Cover Feature

What will Happen After the Final Victory?

Genrich Altshuller and Michael Rubin

Translation by Lev Shulyak and Steven Rodman
Technical Innovation Center, Inc.

With Preface by Lev Shulyak and Introduction by Michael Rubin

Preface

Lev Shulyak

When I read this work for the first time in 1998, I was impressed and shocked by Altshuller's prediction of the future of our civilization in the next 100 years. His unique mind opened for me the reality of our future: life without nature in a natureless, technological environment. His prediction is difficult to accept.

I started to recall specific events in my life, and found how truthful his prediction was.

I remembered how, being a young engineer in 1957, I worked on the construction of the Bratsk hydroelectric power station—the largest of its time—in the middle of Siberia, on the Angara River. The goal of this construction was to bring electric power to this distant region. This was, in itself, a good goal. However, let us look at its final result. Because of this construction, the entire ecological system over a vast area was destroyed. Large fish, similar to salmon, called timen could no longer migrate, and slowly disappeared. A lake 600 km long was created. First, it changed the climate of the region: dry, cold and sunny winters became warmer, snowy and cloudy. Second, the growing lake bottom needed to be cleaned of trees, and prepared for the new rising water level. However, because of a promise made to Soviet Chairman Khrushchev that construction would be finished on a specific date, the forest in this area was set on fire instead of cut down with the tree-stumps removed. That led to pollution of the lake for years to come.

Then a second dam was build 300 km further down the river. The result was the same. Poor Nature . . .. It's only because Nature has a tremendous surplus of resources that she can forgive us for these drastic miscalculations.

I thought that in America it would be different. It is not. A chain of six dams on the Missouri river, potentially one of mankind's greatest achievements, went wrong because of destruction of the regional habitat. Today, the Government is considering restoring this region by destroying all, or some, of those dams.

During the last Century millions of buffalo disappeared from America. This Century has become fatal for whales. Now, perhaps the time has come for elephants. Only those species flourish that can adapt to living alongside humans—rats, crows, sparrows and cockroaches.

So, the authors of this article have described a future that is not too far away.

Today we have become aware of our main ecological problems. The battle to preserve nature has begun around the world. Unfortunately, there is no guarantee that the next ecological catastrophe—one even worse than Chernobyl—will be prevented. This means that mankind must protect itself.

Along side the problem of a natureless technological world (NTW) is the problem of the co-existence of humanity with technology, and therefore, the problem of human artistic expression somehow converging with technology in order to sustain our very humanity itself.

As you will see, the "NTW Problem" is the problem of today that most affects our future.

—Lev Shulyak, Summer, 1999

Introduction: Genrich Altshuller and NTW

Michael Rubin

This small work is the result of many years of exciting and fascinating research conducted by Genrich Altshuller from 1980 to1987: How do conditions on Earth effect technological evolution? What kind of technology was on Mars? Why does a technological civilization dominate over non-technological?

Each time, the subject of investigation was reformulated. In about 1983, after one of his seminars, Genrich Saulovich completely changed his subject: a new direction must be found which allows for developing technology intensely while, at the same time, preserving Nature. Every week we had a meeting. Different methods of investigation and research were invented. Card index data was created; a large number of factual materials were worked-out.

In 1987, as the result of this research, the article "What Will Happen After the Final Victory. Eight Thoughts About Nature and Technology" appeared. This article was published in Poland (Warsau), Cheliabinsk, Petrosavodsk (USSR) and in the magazine Knowledge-Power. The lecture was presented to engineers, scientists and students in colleges and schools. This work, as a rule, created strong emotions. More often, they were negative emotions . . .. Humans have a habit of closing their eyes to obvious things in order to preserve their own personal internal peace (calmness).

At this time, this work continues along these three directions:

1. Development of forecasting methodology.
2. Preparation of forecasting for development of social-technological systems based on NTW concepts.
3. Development of a Theory of Civilization Evolution.

