

System notion, FSA, modelling, problems and solutions

The discussion (mainly on August 7, 2019) was compiled from a [Discussion](#) (in Russian) in the Facebook account of Valeri Souchkov.

English Translation

Andrei Kuryan - there is still such a thing as a solution. If you decide to use a hammer to keep the door to the balcony open, then you created a solution. Do you mean that?

Nikolay Shpakovsky - Well, if we solve the problem of how to keep open the door with a hammer, then we first build in our head a system that includes door, knocker, floor there, wall ... If the system is lined up, we can on this basis build a real device to support the door. Lined up partially - we solve the problem to obtain a working system.

Andrei Kuryan - look, in your door locking system a hammer is present. It performs some function that satisfies your requirements here and now. The solution also includes a hammer insertion operation into the gap between the door and the wall, and then to get the hammer out of there. If you show this solution, for example, to a neighbor, he will offer you instead of a hammer use a suitable block of wood or plastic. The door support system became cheaper. Door and hammer support systems are different systems? Is this a system at all?

Nikolay Shpakovsky - system cannot be cheap or expensive ... cheap or expensive may be a device that implements this system in real life. I did not understand about operations, but you can build a system that includes operations, no problems? It's called process

Andrei Kuryan - In Systems Engineering a system is considered throughout its entire life cycle. According to the TRIZ multiscreen approach a system is not only its version AS IS or AS NEEDED, but AS IT WAS. In other words, in TRIZ, the door support system is both an assembly of the system and the system's evolution: first with a hammer, then with a bar, etc.

Sergey Simakov

1. It seems to me also Valery writes about classifications. When we speak of a system, we speak of a language. Which allows to squeeze world information. Discard the excess that is not needed to decide about the problems. By the way, not only with this help we do it :) It's just about building models. In this sense, systems are everywhere and always. As a property of our thinking. And most likely not only ours. If selected an object - you have a system, a classification. In this sense, the dog also thinks systematically. :) This is the starting point for further malicious determinationitis (дальнейшего злостного определительства). System - this is a certain model in which the supposed to be insignificant for future action parts are eliminated. Partitioning a system into subsystems, etc. - is a process of simplification of the model. When arguing above about the lens, where the border, it was about a more practical model. Well, of course, everything depends on time, i.e., how model properties change over time.
2. And immediately arises the question, is it useful to divide systems into natural and artificial or natural and not natural. By the way a question: What is the difference between these two divisions :) What does this give for practical applications. Personally, I see the need only

when someone can change a system by its own free will, i.e. human appears as an element of the supersystem and this is important for its description. I.e., when we talk about artificial systems this implies that a person can significantly change it. I will not go into details, as human is social - accompanied by a whole society. Somewhere like that. In my mind.

By the way, when I prepare for the exam in physics, I also very actively use the concept of a system, a functional model. :) And methods to work with them. Naturally in this context. The majority more inclusive, to some very advanced or with very large problems I explain everything exclusively. Would there be no exam - there would be no problems and no teaching of system thinking. :) The only bad and good thing is that tutoring requires for each client a completely individual trajectory, which is here and now. Very interwoven with the specific material. In this sense, I did not come to a normal systematization. I tried to do all cleverly, with detailed training planning, but this continuously failed. Therefore, as it is, there are certain general directions, and details as I get here and now. But these are my problems. My features.

Nikolay Shpakovsky - I want to explain to the distinguished assembly my possible annoying relation to the system notion. The concept of a system (technical, complete, functioning) is very actively and effectively used in our approach when working with our tasks. Therefore, I had to clarify well enough such notions as object, what is a system, where does the system live, what type of system is the most effective for solving a problem ... for myself, of course. So this discussion, although off-topic here (sorry, Valery), was useful to me.

Valeri Souchkov - Nikolay, this discussion is just about system thinking - therefore completely on-topic. If we do not determine how to understand the system notion, talking about any kind of systemic thinking is meaningless.

Nikolay Shpakovsky - well, let's try to compare the positions ...

