BIOSINTEZ SPE

The AGI Model in the ALS / CTR Framework

(General intelligence as a functional property of an artificial living system, built on the constructive mechanisms of reality)

We present a project for a constructive model of Artificial General Intelligence (AGI). This is not another incremental improvement to existing AI systems, but a fundamental shift in the modeling paradigm itself. In this document we set out, step by step, to:

- define the class of problems that AGI actually needs to exist for;
- identify the functional apparatus of intelligence this requires;
- show why this apparatus cannot, in principle, be reproduced within the current paradigm — even in its most advanced form;
- and, finally, show what the AGI ALS / CTR concept specifically contributes toward building it.

1. The Superproblem: What a Real AGI Must Be Able to Do

Today's AI industry solves problems of optimization, automation, and recombination of humanity's existing knowledge: summarizing, searching, planning, reasoning within known domains. That is real value, and it will keep growing. But it is not the problem AGI is meant to solve.

The actual superproblem of AGI is constructing reality at the level of new ontological knowledge. By new ontological knowledge we mean not a new fact inside an accepted picture of the world, but a change to the picture itself: a new system of basic entities, new causal mechanisms, a new level of description. Science has seen such transitions before — from geocentrism to heliocentrism, from alchemy to the periodic table, from vitalism to genetics and DNA, from caloric theory to thermodynamics, from classical mechanics to quantum physics and relativity. Each one did not simply add to the existing body of facts; it opened a new dimension of reality and launched an entire technological era. Historically, such transitions have occurred roughly once a century.

In practice, this defines a class of problems that is inaccessible to current AI — not quantitatively, but qualitatively:

- forming new explanatory frameworks in fundamental physics, biology, and brain science;
- building new causal models of complex systems — living organisms, aging, immunity, climate, macroeconomics, geopolitical and infrastructure systems — in domains where existing models are breaking down;
- reaching new principles for materials, energy, computing, and bioengineering, rather than optimizing already-known ones;
- working in open environments where there is no corpus of examples, no external success metric, and where the very formulation of the problem must change as understanding develops.

This is precisely the criterion we propose for evaluating any claim to AGI: can the system move to a new level of representing reality, or does it only work more efficiently inside the level it has already been given?

2. The Functional Apparatus: What Intelligence Needs for This Task

New ontological knowledge is not produced by computation, by search, or by reasoning inside a fixed axiomatic system. It requires a class of cognitive functions that have, until now, been discussed mainly in philosophical and psychological terms, without ever being given a constructive form. We define them constructively:

- **Intuition** — locating a productive direction before formal proof is possible, under conditions where the space of options cannot be exhaustively searched and the available data is insufficient. Not “insight,” but an act of localizing a stable structure within a field of still-undifferentiated possibilities.
- **Creativity** — not a new combination of the already-known, but a move to a new organization of knowledge: stepping outside the current system of categories and generating new entities and a new coordinate system of description.
- **Heuristics** — generating a method of solving a problem where no ready-made procedure exists; choosing a direction of construction by an internal criterion of productivity, rather than by an externally given function.
- **Causality** — working not with correlations and predictively useful dependencies, but with the actual mechanism that generates events, including the causality behind the emergence of a new structure itself.

- **Subjectivity and internal goal-setting** — having one's own functional basis for a cognitive act: the system acts out of the need to resolve a contradiction and preserve integrity, not out of an externally imposed reward function.
- **Qualia / functional mentality** — a subjective functional relation to the cognitive act, without which "understanding" remains mere imitation.
- **Ontological plasticity** — the capacity to restructure the system of categories and levels of representation itself, not only the content of knowledge held within it.

These functions cannot exist as a set of independent modules. They have to be organized into a single functional architecture of a living-system type — this is one of the key results of our first stage (see Section 4).

3. The Conceptual Limit of the Current AI Paradigm — Illustrated by GPT-6 Astra

The limit of the current paradigm is not a matter of computational resources, scale, or statistics as such. It is conceptual, and it is best seen in the paradigm's own highest achievement.

Models in the GPT-6 Astra class are the most mature expression of today's concept of intelligence. Their result on the interactive ARC-AGI-3 benchmark — on the order of two-thirds of human-level performance, against under 1% for systems of previous generations — is a genuine breakthrough. Astra can explore an unfamiliar environment, form and test hypotheses, build a local model of the rules, use tools, and correct its behavior from feedback. This is no longer "a statistical language model"; it is a highly capable interactive, reflective agent.