— *Petrosavodsk, September, 1999.*

What Will Happen After the Final Victory

Genrich Altshuller and Michael Rubin

Let's not be deluded with
our victory over Nature,
for Nature exerts her revenge after every victory.
—F. Engels, Dialectics of Nature.

Part 1

There are three basic types of destructive influences imposed by contemporary technical civilization on the natural environment:

1. Criminal destruction of Nature.
2. "Lawful" destruction of Nature.
3. Necessary dislodging of Nature.

1. Criminal destruction of Nature

This is the most undisguised form of destruction of the natural environment. Initiating forest fires is an example. Secretly dumping oil from tankers into the open sea, another. The chemical industry dumping oil refinery waste into rivers and lakes. Releasing harmful gases into the atmosphere while ignoring all regulations.

Society has, to some degree, cultivated an intolerance of the criminal destruction of Nature. Laws and regulations that protect Nature from this step-by-step barbaric destruction have become strict. There are resources to protect Nature: in general, new and stricter legislation can be enforced—and better and austere control over its compliance can be established.

2. "Lawful" destruction of Nature

Laws allow for the destruction of Nature within certain "safe" limits. It has turned-out that, after 10 to 15 years, these limitations must be drastically increased: restrictions are now being reconsidered, and made more severe. However, in many cases, it is already too late. It seems that such restrictions must be strong from the very beginning. For instance, to resolve the problem of photochemical smog in Los Angeles, auto transportation must be restricted or even prohibited. Who can enforce this legislature? The lawful destruction of Nature is dictated by economic sensibleness. It is difficult to change our idea of "sensibleness." Instead, we have to change our sense of values. Meanwhile, in disputes between automobiles in the center of towns vs. suburban forests—the automobile is winning.

Of course, there is another "lawful" destruction of Nature that is not dictated by severe economic necessity, such as the apparent situation with a cellulose factory in Baikal. Today, the area of forest drought in the Baikal region equals a half-million acres. Fish are dying, and the quality of water is changing. Production of cellulose has a higher priority—because of economic sensibleness—than Nature's treasures in this unique region.

Sometimes, the "lawful" destruction of Nature is not done directly, but through several steps. Laws do not prohibit building high-capacity tankers. However, a large tanker means a lot of oil concentrated in one place. The ocean is still the ocean, with all its dangers. The wreck of a small tanker is an incident; the wreck of a supertanker carrying millions of tons of oil is a global catastrophe.

The aviation industry develops at a high rate. The number of airplanes is constantly growing, and engine power is increasing along with flight altitude. More and more harmful gases are thrown into the atmosphere absolutely legally. Laws cannot foresee the growing danger of ozone layer destruction in the atmosphere. Meanwhile, the ozone protects all living things on Earth from harmful ultraviolet rays.

The power of lasers keeps growing—yet the law cannot predict the possible future effects of powerful laser beams on the atmosphere.

Laws tend to not interfere with economic interests. Laws do not look into the future. This explains the lawful destruction of Nature.

There are still some natural resources left in reserve, so laws must become stricter and more farsighted. However, these resource reserves are not substantial, and it is impossible to significantly slow down economic development and scientific-technological progress.

3. Necessary dislodging of Nature.

Human population continues to grow. New cities are needed, with new factories, new roads, et al. New space is needed for this new technological world. But there is no space left—only that which is still possible to take from Nature.

Suppose the lawful destruction of Nature is totally stopped. Suppose we establish wise and farseeing laws curtailing predatory economic development. There would be no blunt criminal destruction of Nature, nor any "lawful predators." Nevertheless, technology will vigorously erode Nature. New space is needed for ever-increasing populations, requiring the development of new technologies to provide higher levels of living for this overall rapid population growth.

Let's imagine the impossible: An effective method for reducing the population growth rate is discovered and implemented. In the most ideal situation, its effectiveness will only be realized after three-or- four generations. This time period will be more than long enough for technology to completely dislodge Nature.

