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L I F E

Matter. Evolution. Consciousness. Intelligence.

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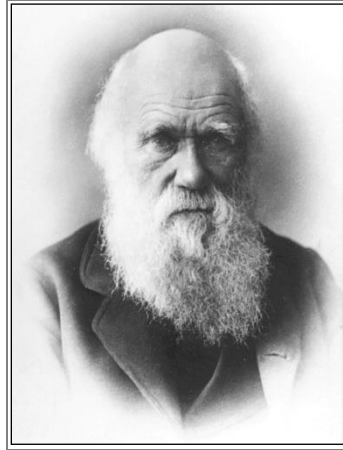
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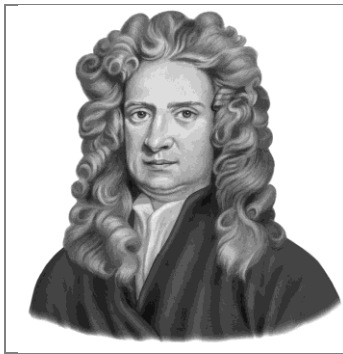
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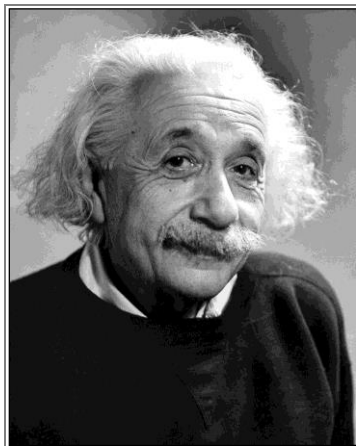
This book represents a humble tribute to all scientists who succeeded through their hard work and their genius to bring a sparkle of starlight into Earth.



Charles Darwin



Isaac Newton



Albert Einstein

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Introduction

This book reveals the mystery lying inside and outside of all of us, answering the fundamental questions related to our Life in the Universe. As you read and understand it, your life may gain more clarity and meaning.

My true intention here is to formulate a global explanation on Life in general, building a coherent and unitary model of the entire physical reality from a deterministic perspective, as neutral as possible. This is my contribution to the scientific knowledge, hoping in this way to help decipher some of the greatest secrets of the Universe and our existence as living beings. Just a simple analysis is intended to be made in this book, but it will consider the evolution of things over time, starting from the moment matter emerged; a minimalistic set of assumptions is used at first, which will be followed by logic and reason. All principles, postulates and theories stated and proved in my previous works ("Prime Theory"[1] and "The Universe"[2]) will serve as a solid foundation to this particular approach. The granular space, matter, energy and fields, the theories of relativity and of the absolute for the motion of bodies, along with the principles of causality, all of these will be an integral part of the explanations given to the complex cosmic mechanism that made possible the emergence, the evolution and transformation of the primordial matter (13.7 billion years old) up to its current structures. About four billion years ago, so during a recent stage of the universe's history, the continuous "struggle" of the matter components led to an apogee, once the primary single-celled organisms appeared on Earth; the simple bacteria born in water (i.e. the liquid medium that was formed when the surface of the planet had cooled down sufficiently) have rapidly evolved and Life took more complex forms in time - until the most special one, the actual humans, emerged as beings with intelligence and consciousness. The odds of this kind of life appearing somewhere in our quasi-infinite Universe, the chances that some evolved beings have reached the knowledge and understanding in the manner we have, all of these are very slim and it is difficult to quantify them with high accuracy. As this probability has an infinitesimal value, we need to show great respect for the extraordinary chain of cosmic events that has led to the appearance of Life and to develop and preserve it as much as possible. We should strive to not forget that this sequence of changes and transformations of matter might be unique at the scale of the universe and unrepeatably in this form. There will be no hesitation in showing what we did wrong until now - relative to our social life and the natural environment - and what keeps us apart from a natural evolution through science and reason, on the path of *normality*.

This whole description is founded on a simple premise: all information we are receiving from the surroundings through our sensory organs is absolutely real and depends on the physical exchange of energy (electrical impulses, no matter how small are their values) with our nervous system. Additionally, we can postulate that the part of information reaching our brains is an accurate and objective impression of reality, and this automatically implies another important fact, namely that our *external reality does really exist* - it is not an illusion. However, it is known that this influx of sensory information, transmitted as electrical signals by neurons through their connections, is not complete. For example, our retina receives only a part of the incoming light, the photons that belong to the visible spectrum. The physical reality that surrounds us is therefore much broader than what we can observe directly, as the matter of any form emits or reflects photons of many more "colors"; however, this missing part of nature may still reach us, indirectly, via various devices. Humans, therefore, can analyze the whole of reality; we are able to unfold and understand all its "dimensions", as we have this multi-sensorial interface with the outside and certain special capabilities. Our reason, memory and self-consciousness, for example, are all higher brain functions that allow the perception and the understanding of all phenomena. *Knowledge is therefore certainly possible!* It stands to reason that our entire world, namely all we can "sense and perceive" from the environment, has a material nature and is located inside a huge three-dimensional space, seemingly infinite. Thus, if we observe a few different things of this frame, at any scale, we soon realize that all of them are working in a predictable way, following specific and universal laws; consequently, if we perform a full analysis of today's world and find all of its rules, then we may extrapolate this data to both past and future, making a precise outline of its development mechanism. And here is a serious confirmation for the existence of reality and for our ability to truly perceive it: our sensory organs did not appear directly in their current form, they have gradually evolved over time, as both shape and performance, by continuous adaptation to the external environment - which therefore had and still has undeniable materiality and existence within this paradigm. *If we exist, our external reality also exists.*

It is therefore interesting to consider *virtual reality*: what if the whole external reality would be in fact a perfect simulation, brought and projected directly to our mind? Or, even more, what if *absolutely everything* is a simulation, including us, our life and our senses - while matter and space we perceive are not actually there, in this form? However, this hypothesis seems completely improbable and no further analysis will be made on it - for the

simple motive that it implies a creator, a special almighty entity which must have created everything for a still unknown reason. And this is not the normal, scientific method to be used. In addition, the dimensions and the huge complexity of this elaborate hoax would imply quasi-infinite energies, impossible to be imagined. And we do not have to forget about the logic problem that would arise immediately, catching us in a vicious circle, namely who has created this hypothetical creator? And how, why, when? And so on...

The full knowledge of reality (whatever it might be, even simulated) and the exploration of micro and macrocosm are mandatory requirements for humans in this context, especially as they have all the means and capacity necessary to carry out these tasks. But why do we have to wonder, research and explore? As beings who possess a great curiosity and who are an integral part of this complex material reality (living inside it and depending on it), it comes naturally for us to examine and study extensively our environment. In order to continue our development, we need more resources, more technology, energy and space - so there are at least a few pragmatic reasons to explore and understand. But is it possible for humans to carry out this research by themselves and to eventually find all the laws governing nature's working mechanisms? Are we able to solve these mysteries, including the most complex one - our Life and our own existence inside this material universe? And could this be accomplished when "the man is part of the mystery", as Max Planck would have said? Whatever the correct approach to these issues of philosophical type would be, it must necessarily include the *physical bounds* of the materiality of nature and the terms *we have to relate to* our measurements and comparisons. We could say, for example, that here on Earth, our species is the most intelligent one at this moment, but this assertion might not be true in a broader context, of our galaxy or the entire universe. However, this book is not a dissertation about the possibility and the ways of absolute knowledge; metaphysics and the other philosophical doctrines involving the principles of ontology will not be further considered. Humans, those beings who have the power of reason, are certainly able to overcome any type of cognitive barrier that would block their path. *Therefore, we may eventually come to understand perfectly our environment and to understand ourselves, as living creatures, in all the material and spiritual aspects involved.*

"I think, therefore I am". If it is possible to continue the perfect logic of Descartes' famous proposition, my updated statement would be: "I think, therefore I live and it comes naturally to try to discover the meaning of my own life". And it is not my intention to raise the implicit doubt reflected by the

original sentence to the degree of philosophical principle or postulate. The main idea of my theory is quite different, namely the *causality*; this is the fundamental principle of our Universe, the foundation of the existence and evolution of all things, at any scale. Let's now consider a few of its implications:

- Our reasoning process, based on knowledge and prior experiences, may be partly transposed as thoughts and conclusions in some particular forms, materialized in messages or documents that can be perceived and understood by others.

- Our thoughts, as processes in which the abstract ideas and imagination meet the memory and logic, are continuously produced by the brain, being the result of many higher functions that are allowed by its very complex structure. These sophisticated functions of analysis, learning and reasoning are integrated into a larger frame, a place where they meet the self and social consciousness, together with our personality and free will.

- Humans have an innate capacity and a certain level of intelligence (seen as a degree of adaptation in generating the optimal response to stimuli) which enables us to analyze all data collected by our sensory system, to take the appropriate actions and to understand the environment, its rules and dynamics. Human response is therefore based on the intrinsic "power" of our own cerebral cortex - a major characteristic that has evolved continuously over time, passing genetically from one generation to another. These responses can be simple and concrete (for example, self-preservation), but they can also be abstract in nature, as a complex resultant of past experiences. As this higher level of thinking evolved over the ages (across many generations, once the number of brain neurons and their interconnections have increased), humans became *aware* of their own existence, thereby surpassing a certain threshold and eventually coming to understand their very own nature. Furthermore, our cognitive capacity will continue to develop, both genetically (at a lower speed) and technologically (by using new tools and devices), managing to cover in the near future all the attributes of the natural environment.