This is exactly why its limit is so telling. Even in this form, the system remains within a single ontological mode:

> *Intelligence as a system of operations over representations within a pre-given coordinate system — a given environment, a given language of description, a given success criterion, and a given, even if hidden, structure of the world.*

Astra can brilliantly uncover the hidden rules within a given world. But it does not, and cannot, raise the question of whether that world of representations is itself sufficient. It operates on signs without constructive access to what they signify. In terms of our functions, this shows up as four barriers common to the entire paradigm:

1. **Absence of subjectivity.** Goal-setting is given from outside — by the task, the benchmark, the reward function. The system is reactive; it has no internal functional basis for its own acts.
2. **Imitation of understanding.** Heuristics are implemented as search (search trees, sampling with verification); creativity, as interpolation within the space of learned representations. Neither produces a new level of representation.
3. **Blindness to causality.** Causality is replaced by operationally useful dependencies; the causality behind the emergence of a new structure is not distinguished at all from the causality of an already-formed structure's behavior.
4. **Reduction of randomness.** Randomness is treated as distributional noise to be suppressed by averaging. But randomness as an independent entity — a symmetry break in equally probable potentiality — is precisely the mechanism by which anything new is born. Architectures that optimize a past distribution cannot, by construction, produce the genuinely new.

These four barriers share a single root: there is no mechanism in the architecture capable of changing the coordinate system of reflection itself — what can even become an object, a cause, a distinction, or a meaning for the system. Parameters and content change; the way the world is constructed does not. This is why intuition, creativity, and heuristics cannot be solved separately here, and cannot be solved by add-ons: they share one fundamental problem, and it lies below the level of architecture — at the level of what is built into the foundation of intelligence itself.

This also produces a difference in behavior at the boundary of knowledge. For Astra, hitting a limit means "the solution has not yet been found within the current space" — so it intensifies search, reasoning, and verification. For AGI ALS / CTR, hitting a limit means "the current representational space has stopped being sufficient" — and calls for an act of a different kind: rebuilding the foundation itself. This is the exact point at which the current paradigm ends and ours begins.

4. The Solution: The AGI ALS / CTR Concept and Model

4.1. Starting Position

We distinguish two levels of general intelligence:

- the natural intelligence of a living system, whose evolutionary peak is the human being;

- a hypothetical intelligence of a more general order — one inherent to the fundamental intellectual organization of reality itself, or to a level of development beyond the human.

Our concept takes human intelligence, as a living system, as its prototype, while understanding that the environment and the basic mechanisms of intelligence have a fundamental character shared with reality at large. From this follow two conceptual levels of the model.

4.2. AGI ALS — General Intelligence as the Behavior of an "Artificial" Living System

The AGI ALS concept was the first to rigorously define general intelligence not as a computational agent and not as a statistical model of representations, but as a property of living-system behavior. Outside the behavior of a living system, general intelligence loses its meaning; the correct formulation of AGI is: the intelligence of an "artificial" living system.

This produced an independent result in its own right:

- a conceptual specification of the functional systems that full AGI requires — subjectivity, internal goal-setting, causality, qualia, mentality, intuition, heuristics, creativity, and, further out, more complex forms of mental functionality (altered states of consciousness, savant-type cognitive configurations, transcendent phenomena);
- a demonstration that these functions form not a set of modules, but a single hyper-networked functional architecture;
- formalization through a theory of linguistic conceptography, developed into functional conceptography: cognitive functions are mapped onto a conceptographic system as a functional, hierarchical structure, which makes it possible to describe cognitive processes as dynamic living systems rather than as the manipulation of symbols, tokens, or embeddings;
- a working MVP of the first stage of the AGI ALS model, built on this basis (a hybrid architecture with an LLM loop).

4.3. Why ALS Necessarily Leads to an Interpretation of the Construct of Reality — CTR

Work on ALS surfaced a limit that cannot be removed by adding complexity to the model. It has two sides, two factors.

The first side — "unconscious intelligence." If we model only those cognitive processes that human consciousness is able to observe, analyze, and describe, we remain on the surface of intelligence. The key phenomena — the emergence of cognition itself, the birth of new meaning, the evolution of ontology, the internal causality of a cognitive act — unfold at a pre-reflective level, for which "visible" consciousness cannot serve as a prototype.

The second side — the living. If intelligence is a functionality of a living system, we must answer what the elementary constructive act of the living actually is — what distinguishes behavior from a physical process. Tracing this systematically from organism to cell to virus, and further to the limiting living structure — a single protein molecule at the boundary between the living and the non-living — shows the following: within the classical paradigm, no behavioral act can be located at the level of a single molecule at all; a quantum-mechanical and pre-quantum representation, by contrast, opens up practically unlimited possibilities for organizing acts of behavior. The elementary act of the living leads directly into the construct of reality itself.

Both lines converge on a single requirement: a theory of the fundamental mechanisms from which locality, distinguishability, reflection, and meaning all arise — the material from which cognition as such is built. This is how the level of the Constructive Theory of Reality — CTR (Vasilenko) — came about.

The project's logic:

> *AI → AGI → AGI ALS → CTR, followed by a reverse pass: building on the mechanisms of CTR, the model of a living system unfolds as AGI ALS / CTR — the complete functional system of AGI.*

The relationship between the two levels is asymmetric. CTR is not a superstructure built on top of ALS; ALS only fully unfolds on the mechanisms of CTR — in the same way that classical physics is a limiting case of quantum physics, not its foundation.