Thought One

There exists today a shaky equilibrium between Nature and technology. However, Nature is potentially doomed. It will be inevitably forced-out by ever faster-growing technologies—even if the lawful, and unlawful, destruction of Nature is stopped.

The notion that Nature will eventually be dislodged by technology, even in the most ideal situation, meets with strong psychological resistance: "This can never happen because it must not happen."

The most widespread reasoning is that there is plenty of free space available on our planet. It is true that towns, factories, roads use only 3.2% of the planet's land capacity. Agricultural land and farms take 10.6%. Pastures take 23.2%. Water reservoirs, rivers and lakes take 2.4%. This totals 39.4% of all available resources. This doesn't seem like very much—less than half of all available space. However, what is left? Glaciers, dunes and land already ruined by humans–15%; forests–30%; deserts–6.9%; swamps–3%; tundra–5.5%. The land is already completely apportioned! Growth of pastureland has stopped. Forest area is reduced annually by 1.7% (0.5% of the planet's total resources). This is a catastrophic rate. If there are no forests and oceans, there is no oxygen in the atmosphere. The development of desert land is a very expensive and slow process. Take, for example, the Karakum canal. Its concrete base was expensive to build (the canal has a ground base through which 17% of its water is lost—170 thousand liters of water per second!) As underground water level rises, salt-water lakes are formed. There can be only one predictable consequence of this, and that is nothing good can ever come of it. The draining of swamps will destroy the ecological balance; many types of plants will disappear, some forms of animal life will die, and so on. It is necessary to have deserts, swamps, and forests. Everything that can possibly be taken from Nature already has been taken.

Another argument is sometimes offered: Technology, as it evolves, tends to miniaturize. Today, computers are a thousand times smaller than were the first generation computers. The working elements of contemporary machines become more compact: Productivity, per one unit of weight/volume, increases. This creates the exact conditions to create an explosive growth in the numbers of machines: A thousand times smaller in size, and a thousand times increase in the number of working elements, taking-up a thousand times more space on Earth, requiring more space to manufacture, as well as service, this micro-technology.

And one more argument: technology can be moved to outer space. This, too, is in vain! Transferring technology to outer space requires the special intensive expansion of manufacturing area back on Earth. It requires new mining, processing and machine building plants. It requires new towns, roads and space-ports.

Nature is doomed. Even with very delicate preservation, it will be dislodged by technology. Even if we try to slow the development of technology, the braking distance will be too long.

Three-or-four generations will pass, and mankind will live in an environment where Nature remains only in backyards. Forests will pass by stages: First, preserved wild areas, then parks, then orchards, and finally small, wilted local gardens. Farmlands are reduced to green houses. The atmosphere will be polluted to unacceptable levels for human standards. Maybe this happens not over three-four generations, but five-six generations—what is the difference? What's important is that this is inevitable. It will happen inevitably, even with the most delicate preservation of Nature. It will happen because it is programmed to happen. We will not have time to change our lifestyle; we will not learn that the "Treasures of Nature" have more value than "automotive amenities." We have lost the time needed to restructure and save Nature.

However, there is still time! Time to look the situation straight in the eyes, and prepare ourselves for life in this new technological world.

Up until now technology has dealt only with so-called natureless "microworlds" [Translator's Note: This is Altshuller's term for sub-systems that are smaller environmental subdivisions within a larger environmental macro-system]. Manmade worlds have been created in limited spaces: submarines, airplanes, spaceships and, to some extent, manufacturing facilities and houses. In general, civilization has been comprised of a combination of

Nature and technology. Nature was not excluded; she worked along with technology (and vise versa—technology along with Nature). At the same time, the goal of creating and improving these natureless microworlds played an important role in the development of technology—a driving force behind technological progress. The large-scale development and operation of these comprehensive natureless technological worlds will require solving large numbers of technical problems. The needs of these new worlds will become, for a long time, a major factor defining future technological progress.

Thought Two.