1. the system is a thought-image, lives in consciousness
2. the main sign of the system is the purpose of its creation
3. when deciding about invention tasks one has to consider a system that gives some product
4. object and system are two different things
5. one cannot say the car system drives further optional

Valeri Souchkov - For me, a system is an aggregate of components (elements, subsystems), which has the properties and functionality that none of its components has taken separately. The boundaries of which are marked arbitrarily around those elements that form the life cycle of the system and realize the goal of the system in its supersystem (accordingly, any system is part of a supersystem into which it is included). A car, a bug, scissors, molecules, an atom - these are all systems. Everything depends on the boundaries. An object may as well be a system. Can't you say that a molecule, scissors or a car are objects? Only the definition of object is different. There are also nuances. If you take a knife and separate the blade from the handle, in principle, it can be controlled and it can also cut. And the blade (if you don't go to molecular level) is not a system. But important properties disappear - manageability and safety.

Nikolay Shpakovsky - an object of course can be (become) a system and, most likely, not one but then it will be called a system, not an object. An object is an unsystematized system, so to speak

Valeri Souchkov - It all depends on the level of divisibility. If we get to the subsystem, which is an element - that is, a component indivisible into other elements, we have the right to say - that's enough to divide. This element is no longer a system relative to our context.

Nikolay Shpakovsky - I understand, you can leave the subsystem at the object level, so as not to clutter up the analysis with which I disagree - car, a bug, scissors, molecules, an atom - these are all systems in my opinion - a car, a bug, scissors, molecules, an atom - all this can be represented as a system.

Valeri Souchkov - yes, you're right. It can be represented because a system is not some kind of physically classified object. This (a system - HGG) are the boundaries which we conditionally outline around a certain amount of interacting elements.

Andrei Kuryan - 1. "The system is a mental image ...".

1.1. But the same I can say about the mechanism, car, etc. In this sense the hammer is a mental image.

1.2. If this statement is necessary in order to indicate that there are no systems in real life, I do not agree. Correctly defined the system consists of real-life elements and interactions between them. At the design stage, we operate on system descriptions, based on which we can create a system in real life.

Valeri Souchkov - Yes, that's right, but that's when we talk about artificially created (designed) systems. Everything is simple here. Difficulties sometimes arise when we try to determine the boundaries of natural systems.

Andrei Kuryan - in natural systems, boundaries are defined by the scope of the laws by which we describe these systems. Borders of the solar system are the effects of the law of universal gravitation on a star, planets and other objects. The purpose of describing the solar system as a system is to check the compliance of the real movement of objects with the description through the law. If there is conformity, then we have reached an understanding of the solar system.

Valeri Souchkov - But a grasshopper, for example? :)

Andrei Kuryan - but not everything is known about the grasshopper :)

Valeri Souchkov - but I just imagine it as a system :) Jumping, chirping. For what it is a combination of components. Makes up a link in the food chain - the supersystem :)

Andrei Kuryan - well, if you can by such a description predict when and where he will jump and how chirp at any moment time, then yes, you have reached an understanding of the grasshopper system and you can use it for some benefit, I don't know, tickle my nose replacing the alarm clock in the morning :)

Valeri Souchkov - That is, since we do not know what a grasshopper thinks and cannot predict its behavior, we have no right to present his as a system? Although it seems that we can quite clearly outline its boundaries and even split into subsystems? By the way, here we are faced with another significant sign and property of the system - it is its behavior.

Sergey Simakov - Returning to the fact that the system is about information compression, about models that we will change later. And in this sense, the dog thinks systemically. Consciously or not consciously - is a second thing. The concept of benefit - for me - is also a completely second matter.

I mean, what we call an object is a frozen process. In the sense that simplifying the change of the whole model, something does not change. Selecting objects is when there is a description with boundaries. Another object has another description. And they interact - this is another rule and outcome. So the brains are just arranged. And as I assume, judging how vision is arranged, which selects at the level neurons some simple entities, and then complicates, it's a completely ancient biological modeling mechanism. Well, it's just that humans have grown to thoughts about thoughts as we think :)

Nikolay Bogatyrev - I don't quite understand why the dear colleagues doubted that the grasshopper is a system ... Of course, a system. It is an organismic structural-functional level of the animal world. A grasshopper has levels / subsystems: organ systems, organs, tissues, cells, cell organelles, molecular level (DNA and RNA). Deeper there is the atomic level. Besides, the grasshopper has several layers of supersystems: population, species, guilds, ecosystem, biosphere. Biologists can blame me for not listing all levels (they can be made more fragmentary). But overall I seem missed nothing ...