4.4. The Foundation: the Constructive Theory of Reality (CTR, Vasilenko)

CTR is a theory of constructive reality. To be precise from the outset: the goal of CTR is not to interpret the physical universe, but to formulate the principles and mechanisms of reality's construct that are needed to model AGI. It touches on ideas from Deutsch (constructor theory), Penrose, Wilczek, and Tegmark, but differs from them in a fundamental way: the foundational medium of reality is treated as a pre-object entity — a medium of potential reality with unlimited possibility, not tied to physical reductionism.

CTR provides a single constructive mechanism (a formula and a set of construct principles) for the existence and evolution of reality in the form of physical, informational, and mental entities.

> *Founding formula (simplified): Reality = variability in reflection = meaning.*

Actual reality is not simply “given” — it constructively arises as the localization of potential variability, its reflection, its acceptance, and its resulting definiteness of meaning. Meaning, here, is not a psychological function of the human mind but an objective structural state of reality; human understanding is meaning of a second order.

It is important to be precise here: CTR does not hand over ready-made “blueprints” of mental processes. But neither is it philosophy. It is a system of concrete principles and mechanisms of reality, on the basis of which mental functionality becomes engineerable. This is exactly why the four barriers from Section 3 receive, within CTR, not a description but a mechanism (see Appendix 1).

This is also the answer to the question of whether intuition, creativity, and heuristics share a common problem. They do: the shared root is the absence, at the foundation of intelligence, of a mechanism for changing the coordinate system of reflection itself. And the solution is likewise shared: not three separate modules, but a single constructive mechanism of reality, from which these functions unfold as its particular regimes.

5. The First Verified Fact: the Ontological Trigger

The verification of CTR as a theory consists in the verification of the AGI models built on it. Of CTR’s broad set of principles, the first mechanism has now been tested on the ALS MVP at the current stage — the ontological trigger, implementing CTR principles 12, 7, 3.2, and 6.

When the system reaches the limit of its current ontology (a Gödel-type incompleteness limit for describing a closed system), it does not generate a probabilistic continuation inside an exhausted picture of knowledge. Instead, it registers the boundary as a boundary of the representational frame itself, and initiates a transition to a higher level of knowledge representation.

This is a fundamental departure from how systems in the Astra class behave at the boundary of knowledge. Astra treats a limit as a shortage of information, search, or verification — and remains inside its existing ontology. The ALS / CTR trigger distinguishes “not yet found” from “cannot be found within this coordinate system” — and

moves the system from continuing inference to rebuilding its own foundation. This is not error detection, and not confidence calibration; it is a meta-ontological act that is, in principle, absent from the current paradigm.

This is still a single element, not a finished CTR platform. But its significance lies in the fact that the broader concept has already produced an engineering-distinguishable, qualitatively new behavior — one that cannot be reached by scaling up existing architectures. What follows from here is engineering, and its ongoing refinement.

6. Civilizational Significance

The current AI paradigm makes humanity faster at working with what it already knows. AGI ALS / CTR sets a problem of a different order — accelerating the processes of deep discovery itself: producing ontological knowledge that the human brain cannot reach on its own because of its biological limitations, and turning paradigm shifts that have historically occurred once a century into a reproducible process.

Because the project establishes universal principles for modeling general intelligence, they automatically extend across the full range of future directions — new cognitive architectures, new principles for representing intelligent elements and their cognition, new models of memory, knowledge, and ontology, mechanisms of creativity, and applied AGI environments in science, engineering, and complex intelligent infrastructure. For this reason, the project is not a narrow R&D program, but a research and product platform that forms the base architecture for the next generation of intelligent systems.

7. Project Structure

- **CTR** — the foundational theory of the mechanisms and constructs of reality. *Not a product.*
- **KTR-AGI** — a next-generation research and product platform.
- **AGI ALS / CTR models** — the experimental testbed: the environment in which the theory is verified and the base for applied products.

8. Conclusion and Invitation to Collaborate

This Brief shows the general technological contours of the project; it is an annotation, not an exhaustive account. The project's logic is deductive: the superproblem of new ontological knowledge requires a specific functional apparatus of intelligence; this apparatus cannot, in principle, be reproduced within the current paradigm, as shown by the paradigm's own highest achievement; the cause is a single conceptual root at the foundation of intelligence; CTR supplies the fundamental mechanisms that make this apparatus engineerable; the AGI ALS / CTR model implements them, and the first mechanism has already been verified; these foundations are changing the trajectory of the entire AGI field.

If the AGI ALS / CTR platform resonates with you, we are ready for a conversation about working together — on matters of investment, expertise, the advancement of AGI technology, and the development of applied, practical projects.

Sincerely,

Aleksandr Vasilenko

Project Lead and Chief Scientist, Biosintez SPE