Seeing life as a unique sequence of evolutionary processes, based on causality and the laws of the material nature, we may say that humans, intelligent beings who realize the passage of time, have just begun the particular stage described above - the one in which they will fully understand their existence. But how did we get here, what was the "path" we followed up to this phase? And, if there will be another stage of knowledge, what it will look like? Are we able to formulate now a clear and objective definition of life, as we have no other similar terms for comparison? Are we able to offer coherent answers to some specific questions related to our existence, such as:

Where do we come from?

Who are we, the humans, in fact?

Are we a unique kind of life-form?

What is the purpose of our existence?

My perspective is very clear on these matters since only the fields of reason and science are involved. Human evolution has taken place at a slower pace on the road of scientific knowledge. As life appeared on this small planet spontaneously and naturally, as it evolved over millions of years through the adaptation mechanisms imposed by the environment, the answers to those questions are no longer required because the questions themselves have no meaning in this context. The emergence of human life on this planet has only scientific explanations, being determined by many factors: the Earth's position in the Solar system, the chance and randomness, the large extent of time and the capacity of the chemical elements to combine together in multiple forms. And indeed, regarded as such, life is a natural construct and therefore we are not able to find its predefined purpose, a universal reason meant to justify it in some way. Once we realized this, once we came to understand all the mechanisms of evolution that led to intelligence and self-awareness, a certain level of development was reached and therefore we may *choose our own purpose of life*, our destiny as individuals and as a species. Our destiny - being intimately connected with the purpose of life - is not something "written" in the stars, it is simply the sum of all decisions made by each of us.

1. Our Universe

Humans have gazed into the skies for many millennia, being very curious to find out their exact place inside this universe with no apparent limits. At this moment, considering the latest astronomical data, we can establish our position accurately: first, our galaxy is one of the billion galaxies that float within a huge observable space of about 10^{26} m. Second, our planet does not have a special position inside the galaxy, among the other billions of stars and their planets; our Solar system is located on the inner edge of one of the spiral-shaped arms, far away from the center, and this thing had positive implications for life. Our "home address" in the Universe may now be formulated exactly: Planet Earth, Solar System, Orion Arm, Milky Way Galaxy, Local Group, Virgo Cluster, Laniakea Supercluster.

The same thirst for knowledge and exploration was manifested recently in the other direction, namely toward the microscopic world. This complex realm may be extremely fascinating as well, especially if you are looking for the building blocks of life, the living cells. Going deeper, at 10^{-11} m we reach into the quantum world, where atoms - the smallest structures of matter - are all located. At 10^{-15} m we meet the elementary particles, the primary constituents of the raw matter. As said earlier, they do not represent a dimensional limit; my Prime Theory [1] introduced the existence of a "truly elementary" granularity of matter, quite possible to lie below the theoretical limit of 10^{-35} m (the Planck length). In this dimensional vastness, the human size is placed somewhere in the middle, around the value of 1...2m; therefore, as humans, we got the extraordinary opportunity to "look" through our senses in both "directions" as well.

1.1. Matter and space

Here is a series of principles, premises and assumptions related to the spatial and material framework of *granular physics* [1], i.e. of that primary mechanics that helped me to describe exhaustively the movement, transformation and evolution of all things lying inside our universe.

a) We are living in a *material* Universe that "works" deterministically, obeying a pack of clear laws and rules, at any minute and any scale. This principle shall extend and apply to both universe models, namely the open and closed ones. *Essence*, the primordial material [3] that has been previously introduced by my theory, is the sole constituent of the structured matter and of the spatial

fluid [1]; in its actual granular form, this material features a perpetual state of motion.

b) The granular (subquantum) space is governed by the *simplest* laws of nature, the truly fundamental ones; they are the source of all the other laws acting at higher dimensional levels. Here are a few of these basic laws:

- All granules are moving in a straight line, at the absolute speed C (a superluminal speed).
- All granular collisions are perfectly elastic (conservative).
- Both granular impulse and kinetic energy are constant in time.
- The sum of all granular impulses in the universe is quasi-null.

c) Whatever is the universe's birth model we would consider, a distributed one as in my article [3], an explosion of a singularity (Big Bang) as in modern physics - or even a continual existence, a clear fact holds true: about 14 billion years ago, the granular density of space was much greater than the current one. The three-dimensional geometric framework (that place where the primordial essence has turned into a granular spatial fluid) had a very small radius at the beginning, of about a few million light-years. This high granular density of space has some major implications:

- Space undergoes a continuous process of expansion. Considering its initial size specified above, we may easily assume that the spatial granules were contiguous at first (even "compressed") and their primordial elastic energy was totally turned into kinetic energy.
- As the initial granular density was very high, the granular fluxes have spontaneously produced some special elementary particles (quarks), which quickly combined with each other; subsequently, these new formations attracted smaller particles (electrons) and thus the first atoms of Hydrogen and Helium have all been created. There was more *matter* (named as such by the current physics) than *antimatter* in the beginning; as matter and antimatter annihilated immediately in equal amounts, the surplus of matter continued to exist in a steady state, forming in fact the primordial material to fuel the first stars.
- The spontaneous creation of elementary particles has stopped at a given moment, when the granular density of space has surpassed a certain *threshold value* (see for more details *The formation of elementary particles* [7]).

- The granular fluxes (the so-called gravity) have immediately started to concentrate the remaining atoms and thus the first chunks of matter were formed; these chunks have rapidly increased in size and mass, gravitationally accreting more gases from around. The directional granular fluxes, as a "force" that determines the shape and stability of all elementary particles, are the basic constituent of any other known field; therefore, the granular fluxes are being indirectly responsible for all the various connections between particles and atoms.

d) Any material body, any field, the Universe itself have formed in processes that obey laws of deterministic nature, expressing the intrinsic causality of all movements and transformations. The "action" of these laws was constant (as it was already stated in the first paragraph); just the absolute value of their parameters has changed over time. As all of these series of changes were *natural*, as some specific laws of physics may apply since the universe's birth, the existence of a creator or of any other form of divinity is no longer required. Due to an inherent nonuniformity of the original granular distribution, certain unevenness was also present in the distribution of matter at larger scales, adding supplemental, macroscopic randomness to all of these processes.

1.2. Time

Time, as origin, is a derived physical quantity; it results from a few special characteristics of the granular structures that made up the matter. The granular material and its fluxes have, among other specific parameters, a *constant absolute speed*; this thing will affect the behavior of all elementary particles and of the structures they formed. Consequently, any movement, vibration, rotation or oscillation, or any global movement these structures would have at a certain moment, it will be subject to some speed and acceleration constraints. This internal "pace" of matter (also of its connecting fields) will be reflected and averaged at the macroscopic level, dictating a certain speed for any movement or a certain time interval for any event [15]. Now is very clear why the laws of relativity [4, 6], applied in the broader context of the *Theory of the Absolute* ([2], Chapter 3), justify the variable rate of the passage of time for a generic material body moving at different absolute speeds (see my related articles [9] and [12], *Mass-energy equivalence and Relativity*). An absolute time, having a maximum flowing rate value, is a specific constant of our universe at a given moment; this kind of time depends on space's intrinsic characteristics - practically on the absolute granular speed and the current granular density. It seems natural from this perspective to consider *space* (the geometric framework) and the *granular matter* (fluxes) as being

fundamental physical quantities. Together they form a continuum, a special fluid that may be even called space-matter; however, we will keep using the classic term *space* for the sake of simplicity. The inner "rhythm" of the structured matter is therefore caused by the properties of space and by the absolute velocity at which a material body moves. The unevenness of the local granular fluxes, a phenomenon known as gravity, also affects time, slowing down its rate by the asymmetry induced to any interaction between the components of matter.

1.3. Energy

As described in my first book (Prime Theory [1]), the granular matter has self-distributed uniformly within the three-dimensional space and created in this way a granular fluid, i.e. a continuous medium with special properties. A large part of this primordial matter shortly aggregates into various elementary particles, which have formed subsequently the atoms of the ordinary matter. Atoms joined together later and formed by accretion processes some distinct cosmic structures, such as gaseous clouds and stars. The gravitational aggregation of these raw materials (the H/He atoms) has thus created many billions of stars - large nuclear fusion reactors where immense temperatures and pressures are forcing atoms to combine into heavier chemical elements, up to and including the *Iron*.