Designing a natureless technological world (NTW) will reveal in advance problems that are vitally important for the continued existence and growth of civilization. It will help prepare "on time" solutions to these problems. Thus, designing the NTW will provide directions for social and technological forecasting.

Today, we are lavishly paying for fulfillment of our desires in the currency of Nature. We wish to have millions of cars—no problem. Our roads have stolen thousands and thousands of miles of natural space while oil extraction and refinery has destroyed much land. Decide to publish books and newspapers—no problem. We just axe more forests—our sources of oxygen.

It is impossible to transform this world into a "natureless" condition—we cannot pay that large a price. NTW must be based on different principles.

Part 2

The thought of the inevitability of a world without any living Nature is frightening to our imagination. Let us temporarily turn-off our emotions and soberly appraise the possibility of creating an NTW.

In principle, the possibility of creating an NTW depends, first of all, on our ability, or inability, to do through technology those things that Nature does "free and automatically:" provide humanity oxygen, drinking water, food, energy and useful materials. The list of Nature's gifts is endless. Nature automatically, and at no charge, provides the human race with optimum factors for existence: gravity, atmospheric pressure, light, temperature, and air humidity. Nature tirelessly destroys waste. She provides rhythm (cycles): change in seasons, cycle of day and night, biorhythms, and so forth. Nature also provides reliable protection—protection from radiation, harmful rays, over-heating, and over-freezing.

In the framework of this article we will cover only the possible biotechnical providers of Nature's most important functions: providing humanity with oxygen, drinking water and food.

"How can we design the NTW?"
"How can we provide for life in the NTW?"

When stating such questions it is possible to have an impression that the NTW is something whose construction we can both begin and finish. Meanwhile, we already live in an NTW. We remain in our houses, subways, busses, workshops, supermarkets, theaters, and sport buildings. We do not drink spring water, and it is seldom that we have in our diet biologically clean produce. This is the beginning stage of an NTW, when the environment to some extent is already natureless; however, the life-supporting resources are still based upon natural systems. The next phase is intermediate: part of the functions of our life support systems will be provided artificially, and part by utilizing natural resources. At that time, the artificial part will constantly expand. Finally, the last phase: an ideal NTW—a world in which the degree of independency from Nature (or, more accurately, from that part of Nature still preserved) is very high—about 90% and expanding.

The creation of the NTW is a lengthy process that includes, in principle, several different phases. A complete (ideal) NTW is separated from us—people living in an earlier NTW epoch—by several Centuries. However, it makes sense that the first rough calculations for the life supporting means of mankind should be made in relation to the completed NTW. This is because the processing rate for forming a completed NTW is always accelerating.

One more preliminary consideration before we start calculating. In accordance with United Nations forecasts, the population on Earth at 2080 will stabilize and reach not more than 8 billion people. At that time, the power of all energetic systems will be equal to about 7x1010 kwt. We will make our calculations based upon this data.

Provision of oxygen.

One person needs about 550-600 liters (0.83 kg) of oxygen to breath during each one-day cycle. By the year 2080, all mankind will consume 1.6x1015 liters; technology at that time will also consume 6-9x1017 liters. To produce oxygen from polluted air by applying deep cooling processes requires 0.0004-0.0016 kilowatt/hr per liter. For the whole of mankind, this will total 1.9x109 kilowatts per year, or 0.27% of all energy produced throughout the world. To provide a closed cycle, it is required to produce oxygen from exhaled carbon dioxide. The process of decomposition of carbon dioxide by utilization of solid electrolytes requires a device with 6-8 watts of power. For each person this will require a device of 150 watts; therefore, for all mankind, 1.2x1017 kilowatts, or 1.7% of all energy produced in 2080.

Providing mankind with oxygen in the NTW is a relatively non-difficult task when we are only talking about breathing. It is quite another matter to provide the artificial production of oxygen for technology: This requires more energy than will be produced in the whole world.