Andrei Kuryan - as a system you can consider all that anything, even a grasshopper. Why do this? Why the grasshopper system is better as the original grasshopper? We seem to be talking about this, no?

Sergey Simakov - We are now trying to describe the system notion using system tools :), i.e., find the boundaries where the system is no longer a system. I'm afraid that with this conceptual apparatus an internal contradiction :) cannot be logically explained. It requires something to believe. Consciously. :) For example, that there is an objective reality that we at least consciously perceive as a system. Always. And then what's the bazaar about - we just see everything systematically, because as soon as we realize, we see the borders.

And then the comparison of the original grasshopper and the grasshopper system is the systemic process of changing the grasshopper system model. Is it better or worse - it is again something about the supersystem. But I can't imagine a measurement procedure. If only not to fall into scholasticism. Meaningless and merciless. Sometimes better say - BELIEVE :) Make a reduction (how we work with models) and work.

The problem is that, as it seems, we plunge into logical loops and ignorance of something. Our knowledge is in a sense a realization, selection of a certain probabilistic state of the brain. And the model is poorer compared to the original. Therefore, it is necessary by force of will to put the stubs of faith. And go to practice. Maybe later, as the model becomes more complex, the method of simplification of faith will go somewhere to a more distant place. And it may be more practical to attempt to understand what we believe. Where are the borders. Although ... it's up to infinity ...

Alexey Schinnikov - Apparently there seems to be a disagreement about whether a system is a model of a real system or a system is this real system itself, that is the system is either a model or reality :)

Nikolay Bogatyrev - I will add ... The real grasshopper and the grasshopper system, as a rule coincide almost always and almost 100% ... But biological concepts / constructs "View", "Rhode", "Family", "Order", "Class", "Type", "Kingdom" (arranged in ascending order) very often can be very different - in reality and in the model ... With this situation, an unstoppable battle is waged throughout life by taxonomists and taxonomists ...

Alexey Schinnikov - in books on dialectics I met a simple explanation: there is a notion of general system and a notion of specific system. A general system is an idea, in programming - a class, and the specific system - a specific instance of class, a materialized idea, a reality object.

A general system (class) - grasshoppers, and the specific system - the grasshopper that I am now observing in the grass.

Nikolay Bogatyrev - well, yes ... The same thing is in phonetics: we know how "A" sounds in Russian ... But even the same person doesn't will be able to repeat this sound twice absolutely identical. (Instruments can easily confirm this, although we and others do not notice this, or rather, our brain - summarizes the signal).

Alexey Schinnikov - most of all I like the approach of object-oriented programming (object class). The class car Volga describes its properties and functions, and you can do with a class the Nine-screen manipulations, predict class changes to a new class. BUT class objects are specific Volga cars owned by motorists with numbers. Conveniently. Also on the Nine-screen you can analyze a specific object - the life cycle of a car at Uncle Vasya, for example.

In my systematic approach (Event Architecture) I divided the system notion into class systems and instance systems (objects).

That's why I asked Nikolay Shpakovsky why not say the car system drives. Yes, it's wrong to say that if we are talking about a system-class, but it's right to say so, if we are talking about a class instance.

