**



Re, **Interaction Object** The Space-Time volume where the interaction of Matter objects occurs during the time interval.

Re **It formalizes the concept of "Black Box"**

true Re $Hz \supset Re[\nabla, V, \Delta T = 0]$

informational Re $Re[\nabla, V, \Delta T > 0]$

∇, **transformation of Matter objects**

$$Re[\nabla, V, \Delta T]: \ (\ Q,\ X,\ Y\ ) \rightarrow (\ Q,\ Z\ ) \quad \textbf{or} \quad (Q, X, Y)\ Re\ (Q, Z)$$

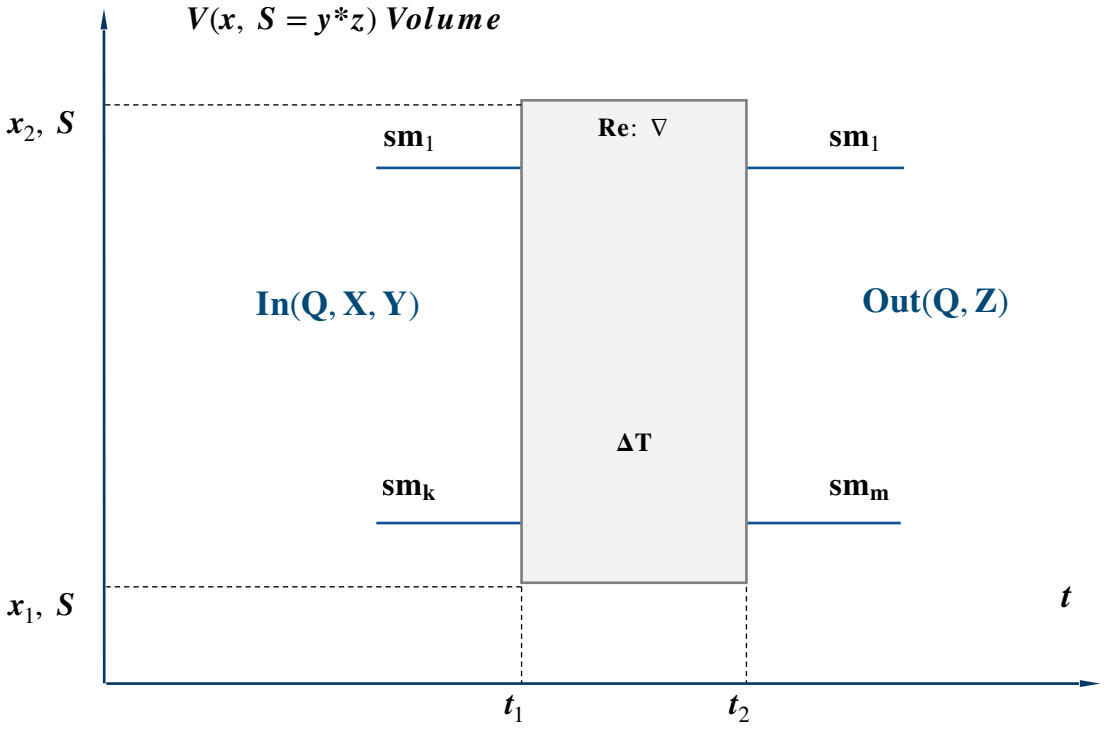
Q Exploitable objects
X Objects that will be part of new objects while maintaining their integrity
Y Liquidated objects
Z Created objects

The fundamental identity of the reactor Re

$$Am_Q + Am_X + Am_Y + St_Q + St_X + St_Y \equiv \Delta T + Am_{Re} + St \equiv Am_Q + Am_Z + St_Q + St_Z$$

Matter, and the motion associated with it, are reduced:

$$Am_Q + Am_X + Am_Y \equiv \Delta T + Am_{Re} \equiv Am_Q + Am_Z$$



- The Reactor occupies a volume in Space-Time, a 4-dimensional object
- The Reactor operates in accordance with the law of conservation of matter