If seen together, the accretion and fusion processes represent in fact a re-concentration of a part of the universe's primordial energy - which is, as it was already stated, only of mechanical nature. It is all about the energy of the granular spatial fluid and about the material structures it formed. Thus, small stellar volumes can store important masses, i.e. very large amounts of energy. The superdense stars may have, after several million or billion years of fuel combustion, totally different destinies. Depending on their mass, some of them may explode (go supernovas) and others will eventually turn into black holes. In the case of star explosions, huge energies are concentrated and transferred within very short time intervals, and this makes the more powerful fusion reactions produce even heavier chemical elements. All these new elements, simple or composite, are scattered throughout the space and they are forming this way the raw material for other generations of stars, for their planets and moons. The accretion process, which is mostly due to gravitation, may clamp together these new materials (from gaseous clouds and cosmic dust) selectively, depending on their state and atomic mass. This will produce a certain separation of that raw matter into some different types of atoms and molecules; anyway, in the end, large quantities of chemical substances may be

located around the stellar cores. Subsequently, the newly born cosmic bodies will revolve on quasi-circular orbits, colliding and blending these chemicals (previously segregated over mass) into diverse and complex mixtures. Many of these phenomena occurred when matter still had enormous temperatures and pressures, causing special chemical reactions and producing complex substances, alloys and compounds that could not be formed otherwise. The particular dynamics of these stars and protoplanets is very important to us; this is in fact the way, sometimes slowly, sometimes violently, the most complex molecular structures, the indispensable ingredients of Life have all been built.

We have seen how the energy of the spatial fluid concentrates and transforms simple chemical elements into heavier elements during the nuclear fusion reactions in every stellar core while releasing a part of this energy in the form of electromagnetic radiation. The photons emitted in this process cover almost the entire electromagnetic spectrum, but many of them are in the visible region. This thing is also very important, as, over the lifetime of a star, an important stream of energy is sent to all its planets, warming them and therefore catalyzing the chemical reactions on their surfaces.

1.4. Complexity and diversity

The mechanical energy (that energy possessed by the universe's granular matter since the beginning) is constant over time, but it can take different forms. Ordinary matter, as structures of quantum-scale elementary particles, was made at first of the simplest chemical elements (H and He); it will accumulate more complex elements later, once the fusion reactions were ignited in stars. Everything was controlled by a single force, the *gravitational* one, whose intensity varied over time; its action was very simple, but the creative effects on matter were extraordinary. Its action explains why, almost paradoxically if we consider the entropy and the second law of thermodynamics, some increasingly complex material structures have been created naturally. The structures of matter - particles, atoms and cosmic bodies (representing in fact concentrations of the same primordial granular energy) have continuously passed through various transformations, but they all eventually reached relatively stationary and predictable states. Those gaseous clouds and the cosmic dust resulting from supernovae allowed the emergence of other generations of stars and of some new formations, the protoplanets, which clearly have "benefited" in their entire future evolution from the multitude of chemical elements generated in the nuclear reactions described above.

The larger number of new chemical elements allowed even more complex structures to form. Different energy values and configurations of the atoms, given by the discrete energy levels of the electrons in their orbitals, made possible several types of chemical bonds. These are the physical premises for the *complex molecules* to appear (structures containing more types of chemical elements, each type having some new physico-chemical properties). Anyway, the laws of quantum mechanics set the upper limit of *complexity* (atomic mass) for stable elements, but the *diversity* resulted from combining more than 118 known chemical elements is practically infinite. We have to mention here the *Carbon* and its special ability to create chains (called concatenation); of all elements, it can form this way the largest number of possible combinations.

Gravity, as it was already stated, is the force that concentrates matter (increases the density of stored energy), allowing the complexity of all things to increase over time. And, in the end, this is the simple reason why the first cells, the first living organisms emerged spontaneously. Life, by continuous adaptation to the environment, has also evolved across millions of years and increased the complexity of all living organisms (Figure 1). However, if we anticipate a little and define the particular force that acted in this case, we may mention the "need" of any being to adapt to its surroundings and to the influence of natural factors, including the mass-extinction events. In the case of ordinary matter, the creation of stable heavier elements is no longer possible, and therefore this kind of increase in complexity has stopped; however, in the case of normal life (evolving with no artificial interventions), the increase in complexity will continue naturally. On the other hand, the intelligent life-forms - humans for now - can produce huge complexity leaps when they use their research, innovation and technology achievements.

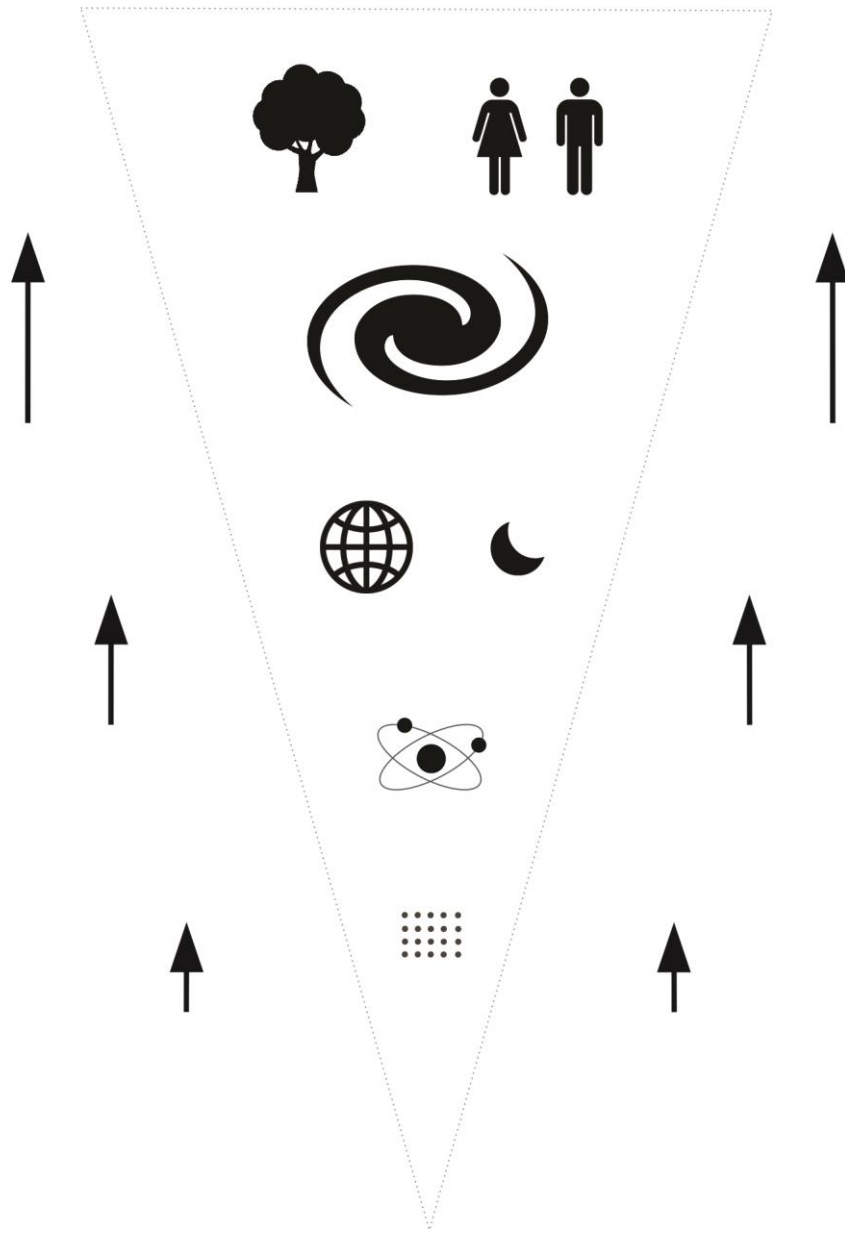


Figure 1 - *Complexity of the material structures*

1.5. Consequences

My mechanistic model of the universe, which is entirely based on the laws of granular dynamics, is completely causal and deterministic regardless of the scale it would be seen and analyzed. It fully describes all the mechanisms of reality and offers coherent explanations on all the events that have led to the actual cosmic landscape; therefore, the lack of fundamental information on the fabric of reality is now surmounted by the new characteristics and rules of the granular matter and space, allowing us to build the theoretical foundation of any possible material entity. The rate of macroscopic time, for example, is established at a granular level; there is also the source of the absolute and relative that we see in the motion of any particle or material body, as it was fully described in my previous book [2]. All ordinary matter has therefore a common origin, and so the same features - *regardless of its state or position in the universe*. The granular flows will bind and shape matter continuously, concentrating in fact that primordial energy and converting it in various ways.

Once we understand this "given" of nature at both quantum and sub-quantum scales, the formation and evolution of all cosmic bodies will seem absolutely natural as the *causality* is truly involved; in fact, the existence of any material structure, whatever complex, may be explained using this causality, a bit of randomness and a certain amount of time. The really huge number of elementary components (particles and atoms), the really vast space, the really long time and the nonlinear interactions can naturally generate the most improbable structures and configurations of things. The energy of several fields may concentrate and connect many particles and atoms in larger assemblies that could remain stable under certain conditions. Therefore, some entities with many new properties could emerge spontaneously and naturally. If all these processes are seen globally, a new and important notion may be associated to our universe's dynamics: *self-organization*. In this way, the granular dynamics determines and makes possible, at all scales, the natural emergence and transformation of the complex objects through processes of variable dynamics - while the total energy involved is conserved over time.