Technology must be oxygenless. First of all, this means giving-up the burning of coal, oil and gas. A new stream of inventions on the subject of oxygenless processes is required. Today these inventions are not profitable. However, we must conceptualize and create them today. Tomorrow it will be too late.

Provision of water.

The standard water consumption per person per day is 2.5 liters; in desert conditions, its 10 liters. For other needs (house usage,

Needs	Daily allowances of water for one person (liters)	Total consumption of all mankind per year (liters)	Power needed to produce water at the consumption rate of 0.01 kw/hr for 1 liter	Percent of energy relative to total energy produced in 2080
Physical survival	3	8.76×10^{12}	1×10^{7}	0.014
Everyday per person	150–500	4.38×10^{14}–1.46×10^{15}	5×10^{8}–1.7×10^{9}	0.7–2.4
Industry and agriculture	6,500	1.9×10^{16}	2.2×10^{10}	30.9

et cetera) in some large cities: around 500 liters. Taking into consideration manufacturing facilities, each person consumes 6,500 liters of water each day. Now, the daily allowance for each person on a spaceship or orbital station during a long journey is only 2.2-2.5 liters. In addition, hygienic needs require 6-25 liters of water per day.

There are many means for distilling ocean water: physical, chemical, electrochemical and biological. There are means to produce water by recycling it from human, medical or technological waste. Consumption of energy in this regard can reach 8-10 kilowatt hours for one cubic liter of water.

The table above contains data about energy consumption at different degrees of water consumption. Astronauts can manage to consume only 28 liters a day, or even less; therefore, we can consider some reduction in water consumption to at least 150 liters a day for a person. None of the variants for satisfying water needs should create concern except for our industrial and agricultural needs. It is here where the intensive transition into waterless technology is needed.

The total consumption of energy to provide water will probably not exceed 10-12% of that which will be produced. Only 0.014% will be used for life supporting needs. At the present time, the water supply takes 0.7% of our total energy production.

Providing food.

Calories needed by each person per day totals around 3,000. All mankind needs 1.16x109 kilowatt of food energy a year. Determining our total energy consumption also requires that we know the efficiency/output of our systems that produce our food. When natural systems are used (i.e., hunting and fishing) the muscle energy used is less than that contained in the hunted food. However, these methods require 20,000 times more space, and 33 times more work time, than contemporary food production technology. Saving space and time, technology lowers the efficiency of food production. In Britain, for example, one kilocalorie of technical energy can produce 0.4 kilocalorie of food.

There are two opposite tendencies within food production. On one hand, natural potential is constantly falling, leading to efficiency reduction. On the other hand, technology constantly improves and simplifies. This increases the return on energy spent producing food. New technology for producing food (nutrition) is gaining momentum. In this technology, the step of raising livestock is completely eliminated—vegetable protein is artificially transformed into a food source of equal quality to animal protein.

So far, there is no technology that allows for the provision of a closed cycle for food production without some natural system. In the near future, new tendencies in technology development will consider the utilization of a more simple natural system in combination with some technological process. Instead of an ecosystem, the ecosystem's components will be used; instead of animals, plants; instead of plants, fibers and bacteria. In parallel with this, food synthesis technology is being developed. In any case, food-manufacturing efficiency must not be lower than 3-4%. Therefore, to provide mankind with food requires 2.9x1010 kilowatts, or about 40% of our total produced energy. Today, agriculture consumes only 10% of our total energy.

In essence, the provision of any NTW with enough basic food to support life is dependant completely upon the cost of energy. Even today, the present level of technology can guaranty the provision of enough energy to support an NTW having a capacity of eight billion people. Of course, the population of this NTW must give-up automobile and air transportation in their contemporary forms that consume tremendous amounts of oxygen, water and other expensive materials. However, living in this NTW (breathing, drinking and eating (will be possible.

Thought three.