Sergey Simakov - Yes. There is no system without a model. A model is a mapping of one physical to another. In this sense, for us (physics is a human body with brain, wider society - as a collective mind) all is a system. Including a specific grasshopper and its generalized model. Again I suggest to return to even the simplest models of the brain. Like model builder. Just the supersystems are different. A particular grasshopper launches one set of models. And the grasshopper models are different. Moreover, they are largely random and somehow filtered by context. For example a particular grasshopper in a meadow in the context of "beauty" launches models of sunrise, and in the context of "on pin" and "beauty" are completely different. The model of a grasshopper without a grasshopper in kind - launches memories of a beautiful functional diagram :) And that of a beautiful woman. :) Actually, the launch of different contexts gives rise to differences. But for this we need some meta-supersystem in which everything is measured. And stopping is required. I mean, that you can drive intelligence and maliciousness to infinity (умничать и злобно определять можно до бесконечности). Everything is connected with everything. And again it turns out that without Faith, that stops the determination process and starts the transition to activity - no way ..

Nikolay Shpakovsky - the grasshopper's mental model (system), different grasshopper models and the grasshopper itself are two different things. The same thing about the automobile. Confusion arises because the system exists on its own, it is present in the model, and is present in its real embodiment.

Sergey Simakov - And I'm about that. If I understood correctly. But still, in practice, I insist that I would like to understand how it all was created. And why are we building these specific models. For at first there were created a set of grasshopper models in various contexts, and then we combined them into a certain metamodel. And then the real something about taking measurements

was classified as a grasshopper which in itself is much more complex, but with certain parameters that are important to us.

Nikolay Shpakovsky - the problem of understanding the concept of a system is confused by the fact that in practice in the solutions of an inventive task we use it in two main cases

1. there is a certain device or phenomenon, technical, biological, any. We need to understand what its structure is and how it works. In order to improve it or something else. So we build the systems, subsystems.
2. You need to create a new device or technology. In this case you immediately start with the construction of a subsystem of systems in order to understand what will be the future car. Then we present them in the form of some kind of graphic, mathematical, physical and any models. We study them and - finally - get real new car. The grasshopper refers to the first case.

Sergey Simakov - In my opinion there is a very delicate case how to classify. In any case, construction is not on empty location. I.e., we need initial models that we will change. Either to understand their initial failure for transformations, studying their “physics” followed by a change, or believing that it’s enough to build new models on this basis. But there how it goes. In this sense, inventive tasks are about refinement of knowledge. New device and technology is new knowledge implemented in “physics”. In this sense, TRIZ in the broad sense is one of the sets of general environmental study instructions focused on meeting human needs with more technical means. Well and compare these sets with others and with each other, where the boundaries are - in a social meaning more expensive :)

Nikolay Shpakovsky - while realizing new knowledge in real life, it is necessary first to build it in the mind, that is, build models, especially the mental model - system. Of course, accounting many things, who will argue. But the essence does not change such matters. The system notion is the foundation of everything.

Alexander Veres - One of the main properties of the inventor is imagination. Exactly there exist systems :)

Sergey Simakov - So I am about the same. First in the head or heads. Again. I expand this a bit. This model is probably more than 90% not verbalizable. If you try to verbalize everything important - you can get mad. Previously verbalized has passed from conscious to automatic. I.e., a system as a model with which aggregated brains really work, is an order of magnitude greater than described. For the system that’s in the mind, as one of the most important facts it can get as swearing with the daughter (может попасть ругачки с дочкой). Which does not appear in any list of stakeholders and cannot be listed :) Off topic - exactly therefore children have to study at school for 11 years in order to automate at least 10%. :) For if you try to build at least a graph of knowledge - you can get into a mess. :) And exactly therefore, I carefully relate to AI for inventive purposes. By the way, as complexity control method - use various numerical program modelings if it’s not important - why. This is to make the heads unload. And to learn how to actively “collaborate” with them is a topic. I.e., highly significant, I repeat, conscious models of a system is a very small fraction of really applicable ones. Attempts to build a more conscious models have also negative consequences. Actually about that was the conversation about lens. With the conscious awareness of the model, a lot of interesting things can be noticed, that are not required for the specific purposes of building the

model, as if the main concepts are explained for newcomers (как пояснiловке к основным понятиям для новоинтересантов).

Nikolay Shpakovsky - under damned tsarism, when logic was taught in schools, they said this: “a revolver of the Nagan system, model of the Tula plant” someone can comment on that as part of our discussion?