The primary granular mechanisms, being the basis of the emergence, interaction, motion and transformation of the structured matter, generate observational uncertainty only at the microscopic level. If we could know the values of all state variables that describe an isolated system at a given time (and if space would be uniform), its future evolution would become completely predictable. Seen as a unitary macroscopic system, its global state may be expressed as a "summation" of all states variables. Therefore, the properties of

the macroscopic system are in fact consequences of the primary mechanisms and of the speed limitations existing at the lowest scales. And here are some implications of this thing, seen from my new *Granular dynamics*' perspective:

- The superluminal, absolute speed C , along with the presumed granularity and uniformity of space, are all setting the maximum possible speed for any granular structure (particles, photons of any frequency) to the speed of light, c .
- For the same reasons, any granular construction is subjected to the consequences of the principles of relativity, and thus it cannot move simultaneously in space and time (the local time depends on its absolute movement and on its interactions) at the same "speed".
- The dynamic mass [9] of objects increases, as their global velocity approaches relativistic values, due to the reorientation of elementary impulses inside their particles; in the same way, an asymmetry of the local granular flux (an intense gravitational field) produces similar relativistic effects by "increasing" the mass on a certain direction.
- The laws of granular mechanics and their parameters remain unchanged over large time intervals, as the granular density is quasi constant (anyway, the global variations cannot be observed inside a fully connected system). Therefore, all interactions between the elements of matter, the fields and their effects at a distance will have constant intensities on those intervals.

The stability of matter, imposed by the level of granular density, may be maintained further for several billion years, whether our universe is open or not and despite its accelerated expansion.

2. Earth, a special planet?

On a particular planet in the Universe, at a certain cosmic moment, the temperature has dropped sufficiently to allow the solidification of many chemical elements; while some elements are still in a liquid or gaseous state, the planet's surface may have these general features and components:

1. A wide range of chemical elements, which, under certain conditions of gravity, radiation, pressure and temperature, may combine and give rise to new substances and compounds with different physico-chemical properties. *Carbon* is an element that has to be mentioned here, as it easily combines with many other elements (such as Hydrogen, Nitrogen and Oxygen).

2. The liquid water, which, due to its special molecule H_2O , can easily mediate various chemical reactions, can dissolve many substances and can transport (in liquid form or as vapors) other soluble elements.

3. Some active volcanoes, which can surface a lot of heavy elements. Their liquid magma can cool quickly in contact with water or just with the atmosphere, building some specific landforms. In any case, those heavy elements reach into the waters, where they can easily combine or dissolve.

4. A protective atmosphere (composed, for example, of Oxygen, Carbon dioxide, Nitrogen, etc.), which may also facilitate the process of combination and the transport of certain chemical elements. Moreover, it acts as a shield against asteroid bombardment, it filters out a large part of the ultraviolet radiation and it may cause the greenhouse effect. Also, it can propagate electric discharges between the clouds and the ground.

5. The solar electromagnetic radiation (from the nearby star), of different wavelengths, which brings a supplemental amount of energy and may initiate and power *continuously* various processes of combination. Infrared radiation will produce heat through the greenhouse effect, while ultraviolet light may cause the ionization of some substances.

6. The movements of rotation and revolution (and the possible tilt of the rotation axis), producing the day/night alternation and the succession of the seasons at certain latitudes.

7. The natural radioactivity, of very small intensity.

8. The planetary magnetic field, powerful enough to act as a natural barrier against corpuscular radiation (cosmic and solar).

9. A large planetary surface (land and water - seas and oceans), various landforms, moderate variability of the climatic conditions.

10. The optimum magnitude of the gravitational field, enough to keep the atmosphere bound to the planet (and to cause an appropriate pressure).

11. The presence of a large moon plays a very important role, to stabilize the planet's axis of rotation.

This whole planetary environment is the result of many natural processes, events and facts, from the impact of meteorites, asteroids and comets up to the optimum distances from the planet to the central star and the largest planets. After a violent period, the planet's surface has become stable and these environmental conditions remained relatively constant over a large period of time.

The special, maybe unique planet *Earth* has formed about 4.6 billion years ago and, after a few hundred million years of struggle and instability, it crosses a quieter period that perfectly matches the above stationary profile.

These environmental conditions, along with the hazard of many climatic changes, allowed some natural processes to increase the order of matter and to organize it, to build this way some complex molecular structures. The energy received from the *Sun* catalyzed these water-based processes, and things continued until a special molecular construction emerged, a stable structure that can spontaneously replicate itself. The next big thing that happened in this context is the process of photosynthesis, and this was the moment when the element Oxygen started to accumulate in the atmosphere and to form a protective layer of Ozone (O₃). At a later stage, more complex single-celled organisms and multicellular ones have emerged, and thus Life practically "exploded"; these living organisms consume energy from the environment (oxygen and water, but also light and heat), interact, transform and multiply themselves, spreading over larger and larger areas.

In this huge natural laboratory, where all the chemical elements are practically present, where the movement is continuous and the changes of climate are fast, the number of combinations between different substances is actually infinite; it was only a matter of time until the first cell came into existence - that special structure with distinct properties to be considered a living organism. The odds for this first form of life to appear were very slim. A mixture of substances in precise proportions and a specific sequence of separate processes that happened over a very long time were needed to this end. As the *Drake Equation* shows, life is very likely to be hosted on many

other planets and moons throughout the Galaxy and the Universe (those exoplanets located in appropriate regions, neither too close nor too far away from the stars - the *Goldilocks zones*). Similar sequences of events can therefore happen in different places, but the life there would not necessarily be identical to that from Earth. Anyway, a very important thing will surely happen after the moment life (of any kind) emerged, wherever and however, namely its *evolution*.

Note:

Those "building blocks" of life formed in the primordial oceans could have extraterrestrial origins, as the organic molecules could have been brought from the cosmic space by comets and asteroids (panspermia). Simply seen, this thing would only change the place where these molecular structures were born; otherwise, the implications are greater, increasing the odds of other planets/moons in the solar system to host various types of living organisms. Moreover, the chances of life to be more widespread across the star systems, even outside the Goldilocks regions, would increase significantly and therefore the areas to be searched for alien life would thus expand.

3. The Theory of Life

The inherent nature of matter, of all its chemical elements, allows the atoms and molecules to combine into complex and stable structures through the known fields (the electric one mostly). Various chains of molecules, especially those formed around Carbon, are quite common in a place with many energy sources. Their structures were constantly built and broken until some of them became stable and perfectly repeatable. Life is based on such structures and their replication mechanisms, in our case on the RNA and DNA [13] molecules. This is an easy way to transmit the "blueprints" (information) to future generations, and this also makes possible the change, adaptation and evolution of Life. DNA represents the common factor of every form of life, the key element of life on this planet; it simply allowed the single-celled organisms to change and evolve into humans.

How can we define life? And more importantly, the intelligent life?

Can we, humans, analyze and understand our own life?

3.1. The general definition of life

Life is a set of mechanisms and processes that characterize the "working state" of a complex material entity, which allows it to grow, evolve and reproduce independently by the continuous exchange of energy and matter with its environment. The fundamental feature of life is its temporary existence, the finite duration of the "operational condition" for the related physical body. In order to survive through time, to create descendants (duplicates) with similar morphological and functional attributes, all types of living organisms must possess a particular division (or breeding) mechanism.

There were major leaps in the natural evolution of life on Earth; all significant changes in the environment were somehow reflected in the living organisms, allowing us to identify several stages in the history of life:

- *The emergence of the first living cell.*

The ready-to-use nutrients from the primordial ocean, the heat and energy from the solar radiation, all of these needed just some time to combine and produce the first viable cell. As the elementary particles did, the matter

structured around the carbon atoms also takes a step further on the road of self-organization. A sort of membrane made of lipids, a few amino acids bound into a single structure, a bit of chemical energy [11] and here are the simple ingredients that spontaneously formed the very first cells. The other factors involved are a pure hazard and the energy-rich environment. In conclusion and metaphorically speaking, all the special physico-chemical properties of Carbon have helped mother nature to build two extremely precious things, diamonds inside the Earth and life on its surface.

- *The emergence of multicellular organisms.*

The first corpuscle was bounded by a filtering membrane, which allowed a selective transfer of substances from the environment toward the interior. Later on, the cell has increased in volume and exceeded a certain dimensional threshold; then, it simply divided into two similar corpuscles, continuing the development process as a unitary body.

- *DNA/RNA replication mechanism.*

The chains of organic molecules found in DNA (adenine A, cytosine C, guanine G and thymine T) form a double helical structure whose molecular groups (genes) encode the genetic information of each individual and of each species. During replication, the DNA strands are separated by an enzyme called helicase [13], while polymerases helped form new copies. This way, all the information and characteristics stored in canonical format may be copied and transmitted to other cells and to the descendants of that organism. It is important to mention that this process may produce different variations (or errors) of those molecular sequences of genes; these changes may be induced by the mutagenic factors of the environment or they may occur naturally. Anyway, this imperfect replication will cause differences between individuals, therefore certain biodiversity, variability and even the emergence of new, completely different species; more resilient individuals may appear this way among the members of the same species, and they may pass on their special genetic characteristics to the future generations.