$Re[\nabla_{D_L}, V_\Theta, \Delta T]\ (\ Sm\ ) \to (\ Sm\ )$ — The own reactor of the area D_L

$0 = Re[\nabla, V, \Delta T]\ (\ \emptyset, \emptyset, \emptyset\ ) \to (\ \emptyset, \emptyset\ )$ — Empty reactor, Null area D_L
$1 = Re[\nabla, V, \Delta T]\ (\ Q, X, Y\ ) \to (\ Q, X, Y\ )$ — Identity transformation (motion)

$Re[\nabla, V, \Delta T]\ (\ \emptyset, \emptyset, \emptyset\ ) \to (\ Q, Z\ )$ — Forbidden reactor
$Re[\nabla, V, \Delta T]\ (\ Q, X, Y\ ) \to (\ \emptyset, \emptyset\ )$ — Forbidden reactor
$Re[\nabla, V, \Delta T = 0]\ (\ X, Y, Z\ ) \to (\ Q, Z\ )$ — Forbidden reactor

Operation of composition '+'

Composition is possible under the condition of $Re_1 \bigcap_{V,\Delta T} Re_2 \neq \emptyset$

Associativity $(Re_1 + Re_2) + Re_3 = Re_1 + (Re_2 + Re_3)$
Non-commutativity (in general) $Re_1 + Re_2 \neq Re_2 + Re_1$

The addition of two or more reactors will be a reactor $Re_1 + Re_2 = Re_3$:
The addition of a reactor with an empty reactor $Re_1 + 0 = 0 + Re_1 = Re_1$

In this case $V_3 \leq V_1 + V_2\ ;\ \Delta T_3 \leq \Delta T_1 + \Delta T_2$

Inverse reactor $[\ (Q, X, Y)\ Re\ (Q, Z)\ ]^{-1} = (Q, Z)\ Re^{-1}\ (Q, X, Y)$

- Not every reactor has an inverse

The addition of a reactor with its inverse $Re + Re^{-1} = (Q, X, Y)\ Re\ (Q, X, Y) = 1$
$Re^{-1} + Re = (Q, Z)\ Re\ (Q, Z) = 1$

The addition of a reactor with its identity

$Re + 1 = (Q, X, Y)\ Re\ (Q, Z) + (Q, X, Y)\ Re\ (Q, X, Y)$ **does not exist**
$1 + Re = (Q, X, Y)\ Re\ (Q, X, Y) + (Q, X, Y)\ Re\ (Q, Z) = (Q, X, Y)\ Re\ (Q, Z) = Re$

The result of any operation is a new reactor with new parameters. The invariance of Matter is prohibited.

Associative chain of reactors

A certain set of reactors, linked by addition, forms an ordered chain, which in turn is a reactor (the index indicates the reactor number in the partition).

$$\sum_n Re_i = Re_{n+1}$$

A partially ordered union of chains, which forms a connected graph through addition, is in turn a reactor

$$\sum_m \sum_n Re_i = Re_{n+m+1}$$

Content

List of literature:

1. Kurbanov O.I. - Algebra of Economics. A Model of a Cognizable Reality. Part 1. Main provisions - 7 pages - Certificate of copyright registration. Republic of Kazakhstan, №50231 от 7.10.2024
2. Kurbanov O.I. - Algebra of Economics. №5 (24) 2024. Online edition "Electronic Scientific Journal "Central Asian Scientific Journal" Certificate of registration: № KZ91VPY00039228 от 25.08.2021г.

Administration of the "Algebra of Economics" project:

Russia Kulikova Daria
Kazakhstan Shesterneva Svetlana

phone +7 (771) 535-57-65
Tenchat https://tenchat.ru/algebra-of-economics
LinkedIn https://www.linkedin.com/groups/10031039/
WhatsApp Algebra of Economics
e-mail admin@ae-science.com
www ae-science.com