Valeri Souchkov - Of course. In this case, we are talking more about an abstract system model that summarizes specific instances of the system. Here for example, the abstract elephant system. Elephant can be African, Indian - morphology and anatomy will be basically the same, the differences will already be at specific implementations. That is, there are some general properties and signs. For example, one elephant has oval ears, the other round. But every elephants will certainly have a trunk. Hence the hippopotamus does not fit into the “elephant” system - there is no essential component - the trunk.

Nikolay Shpakovsky - that is, there is only one system - the models are different, right?

Nikolay Bogatyrev - you can add - and each individual an African elephant, and a grasshopper of the same species, and a gun of the Tula plant will have individual differences (by type of individual fingerprints and shape auricle in humans).

Nikolay Bogatyrev - “that is, there is only one system - the models are different, right? “ - There is simply a HIERARCHIC STRUCTURE: 0) a car, 1) a light car, 2) a Ford car, 3) a Ford Fiesta model, 4) a Ford Fiesta of German / American / Russian production 5) individual copy of cars ... The same thing - with elephants, guns, grasshoppers and people ...

Sergey Simakov - But it’s possible in another way. Even worse. I would say one name for the systems, and for each context - different models. The theme is famous for us, when practiced intuitively. When for a metal collector and a racer :)

In a variant with a hierarchy such models are more or less the same. Just a narrowing of the permissible range of parameter changes from top to bottom. Well or in more complex situations - different sets, quasi interconnected.

Nikolay Bogatyrev - with a change of the context also systematology / taxonomy / hierarchy will change ...

Sergey Simakov - Indeed !!! And when you consider that the taxonomy and other this is very often a random choice between several options. This way or another ... :) I again about flexible logic turning into Aristotelian :) Which falls apart when detailing it And after all, somehow we have to work in this mess. And even the majority of the people does not even realize it, and make effective decisions :)

Nikolay Bogatyrev - yeah ... I also sometimes think how it all exists, works and how do we sometimes manage to understand each other (true .. not always :)). And elegant solutions are frequently found precisely when changing context: TRIZ and jokes are built to a certain extent on that ... :)

Alexey Schinnikov - the philosophy of dialectics distinguishes between systems-in general (classes) and systems-specifically (objects, class instances). The same approach is used in object-oriented programming, and well should be used in TRIZ to eliminate confusion of the abstract and concrete.

Andrei Kuryan - systems class - system - model - version - batch - product №, etc. - this is a classification and at the same time identification, adopted in traditional technology. There are international standards for the procedure of such classification / identification. But it's not really what TRIZ offers. In the system operator, a separate axis is the evolution axis of the systems, just designed to view the system from a point of view of how it appeared and changed. In other words, how did change its composition, structure and functionality. Therefore, by a system we do not mean just some kind of representation of a real object, but also the totality of changes in it.

Nikolay Bogatyrev - in biology an evolutionary view of what in TRIZ is called a system operator is a very widely used method in paleontology (in combination with reverse "engineering" ... :)).

Andrei Kuryan - yes, but there is a vague suspicion that the revolver Nagan system does not apply to biology :))

Sergey Simakov - Well, why ... In the context of interaction with Biotel - mostly direct. :) You can still have many biological contexts to look for. :)

Nikolay Bogatyrev - alas, has ... :(The most direct ... function of the Nagan stop the biological functioning of a large ground animal, for example, a human. By the way, biological and technical evolution have similar stages, only they go in different directions ... :)

Sergey Simakov - Nagan - as an element in the evolution of firearms - weapon evolution - vehicle evolution - human society evolution - evolution biological systems. Well, then you can look down to bacteria and DNA. :) But down (or up), the most stable and fundamental models are the physical models of the world. If you go to subsystems, you will fall into supersystems. And vice versa. Simply when they go down - the appearance of other super-systems goes more often on the unconscious level. Otherwise, the roof will go. I'm so, to play around. And as a comment to the conversations above. And as hint that this disgrace can not be uniformly described. And all the time you have to keep a balance between the accuracy of the model and the time to create it. Dropping the accuracy of inaccurate rules makes sense if it affects the result significantly. For, in the process anyway a bunch of feedbacks will be involved. And the most vile will become known, and even then not always, when everything is already over. :) I.e., it is not clear how to keep the balance consciously :)