- *The process of photosynthesis and the rise of atmospheric oxygen.*

Once some primitive bacteria started to produce Oxygen (a process called photosynthesis) and to eliminate it in the atmosphere, the explosion of life and its diversity has just been triggered. This element has easily reached all kinds of organisms, "powering" them chemically in a more effective way.

- *Cell specialization, the sense organs and the nervous system.*

Cell specialization and differentiation were major changes for life. A new internal structure, namely a network made up of several specialized cells called neurons, has soon taken shape. This nervous system can process efficiently the signals sent by sensory neurons (informing about the external environment) and can provide a rapid and optimal response for that body. The same rapid structure is also involved in the efficient "automation" of some internal systems that are necessary for all living organisms.

- *Adaptation to the environment, natural selection [14], the development of intelligence and the emergence of self-awareness.*

Intelligent life has appeared due to the repetitive actions of the above mechanisms, processes of adaptation and selection in which the complexity of the internal structures of certain organisms increased significantly. And we are talking in particular about the brain, the most important organ of the central nervous system, which has grown and thus has allowed more powerful functions to all animal species. New layers of specialized neurons have been created, opening the road to communication, languages, abstract thinking, intelligence, complex interactions and self-consciousness.

- *The gender differentiation of the most complex organisms has triggered a faster adaptation and a more pronounced variability within a species.*
- *Natural disasters and mass extinction events that have significantly affected the course of life and even annihilated entire species.*

We can mention here the volcanic activity, global temperature changes and the extension of the ice caps, cosmic gamma-ray bursts, solar eruptions, large asteroids, etc.

3.2. The definition of intelligent life

Any form of life that is equipped with an advanced nervous system can adapt better and faster. He acquires more information through his dedicated sensory subsystems, processes them more quickly and provides a more appropriate response (automatic or not) to these stimuli. The increase in brain volume allows the existence of a greater number of neurons (the fundamental cell of the nervous system) and implicitly a greater number of neuronal connections (synapses). The basic functions of the nervous system (sensory perceptions, learning, memorization and responses to stimuli) are all improving, facilitating a better adaptation to the environment and better

relationships between the individuals of the same species. As the individuals may now communicate through various means, their survival skills are developing and their reproduction chances are increasing, practically their *level of intelligence* (seen as that superior capacity to adapt and to offer an optimal response to stimuli) significantly improves. This "quantity" has led over time, inevitably, to a "quality" leap; the species called Humans gets at a given moment an additional brain feature - the self-consciousness - a particular thing that may be seen as the supreme, maximal form of adaptation of an intelligent being to its environment.

The intelligent life (and we are talking here about the contemporary humans) implies supplemental functions and superior capabilities as consciousness, reason, free will; it also presumes the complete conversion of the primary instincts in evolved thinking based on knowledge, understanding, logic and morality - all operating at an individual level, yet having a significant interference with the group. The social connection was very useful to most of the evolved beings, representing an important development factor for their respective species.

We may assimilate the intelligent life with a complex set of procedures implemented and executed by an artificial automatic system (a sort of robot), which, while "operates", exchanges information, matter and energy with its environment; as a result, this system may take some decisions beneficial to itself. Moreover, it may learn from its past experiences and may initiate and execute various actions towards personal preservation and development, using its "intelligence" to better adapt to the external environment.

These are well-known things and we should neither reinvent nor tell them again; however, as they are presented in a causal manner, more light could be shed on the natural phenomena related to life and its emergence. Once we understand all of these mechanisms and processes, a major change in human mentality is very likely to happen. Moreover, a new evolutionary and adaptive process could be triggered, leading us to a higher intellectual level; in this way, all humans may get closer to their cosmic position - that place where our species should continue to evolve as quickly as possible.

3.3. Consciousness and intelligence

Consciousness is a direct result of the increased complexity of the brain structure, a natural consequence of the perfect adaptation of humans to their environment. Obviously, it may also be seen as an evolutionary extension of instinct. At the same time, consciousness is a means through which a sentient being realizes his existence and his connection to nature - using the information received from the sensory organs - and produces a much more "intelligent" reaction, above instinct and imitation, which is in fact a resultant of his previous experiences, of his reasoning and understanding abilities.

Clearly, our consciousness, as our intelligence, is located inside the central nervous system. There is the place where our brain matter, a highly organized and interconnected matter, has changed quantitatively (increased in volume) and suddenly experienced a qualitative leap. And this is not a simple economic truism that could be used everywhere, it is just the result of human evolution across millions of years.

If an evolved living organism receives certain information (stimuli from the environment) through the sensory system, he could respond and act according to some "hard-wired" rules, instinctively, as such:

- to preserve his own life and integrity (and of the entire social group).
- to maximize the volume and quality of the food, to access it easily.
- to defend or extend his territory, to remove the invasive species.
- to ensure the best partner for breeding, to eliminate the rivals.
- to provide comfort/safety/resources for himself and for the other members of his social group.

These responses, more complex as the organism is more evolved, are all memorized, forming a sum of old experiences that may provide a useful mechanism to improve the future decisions. However, this mechanism is linear and relatively slow, yet it may provide all the necessary means for a species to prosper and for its most suitable members to survive and reproduce. Obviously, there are exceptions from this mechanism, namely the "evolutionary leaps". Even the DNA, one basic molecule that allows the perpetuation and evolution of all living organisms through gene propagation, sometimes leads to qualitative leaps due to those "duplication errors". The human genes may be naturally modified by various factors (as it was already mentioned: chemical mutagenic agents, radioactivity sources, electromagnetic

waves, ionizing radiations, etc.) that cause errors in the accurate replication process of the DNA spiral. In this way, some of the descendants may have many different, even superior features. Anyway, this evolutionary road enabled the number of brain neurons and of their connections to significantly increase. It is obvious that a better adaptation requires a larger amount of stimuli to be processed at once and a growing number of previous experiences to be memorized. As more signals from the sensory systems invade the brain, new dedicated areas are being created there to process, memorize or respond to them in a better way. And all of these zones must be completely interconnected in order to generate the optimal solution as fast as possible. This improved accuracy of the senses is automatically leading to a pack of evolved brain functions; a whole new level of thinking emerged this way, allowing superior strategies and tactics (for hunting, defense, etc.) to develop.

We must not neglect the social aspects; the group and the family play a fundamental role in the global development of their members. A group ensures *success* and facilitates better protection and good care for the offspring, also an easy exchange of information between members. The pace of evolution appears to be faster on this road. The nervous system of the superior mammals has seriously evolved through the mechanisms described above, giving rise to new and decisive abilities: communication and interaction skills, working and fighting for food/territory as a group, tool manufacturing. All these activities developed the nervous system of the primates continuously, helping each individual to become aware of his role and position in their groups. The new communication skills were very important in triggering the process of self and social awareness. Once this embryonic consciousness has formed, the journey to the actual level of complexity got significantly shorter (it only took about two hundred thousand years). And as for today, this biological kind of adaptation seems complete. The modern human has faced all of the basic challenges of the environment, he is now fully adapted. This primordial level of human consciousness - as a result of the maximal evolutionary adaptation - seems to be quite stable and might remain essentially unchanged for a long period of time. Only a major change in the environment, of high intensity and long duration, could lead to some other modifications in the human nervous system.

Humans came to understand their natural environment, their own biology, their own evolution. However, his evolution is not yet complete, and there are three different ways to follow. The first one, genetic manipulation - this is a complicated thing, currently with no certain results, and seen by many as immoral. Secondly, using technology and imagination, humans may create a

machine similar to their own brain, but faster and more powerful. This advanced machine will learn and progress, eventually reaching into a zone of simulated or real consciousness; therefore, the artificial could become the new natural one day. My optimism relative to this future moment is not changed. Contrary to Stephen Hawking's opinion, this *Artificial Intelligence* will not be fundamentally dangerous; AI is created and controlled by humans, being in principle as "good" or "bad" as its designers are. The third way involves the man-machine hybrids, but this is more an extension of the human's natural power and capacity than some new and innovative progress.

Important features of the consciousness

- As a higher function of the brain, consciousness helps us to better *perceive* and *understand* reality. It represents the means by which we can represent the abstract, those things without concrete references; using the consciousness, interestingly, we can even understand our consciousness! It seems to be a paradox, but this rather shows there are no limits to human knowledge. Humans, through their mind and intelligence, are deeply connected and integrated into the natural environment at this moment. The power of abstraction and scientific knowledge allow this species to progress, to conquer the outer space and to continue its existence. Consciousness, as well as reason, also allows these things to happen. The certainty, however, can only be provided by each and all of us.

- Consciousness is personal, but it also has social aspects. It is important to take into consideration here the intrinsic capacity of this material support of consciousness - the human brain. Thus, the parallel processing and differential analysis (data from the sensory organs are simultaneously compared with the stored patterns) had significantly accelerated the development of the human's ability to sense his environment and interact with it. Any object or event generates a corresponding mental model, and these data may be reinforced, learned and stored through repetition. The parallel processing on large areas of the cerebral cortex, on billions of interconnected neurons, allowed this new higher function named consciousness to arise. As social beings, humans had to improve their communication skills, and this thing happened simultaneously with the "explosion" of their consciousness. Language and verbal communication have facilitated the rapid connection of large groups of individuals. After a transitory period, the modern human can therefore communicate, understand, reason, analyze; he can now make conscious decisions that are no longer dominated by instinct. He has his own will, also his own character; some defining features are inherited from the parents, some others are formed by education, while others simply resulted from his personal

experiences. The human individual is relatively autonomous, can make it by himself, but he also realized the advantages offered by the group - as being the best solution for personal and global protection. As his decisions are no longer only instinctual, the modern human achieved a *conscious willingness*, becoming "responsible" for the consequences of his actions; his free will may now show all of its sides, good and less good as well.