Technically (energetically) it is possible to build an NTW today with our existing technology. This is partially a sad conclusion, because that most powerful factor preventing the extinction of nature is no longer present. It is sad that we can live without nature by building an NTW because this means that nature will very soon be destroyed . . ..

Our calculations are preliminary and extremely minimal. Meanwhile, the world has been built with tremendous surpluses.

These surpluses, from nature's perspective, provide high system reliability. From the human, or, if we can say, the scientific and technical perspective, this surplus makes possible all research and development. Research and development of the world is linked with mistakes. In a world without this type of surplus, these mistakes would mean catastrophe. The world (with, or without, nature) requires a surplus.

Take, for example, the fate of Kara-Bogas-Gol. In 1982, the 200-meter sound between Kara-Bogas-Gol and the Caspian Sea was closed with a dam. The decision to do this was made because of the so-called "shoaling" of the Caspian, a result of high water consumption along the Volga River. Later, when Kara-Bogas-Gol salt, a valuable natural product, turned into a poisonous dust blown about by the wind, it was discovered that the losses from a dried-up Kara-Bogas-Gol were higher than those losses from the shallowing of the Caspian Sea. At the same time, it was also observed that the level of the Caspian Sea had not gone down, but had, on the contrary, risen. It was discovered that the main factor affecting the sea's level was tectonic processes of the sea's bottom, and not the evaporation of water, or its drainage through the Volga River.

In an NTW with no surplus, such a blunder could mean global catastrophe, or at least an emergency disaster. In a world with high-level surpluses, even large blunders can be easily overcome.

Designing an NTW with high-level surpluses means, in the first approximation, providing sufficient energy reserves, as well as a limited number of the most important materials. This task is not beyond reality. However, "reserves" does not mean "unused reserves."

During winter, the village of Kurush, in Dagestan, is completely cut-off from civilization. From ancient times, fences surrounding houses in this village were made of kisiak [a dried, flammable mixture of grain, straw and animal dung]. If there is not enough firewood at winter's end, the fence will gradually be used for heating. In summer, these reserves are again restored. In 1962, an American aircraft company offered a similar solution. Sections of internal partitions of the Apollo III spacecraft were made of a compressed food mixture. Another example of creating reserves is developing furniture containing Berthollet's Salt (potassium chlorate). When this furniture catches fire, it releases oxygen.

Thought Four

In general, it is possible to build NTW's with large surpluses (NTW+). This will require finding, and realizing, many new inventions. It will also require higher degrees of caution during the research phase and reconstruction of the world. Considering the accelerated development rate of science and technology, it is possible to assume that the creation of an NTW+ will be possible within the next 80-100 years.

Part 3

It has been possible to build NTW's, and even NTW+'s, for some time now. This is not much to celebrate. Mankind needs the natural world for a very long time, if not forever. Man must feel that this world will always exist. Only in an everlasting world will there be motivation to continue progress from generation to generation (the inspiration to preserve and develop civilization.

There is no technical means that allows for providing an eternal NTW. Basically, this is a social problem because we are talking about the construction of the WORLD ITSELF, not comfortable and long lasting cells (cages).

Thought Five

Socially stable and growing NTWs (both SS-NTW and SS-NTW+) must be worlds containing infinite knowledge. The beauty of these worlds must also be infinite. Only such worlds will be everlasting.

Providing infinite knowledge is relatively simple—through continuous research in microcosms (deep into substance) and macrocosms (the Universe itself). It is much more difficult to create worlds with infinite beauty. "Beauty Resource" is that indicator by which technology is far behind nature. Technical systems obtain, as a rule, the quality of beauty only at the end of their existence (for example, the beauty of tea clippers, or wooden architecture). Usually, "technical beauty" is a narrowly functional beauty (like the streamlining of high-speed transportation), or the imitation of nature.

In 1982, when we started to work on the subject of NTW, we went through many stores in Baku that sell electrical appliances. We found 20 types of electric fireplaces. Eighteen had naïve, or rough, imitations of burning wood. Two electric fireplaces (the most inexpensive) had limited functions—they looked like primitive electric heaters. Even in patent literature we did not find one invention that could claim the beauty of physical effects belonging only to technology, and not to nature.