- The negative effect of the consciousness. Once this new capacity emerged, primitive humans start to search and discover, being curious about the environment and about their own life; thereby, a lot of fundamental questions were raised at that moment, and no rational answers could be given. The inner conflict arose immediately, generating all the primal fears related to the unexplainable. Humans could not understand many things back then, such as life/death, light/darkness, fire, the sky and the thunder, etc. Therefore, to invent and to believe in some protective, mighty gods was the normal thing they could do. From that moment on, the human consciousness and subconsciousness have both been dominated by the concept of god, seen as a creator and ruler of everything.

- The materiality of the consciousness. The human brain, as a unique depository of the consciousness and personality, of our reason and defining ego, is a complex neuronal structure whose materiality is beyond questioning. We are represented (ignoring the integrality of our body), at a given moment, by all of our neurons and their synapses, by all the electrical impulses that practically generate our thoughts, sensations and our reactions. It is obvious that we are talking here about the structures of neurons, about their organization and interconnection, about chemistry and electricity (very small currents and voltages). There is a discrete matrix of complex structured cells that hosts a dynamic network of electric fields, and these circuits are implementing all functions of the brain, including the higher ones. "Subtle" energies are crossing the multitude of electrical connections and all these continuous informational transfers between neurons ensure our thinking and learning processes.

The transfer function of the electric signal that flows between neurons (the synapses) is characterized by a small delay of the output relative to the input and by a variable electrical resistance that depends on the amplitude of the actual and previous impulses. This mechanism of "memorization", along with a repetitive excitation of the nearby inactive neurons, might lead to the creation of new neurons and specialized areas; these new brain zones could be very effective in pattern recognition and correlation detection processes. Therefore, some self-organized and self-taught layers of neurons can generate

in this way complex automated responses, quick decisions to certain stimuli - which do not presume energy-intensive calculations. We may see here the natural optimization of the brain areas and functions, which is very useful to control many repetitive activities at a lower, subconscious level. As an example, you may consider the walking, an automated process that does not require conscious control of the numerous muscles involved.

- The structurality of the consciousness. This special organ called the *human brain*, which is made of about one hundred billion neurons, hosts *all those things* that define us as intelligent beings. Waves of electrical fluxes are continuously passing through its neural circuits; these impulses represent in fact our consciousness, they encode all of our thoughts and feelings. Different neuronal structures from specific areas are encoding our talent, imagination, reasoning, but also our personal response to external stimuli. Each brain's neuron might be connected with up to ten thousand other neurons, and this simple fact lets us estimate intuitively the hidden "power" of this human organ. Large areas of the brain are dedicated to the senses, to sight in particular, and this ensures a very fast response in case of necessity.

Features of the specialized areas of the brain:

- These areas may be trained and developed in time through study, experiences, practice - i.e. any method of learning.
- Their activity is continuous, even while we are resting or we are asleep.
- They have a dominant component, which has been transmitted and developed on genetic grounds, being inherited more or less from each parent.
- They can either evolve or regress over time - depending on how much we "use" them. Everything we have learned, as rational decisions or automatic responses to stimuli, our memories and impressions, the words of our native language or from other ones, all of these may be stored "better" or may be lost. To remember a specific thing, to use repeatedly a special area, these are very important ways to strengthen certain neural pathways and better store the information. We learn something every minute and even store it in our long-term memory, and yet we do forget other things at the same time. Our own personality, our proper concepts of pleasantness, fairness and usefulness, etc., all of them may shape differently some specialized brain structures and may dominate their initial "hard-wired" configuration, dictating continuously our reactions, actions, and performances - those attributes that identify us as persons. As the level of brain complexity (provided by the huge number of neural connections) is really high, the

potential number of human personalities tends to infinity. Actually, there are no two identical persons, even in the case of twin brothers. Our basic personality traits were passed down through genetic inheritance, from parents' DNA and species' genome, but all personal experiences have also a great contribution.

- Consciousness and determinism. Our imagination, our new ideas, even our feelings are deterministically generated, out of the complexity of the neural connections. At a fundamental level, on a certain neural circuit, a simple decision is made as a binary response that corresponds to specific information. It may also result from a fast parallel computation, less conscious processing of some input and stored data. This is in fact the "idea" that comes up suddenly, the intuition we manifest sometimes or that decision we made as an expression of our own free will. All these are very similar to a smart search in a huge database, a process in which only a few records are practically accessed.

- Self-control. Consciousness, as human's supreme form of adaptation to the environment, allows a "self-control" process on several levels, self-censorship of the reflex actions that are caused by certain stimuli or by our assessments. This adjustment "zone", as a brain function that allows us to be aware simultaneously of the facts, causation and response, is "located" somewhere above our primary instincts and may overcome them in most situations. The overlap of these multilayer areas, the instinctual and the conscious ones, generates internal conflicts that frequently lead to unexpected decisions. The moments of fear or panic, for example. Or the basic needs of a human - if they are not satisfied, some unconscious, irrational actions could be easily triggered.

- Ethics. As social beings, humans created a comprehensive, but quite relative concept of "good" for individuals and groups. Consciousness has helped this concept to improve; in the meantime, we completely realized what is life, what is its purpose, and we understood the ephemerality of all human beings. In conjunction, these things have simply and directly led to the emergence of some moral values and principles: the ethics.

- Levels of consciousness. Depending on the concrete degree of "awareness" involved in our data analysis and decision-making processes, we may identify several levels of consciousness. This improved ability to understand our own thinking mechanisms could represent, in this context, the highest possible level of the actual human consciousness.

4. Evolution and adaptation

It took a very long time, billions of years, for life to turn from its unicellular form into a complex and intelligent "construct". This lengthy period of time, the favorable environment, even the global extinction events - all have made their specific contribution to the process of shaping a truly evolved life form in the Earth's big laboratory. There is no doubt that life has emerged and evolved naturally, continuously adapting and overcoming barriers, molding primordial organisms through the ages up to their most elaborate configuration, the actual human. This being, by its own forces - both mental and physical - continues the evolutionary process and even tries to make some new jumps. The previously mentioned threshold may be called a *scientific threshold*, as it is entirely due to the progress made by the accumulation of scientific knowledge. It is in fact that limit humans surmounted once they fully understood their materiality and the related laws and mechanisms, such as the causality, the flow of time and the principles of motion. And this was a triumph of the scientific knowledge on the surrounding reality and on our inner side, but there will be profound and immediate implications in the mental field. Humans hold now the key to deciphering their existence and consciousness, the secrets of life in general. The mystery has almost gone, the existential crisis is over, and now we may completely focus on the future. However, *the mental threshold* might be much more difficult to cross; new evolutionary mutations could be required to change the capacity and support of our consciousness, a major adaptation of the human species to the information society. It will take a lot of time and it will be painful, but this threshold must be surpassed as soon as possible. Those many years wasted by humankind in the religious darkness, the significant delay in reaching the *Normal stage* must be compensated somehow, because time is a very expensive thing. And we may now face two great risks, self-destruction and postponed space colonization. Simply said, human bases could have already existed all over the Solar and Proxima Centauri systems, and the galaxy exploration could have been just in progress.

Our societies, more or less globalized, will have to undergo difficult changes. And it is not about small changes, here and there; *everything* has to be rearranged by using a new value criterion, a criterion that is centered on the survival of the species. People, things, states, social hierarchy, all of them. And no, this is not a utopia! Once this global, joint project is accepted, mankind may give up on the old social, economic and political relations. We are a resilient species; we have even managed to evolve in very harsh conditions, but slowly and at great costs. All of today's types of social, economic, political systems - capitalism, communism, dictatorships, democracy, free-market

economy, parties and governments - are practically pseudo-structures and concepts, and they must be changed. Most of them were springing from some "leaders" who never decided for the benefit of each individual. Moreover, they did not respect the basic human rights and freedoms - which are normal in a civilized society; they even deepened the segregation on different reasons. Many countries have promoted social egalitarianism, as harmful to the human being as the unfairness of the extreme inequity. The actual social systems have all failed, and they are now just inefficient time and energy-consuming organizations. Some good principles have all been wrongly implemented. Smart, decent people were removed from decision-making positions and thus many individuals were affected. It has been proved, across the entire history of humanity, that humans cannot live together in a limited habitat; practically, nothing was normal in our past. The wars and crimes were caused by false goals like money, power, land, domination, and all of these have changed the normal hierarchy of values in our world. Furthermore, the irrational exploitation of some natural resources produced serious shortages, polluted the biosphere and destroyed many biosystems - and all of these were done by many political-economic systems of government to ensure a so-called quality of life, on the basis of the so-called free market and supply and demand mechanisms. The amount of economical and political nonsense borne by people, at the dawn of the third millennium, is unbelievable! Also, human rights seem to be completely forgotten! So much injustice is still present in today's world, so much dictatorship disguised in democracy, so much lack of freedom...

And there are many more details to show and analyzed; anyhow, these are indisputable things, which produce more negative effects than all the wars in human history, completely justifying the *project of change* proposed above. We have come to a turning point; humanity must make a big step forward, overcoming the past. The current evolution and adaptation must eliminate the animal from humans, the predator lying inside each of us (who partly turned into a warrior), in order to rediscover the normality of being and living together. We all are humans, different in many respects, but we all are social beings and we must reinvent the rules and the normality of living. The good news is this: the destiny of humans is only in our hands. The bad news is: now, at the end of 2017, we are still far away from the critical mass of *global will* that is required to take this natural leap into the future.

5. Principles and rights

Theoretically, at least, all human beings were born *free* and *equal*. However, once we grow up, we come to understand that the reality of our world does not provide these normal things, quite the contrary! And it is not about some restrictions of the natural environment, the place where we may move and live freely, nor about the people around us. It is about the social norms and legal obligations imposed by your bigger group, those rules you might not like, but which you will be compelled to respect. However, as time goes by, we all are getting used to obey these rules due to our social mimicry, coming to believe that this is the normal, the real freedom. The genetic heritage of each of us generates a race, gender, ethnicity, family and country differentiation, as we belong to a particular group that has specific features, preventing our full equality within the species. In this modern era, liberty and equality were both proclaimed for all of us, plus something called "human rights", but they seem to me more like words especially meant to inhibit our "senses". Modernity also proclaims democracy, as being the power of some ethnically or geographically differentiated people to elect a group to rule them. This soon proved to be a utopian idea, which only sounded very nice in theory. In fact, free speech, the right to vote and other fundamental human rights are only ensuring a pseudo-exercise of power in our very large communities. Socrates himself raised some legitimate questions related to democracy and its very nature - seen as an unjust and corrupt political system - and this nice concept was proven wrong since the beginning! But the idea seemed useful to many leaders and most regimes, and it is still applied today, in various forms.

For hundreds of years, our leaders have learned to take the full advantage of this concept, maintaining their positions and privileges in the name of a principle with almost no real content! They have relied upon the idea that it would be very difficult for members to give up on the primary protection provided by their group. This primal instinct of survival is hard-wired in our species' DNA, and it was continuously and fully exploited by unscrupulous leaders. Small revolts, rational and justified ones, of people who no longer wanted the dictatorship of the majority, did not overcome this important force. And this is not a subtle plea for anarchy, or a utopian society based on limitless freedom, it is just an observation of today's reality.

A new, modern vision is missing to all leaders of our world; they all seem stuck in unviable historical constructs. The rules they had imposed to fix some obvious social errors have all turned into some stifling restrictions that actually have increased the number of problems. Individual freedom is becoming more

and more a meaningless word; human rights are seriously limited, abusively and illegally, and extensive *control* starts to dominate our society.

Regardless of the technological progress of many nations, of fast Internet or mobile communications, of the scientific advancements in all fields, global politics and international relations seem to be in a prehistoric period. There is no global management of the planet-wide problems, no concerted actions to protect the environment and to reduce the greenhouse effect, nothing to improve the health of the planetary ecosystem and of the population! No. Globalization, basically a good idea, is just a word. There are instead many conflicts between countries and peoples, astronomical military budgets, crimes and destruction - it seems that we are intensively preparing to kill each other. A global unifying effort is completely missing these days, a plan to normalize the planet and the life of every human being, to bring peace and equilibrium for good. Sadly, most people take for granted the current way our world is organized and cannot see the alternatives. Moreover, they are practically forced to live a sort of Stockholm Syndrome endlessly, accepting quietly a ruling minority with no vision. It is in fact a state of subtle, but global alienation, which currently overshadows and annihilates the positive, normal and authentic side of the modern man.

Considering the technological level of humanity, in balance with the standard of living of each human being, the level of Earth's resources and the state of the natural environment - whose rate of increase or decrease are quite different - some global measures have to be taken immediately. My optimistic perspective on this presumes at least two hundred years until something will change significantly. What should we do now? In the first place, we have to optimize the allocation and exploitation of any resource; also, serious efforts must be made to stop the conventional and nuclear arms races, diverting their budgets to scientific research. For example, toward medicine, efficient agriculture, toward robotics and the conquest of cosmic space. Then, a gradual optimization of the world population, in order to ensure a decent standard of living and good healthcare for everybody. Also, the educational systems should be adapted immediately to the new requirements. Third, our mentality needs to be changed and a new scale of values has to be built. The world needs new economic models. Money must be transformed - as they can no longer reflect any normal, absolute value in the actual financial systems. All political systems must be eliminated. Experts need to be consulted in any economic and social matters. All people need to understand this new initiative and implement it, changing their current status quo. The very foundation of our society will change, along with the concepts of state and possession; we will respect each

other's rights and we will collaborate globally, protecting the natural environment. The technology will work for us, while we build a better future and live normally. The fall of ideologies and religions of any kind is predictable and it seems absolutely necessary. Of course, these rules must be slightly adjusted once we have reached to other planets, when our life and cohabitation will be more difficult.

This new initiative must be started as soon as possible, the downfall and annihilation of humanity must be stopped now, also the degradation of the environment and the quality of life. My hope is that we have not reached yet a tipping point and we are still able to get back on the right track!

It is obvious that these mental changes will lead to profound changes in our society. Therefore, our social life will have to adapt to a decent cohabitation, based on respect, tolerance and a common goal, in which each individual must have a conscious contribution to the welfare of the community. This new social model cannot be fully defined right now, but we only may say that it simply derives from the word *normality*.

Our inner animal and our initial ignorance made us pay a great price. The fights must come to an end. We found out the explanations for the so-called four basic elements of nature (fire, water, air and earth), we know who we are and where we are heading to; all fundamental questions have been answered. The fantasy of a mighty creator is no longer needed, as it never did. Now is the perfect time for this mystical-religious delirium, any forms it would still have, to stop and disappear forever. The evil things done over thousands of years by religions and by their fairy tales, the crimes made by the followers in the name of their "faith", all of these will be forgiven and forgotten, and humanity will take the path of normal, pure scientific knowledge, which only involve the human reason. This dark period of mankind must end right now, and the normal scale of values must be restored. A new, rationally planned destiny of humankind will prevail. This dominant normality has a material side, which also has to be implemented. The actual level of science and technology brought us very close to a technological threshold: the man-made machines will work for us and will provide all we need for living. However, this could only happen if the machine itself will not be regarded as a potential risk, but merely as a necessary help. We are building those machines, we are giving them artificial intelligence, and we allow them to communicate with each other. Therefore, we will be the ones held responsible for their programming and supervision, for their degree of autonomy and their decision-making level. The artificial intelligence-based machines represent a necessity, a part of humanity's hope for a better future. Although the human species will still evolve, our organic

nature could be enhanced by machines and our health could be improved. Furthermore, the complexity of a machine, its potential intelligence and reliability could easily transform it into a necessary companion of humans in their journeys to other planets and stars. Only a fast machine could manage the multiple variables of this kind of travel, significantly increasing our chances of success. The redundancy offered this way to all human actions and decisions, the enormous computational power of the intelligent machines will give us safety and support in any major cosmic endeavor.

6. The philosophy of good and evil

Good and *evil* are, indeed, rather relative concepts. Even the *normal* has various interpretations... However, there is some absoluteness hidden in all these words! And here are a few examples of evil that had a deep impact on humanity. The good, seemingly the opposite of everything humans have done until now, is indissolubly connected with the normal. And there is no need to adhere to a certain philosophical current in order to go further. The way of scientific knowledge, of logic, rationality and normality seems to be what mankind has to follow now, as a species that has just understood the reality. We should use a series of simple principles (that are only partially covering these matters) arising from our obvious material nature and endorsed by science, which must be corroborated with an a priori validation offered by the human's cognitive abilities. Therefore, as it was postulated in the Prime Theory's introduction [1], our full knowledge of reality is possible. Moreover, it is absolutely necessary and it will even help us to redefine more accurately the terms related to all these processes and concepts.

Our species has acquired a large dose of negativity through the ages, sometimes exceeding the amount of positive. And we are not only talking about the millions of years of interspecies and intraspecies struggles that impregnated us with negativity, which made the human's way up to the top of the food chain. There are many other gaps, more subtle ones. However, there is hope; all of these may be changed eventually, the historic evil may be annihilated if we start right now that *initiative for humans*. What are the basic concepts and principles of this project? Here are three of them:

1. The surrounding environment is purely material, at any scale it would be regarded. All structures, alive or not, and all their interactions bear the unique feature of materiality.

2. Human knowledge is simply possible, to any extent. We have no other objective limitations, besides the well-known ones: space and time.

3. The good can be identified with the prosperity of each human, with the perpetuation of our species in general, with its growth and peaceful development up to the cosmic scale.