Humans appeared and developed in a world favorable to learning and beauty. This is one of the main reasons for the fast transition from ape to anthropoid stage. However, as fast as a main transition appears, the opposite transition happens (perhaps even faster!) if mystery and beauty within the world disappears.

Nature has tremendous "reservoirs of beauty." In an NTW, such reserves will be impossible to create. An inexhaustive reservoir of beauty in any NTW can only be attained by creating the possibility for it to continuously reappear and develop.

Let me explain this thought. Before music, there was only natural noise: the whistle of wind, forest murmurs, bird songs, and the rhythmic rush of ocean waves. Music begins with the imitation of nature's sounds. However, this sound imitation soon grew into MUSIC. This is just one indisputable case where "technical beauty" (meaning "beauty created artificially") is much stronger and more inexhaustible than "natural beauty."

Thought Six

The creation of a socially stable and evolving NTW and NTW+ is impossible without many new socio-technological inventions, just like in the transition from natural noise to music. The solution of these complex super-tasks may require tremendous consumptions of energy and time. Therefore, it must be started today. Tomorrow will be too late.

In the natural world, it's possible to think by the trial-and-error method. Nature's great surplus absorbs the results of mistakes, and forgives slow and ineffective solutions to problems.

Thought Seven

When building SS-NTW and SS-NTW+, as well as living in these environments, requires another type of thinking: A more effective thought process that excludes major miscalculations, and considers the dialectic of a rapidly evolving world. The Theory for Solving Inventive Problems (TRIZ) can be considered as a remote prototype of this kind of thought process (or, more accurately, those general concepts of strong thinking procedures on which TRIZ is based.

We live in a world whose core obsession is material consumption. During each century, this world consumes half of nature, and four-fifths of nature's beauty (these are only approximations, but we are talking about at least an order of magnitude).

Thought Eight

In an NTW, it's necessary to deny ourselves a material-incentive life style as life's central value. The main vector of the NTW must become that of creativity. It must be directed into the deeper and wider study of our world in order to make it richer and more beautiful. Most of the NTW's population will be involved in creativity. A wide training network will be required in order to teach a new philosophy of life, and a new technology of the creative thinking process. The distant prototype of such a system is today's classes in TRIZ.

We wanted to end this article with a traditional address to our readers: "The Authors will appreciate any criticism and comments." However, speaking honestly, we know those comments and objections, and our attitude toward them is sad rather than appreciable. People are accustomed to a world within nature, naturally. Thoughts about the inevitable transition of this world into an NTW prompt very strong and negative emotions. A list of objections that we heard, while working on this article, could take-up dozens of pages. These objections are based on emotions (or, primarily, on emotions), and are, therefore, irrefutable. For example, how can we answer this argument: "This is all rubbish! I cannot imagine life in a world without the sky, sea, forest, animals . . .." Take, for example, this objection: "People cannot live without wars and confrontations. In the NTW, any military confrontation would mean the end of civilization . . .."

In the beginning we tried to confront emotions with logic, reason and calculations. We proved that a transition to the NTW has already happened, and there is no way back. We carefully hinted that our ancestors also could not imagine life without caves and mammoths. We made an analogy between the NTW and a ship: There is no internal war on ships; otherwise navigation would not be possible. All this was in vain. Our opponents continued to repeat: "This cannot happen because it has never happened in the past!"

It is impossible to argue over emotions—or shout-over, or stop them. For these opponents, a green light must be turned on—let them spill their feelings freely. A man colliding head-on with the "impossible" (or something that seems impossible) first exclaims before actually thinking, "This cannot happen!" He may repeat this a thousand—or ten thousand—times before finally saying: "But, what if . . .."

So, the authors have appreciated these criticisms and comments in advance. They promise to precisely—and firmly—consider all objections.

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