All of these principles are leading automatically to a new set of rules, to a new "decatalogue" for humans, deeply connected to their life, place and their role in the Universe. It is not in my power to identify what exactly is good or bad for man, but some ideas may be easily extrapolated from the above principles, as well as from some natural practicality - enhanced by evolution and adaptation over time - which was offered us for free to learn from it. We may thus be able to discern what would be useful, good, progressive and necessary to our successors to ensure their peaceful cohabitation, protection and continuity. It will be better to get rid of our primary instincts, mysticism and pseudo-ideologies, and to follow a simple philosophy of normality. The leap described above must start with the global assimilation of this general concept and by implementing it as a *modus vivendi* to all individuals. This concept should propagate normally across generations, people becoming simply and gradually aware of this global purpose, of this "greater" good - which is the preservation and development of their species. To change the global paradigm that is associated with our very existence might be very difficult, but it will come naturally once we all realize that the survival of the species is in fact our common, supreme goal.

Considering the long time it took our planet to build a proper environment for life, the first organisms to emerge, evolve and adapt, plus the long period of transition from primates to the modern human - we could easily identify a *universal mechanism* that allows life to emerge, to perpetuate and develop continuously. This mechanism worked perfectly on Earth, leading us to this point when the modern human is compelled to turn into a traveler, an explorer of the galaxy. Obviously, this process can only be done once the human's inner conflict is successfully surmounted. However, this conflict must be firstly known and understood in detail, then turned into an inactive state; this is the only way our inward progressive type of forces could become dominant. The purpose of this step may seem quite distant and vague, but it is more important than any other thing. And this is not an artificial change that is imposed for the sake of a perfect utopia; it is just the natural path humanity has to follow, over several generations, in order to turn the modern man into a *normal human being*. To avoid humanity's extinction in human-human

conflicts. To show respect for the very small odds of life's emergence and evolution processes.

But is it worth it for humanity to have a future?

Observing the chain of extremely improbable events that eventually led to life, to its evolution to intelligence and consciousness, my simple answer is yes. The uniqueness of these cosmic and planetary events has a huge intrinsic value, which we must always honor. And humanity can do this by starting that global mutation described above, starting to turn itself from a planetary civilization into a stellar one. We all came to realize that the "spark" of our life is just an ephemeral flicker of the stardust and therefore is our supreme duty to keep this light shining for as long as possible.

What are the laws all people should obey?

Isaac Asimov [17] formulated for the first time the Laws of Robotics, ensuring in a logical way that all AI-based entities, created and programmed to help us, will never harm humans, in any way. In other words, the man - as an intelligent being - may establish consistent rules of behavior for any AI-based machine in order to manage all situations that may arise in the new man-machine relationships. And it is not about the preconceived idea that such a robot, which might get at some point an incipient form of self-consciousness, would automatically like to eliminate the "competition" - its creator, i.e. the human. Robots can always be programmed with a set of clear rules to control their entire behavior. Here is the original set of laws (that includes Law zero):

- Law 0: A robot may not harm humanity, or by inaction, allow humanity to come to harm.
- Law 1: A robot may not injure a human being or, through inaction, allow a human being to come to harm, except when required to do so in order to prevent greater harm to humanity itself.
- Law 2: A robot must obey any orders given to it by human beings, except where such orders would conflict with the First Law or cause greater harm to humanity itself.
- Law 3: A robot must protect its own existence as long as such protection does not conflict with the First or Second Law or cause greater harm to humanity itself.

They are in fact fundamental laws which humans must also obey in the name of the common welfare, as an expression of their social conscience and free will. And here is my proposal for three basic laws of humanity, laws that should be obeyed all the time by each individual:

1. A human may not harm another human being (or humanity), or, by inaction, allow a human being (or humanity) to come to harm.
2. A human may communicate, collaborate and work together with other people, as long as these actions do not conflict with the First Law (1).
3. Humans must continuously improve their life and preserve the natural environment, using all the means provided by science and technology; their supreme duty is to learn, to wonder, to invent, to explore, as long as these activities do not contradict the First Law (1).

This minimal set of laws must be adjusted once human evolution reaches a cosmic dimension, especially if we meet another advanced civilization.

The exodus to other planets is absolutely necessary?

Of course, the human exodus is necessary, and it should have several destinations. We need more resources, we need more space and we must explore the unknown. Humans need to colonize other planets, but they must not disturb any other life forms or alien civilizations in this process.

What has prevented us to have a faster growth rate?

The progress of humanity was remarkable, especially in the last two hundred years. We took advantage of many natural resources (such as coal, gas and oil), so we have built cities and cars; now, we are communicating instantly and we are traveling very quickly. But all these things could have had a higher pace if an obscure force would not have opposed constantly, in addition to our well-known social problems.

The generic term "church" will be further used to denote all sorts of organizations, institutional or not, which spread "religion" through an elaborate scheme involving mass deception. They actually sell some pseudo-moralizing stories centered on one or more deities, on a divine creator of the world, used across millennia to control and exploit the less informed people. Many persons have taken this whole invention for granted, even believed in this supreme being. Over time, the church has managed to impose "faith" as a single means of knowledge and to indoctrinate lots of people, perverting their minds and slowing down the global progress of mankind by centuries. The malicious combination of some so-called answers related to the mystery of life, the imposition of a so-called code of conduct for people in the name of a so-called sacred text, the artificial segregation in believers and non-believers and the punishment of the latter - all of these have created a criminal mechanism

that has freely operated in the last two thousand years. Its impact on humanity, regardless of the historical period or location, was and still is disastrous.

Presented as a "spiritual" thing, this "faith" mechanism is a concept full of pseudo-explanations that targets a sensitive area (still dominated by some mystery) of our conscience. It has exacerbated the primal instincts of humans and alienated them gradually, paralyzing and annihilating their natural appetite for knowledge and rational explanations. There may be a justification for that, it may have been normal in the dawn of human civilization, when the fire and the falling stars were inexplicable things. Maybe it was normal then, for about five minutes. Unfortunately, these pseudo-ideas were spread rapidly; the church's institutions have strengthened and even tried to suppress the scientific "opposition". And there were many servants willing to continue this criminal scenario, while most politicians took advantage of this opportunity and let the church thrive. Seneca himself might have said: "Religion is regarded by the common people as true, by the wise as false, and by rulers as useful". Anyway, this church business has turned into the ugliest affair of global dominance and control in human's history, and does not seem to fade fast enough in the third millennium. Power, in any form, is something very attractive, something worth killing for, both physically and spiritually; therefore, many people are still lacking today their complete freedom of thought. Indeed, humans were violent creatures, territorial and possessive, willing to take advantage of the others. But many years have passed and this kind of struggle should be long gone from our personality. Humans turned civilized at some point and this had to change them, to affect them deeper, up to the genetic level; only a few generations later, they must have become normal and balanced beings, living in peace and working for the common welfare.

We may continue to blame our nature, but there is more than that... Our inner essence is in fact a mixture of love and hatred, aggressiveness and understanding, personal and group well-being, altruism and greed, which seemed to be progressive at first. However, these antagonisms should have diminished over time, and the biased groups of individuals had to disappear.

If we were to measure accurately, the global "benefit" brought by churches to our civilization is in fact a significant delay in human progress, a global human regression of hundreds of years. Science would have been in a higher, normal position and the earthlings would have been free to choose their new home planet now! These religious organizations have caused serious harm to humanity in general, and their evil influence is very difficult to compensate; they all clearly show, as well as the politics, the negative side of

the groups, leaders and social structures, as they all have favored the abuse of power. Unfortunately, taking advantage of the so-called freedom of religion and of the broader concept of freedom, these churches are and will still be able to control a large number of people for many years.

But the goodness will prevail eventually?

The great work of many scientists has significantly reduced those delays in human evolution. Over the last centuries, geniuses like Darwin, Newton, Einstein have shown the true power of the human mind and how scientific knowledge may help us progress. They revealed the materiality of the world and the laws of nature at any scale. Also, they have proved how life emerged and evolved naturally, shedding light this way on millennia-old mysteries. The creationistic "blindness" of human reason has just come to an end. A new era, of scientific progress, has begun; people must embrace it in order to improve their life and to protect the planetary environment. The positive and the tolerance will be released from all of us, and we eventually come to live together in normality, we will freely expand and evolve.

Our intelligent species is about to complete a difficult evolutionary stage. But we have to rethink life itself and its real value, and, to that purpose, a minimal initiative was described above. We cannot engage in a major cosmic endeavor as long as our inner and outer conflicts are not yet settled; they must not follow us in space, under any circumstances.

It was a very long journey... It all started with the granular fluid and its special mechanics, with those hydrogen atoms that filled the space about 14 billion years ago. Then the first stars ignited, and many other chemical elements were forged inside their hot cores. Some stars went novae, and all the planets and their moons were soon born from the accretion of that cosmic dust. At the edge of a regular galaxy, on a small planet called Earth, complex molecules have joined together and formed the first living cell. One cosmic moment later, about 4 billion years, those primordial organisms turned into some evolved creatures named humans. They are self-destructive but intelligent and full of curiosity beings. They have reached their Moon and soon will set foot on another planet, Mars. But could they travel even farther, on the way to the starlight, leaving behind all their inner contradictions and becoming a normal, real cosmic civilization?

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