Andrei Kuryan - yet the function of Nagan is to throw bullets. The use of the Nagan in decisions to terminate biological the functioning of large land animals, including humans, is far from the single use. IMHO, the threat to use a gun in disputes had much greater impact on the evolution of society than its direct application. And they can chop nuts))

Nikolay Shpakovsky - throwing bullets is the appointment of Nagan prescribed by its developers and manufacturers. It is still very unsuccessfully called the GPF (main useful function - HGG). In general, an object has no function (except subjectively assigned to it), it appears to depend on the location of the object in the system. Let's say we try to turn off the light, do not reach by hand and use to extend the arm the uncharged gun - then the function in his system will be like this - part of the transmission and a working body for acting on the switch (a person who saw a gun for the first time, he says - oh, this is a contraption for turning off the light).

Andrei Kuryan - this is a very interesting question - is the Nagan part of the turning light off system. In terms of multi-screen - no, because the Nagan was not intended as an element of this system. What then this? In IT, it is called a decision when the result is achieved by the assembly of ready-

made components, initially not intended for such a result. In real life it is called “life-hack”. I don’t know if a Nagan can be considered as an element of the turning light off system. Or a system is something more structurally stable.

Sergey Simakov - What will change in solving a practical problem if we don’t call it system?

Valeri Souchkov - It will be harder to see the resources that can be used to find a solution for a task with a higher degree of ideality. Allocating a system, subsystems and supersystem, produce the search for resources can be more fully and - more important - systematically.

Sergey Simakov - When I hear about the GPF, my hand involuntarily reaches for the gun :). Seriously, highlighting the GPF allows you to focus on the main thing here and now, transferring secondary tasks that arose during the solution process to later time. This all was fine at the time of the appearance of TRIZ, when systems were simple and it was enough to change one or two parameters to improve the functionality. Now if you stretch your tail your nose gets stuck. Therefore, it is of course useful to try to find the GPF, but it’s dangerous to focus on it. A set of functions with borders.

So I also about it. :) I.e. always a system what ever you consider. Moreover, according to the hypothesis, all this is stitched biologically. :)

Valeri Souchkov - GPF is helpful when the system is simple, as a hammer. Today complex multifunctional systems are developed. Take the same food processor that has several working bodies, and depending on what we need at the moment, the GPF is changing. Of course, we can say that the GPF of the processor is to “process the product”, which, in general, is correct, but too abstract. What about the smartphone’s GPF? Launch applications? Support talking? Taking a video? It all depends on the context of the application of the system at a particular moment.

Sergey Simakov - Yes. The problem is that the desire ALWAYS to find the GPF leads to, as you write, finding it at the highest levels of abstraction. Too high in the supersystem. Too far from physics of the specific system. The formal solution is to expand the system so that it starts to include a bunch of hell knows what. Well yes. Monstrous. But not decisively.

TRIZniks will forgive me, I’m also identifying a working body, engine and else. Never in life in practice I have used the GPF. There is a functional model. Enough.

Valeri Souchkov - Yes, when we define as a GPF a too abstract function, it loses its binding to specific components and processes. This is a goal, not a function. Therefore, in multifunctional systems I don’t define the GPF at all, but functions aimed at those elements of the supersystem, for the implementation of which a system was created.

In the functional model, they (GPF - HGG) all the same come to light, albeit in an unnamed form. Then it’s already possible to identify, analyze them if there is such a purpose. And they sometimes arise in task optimization.

Nikolay Shpakovsky - I’m also support the position that it is not clear where to put this system in solving a problem, and why it is needed ... apart from resources, perhaps. Everything changes dramatically if during the problem solution the GPF goes through the woods. You need to understand the function, which is performed by the object in the system in this particular situation. Systems after all different ones are used when deciding ... For example, what is the GPF of a harmful system?

Andrei Kuryan - GPF allows you to understand what the system was originally invented for.

Nikolay Shpakovsky - for what?

Andrei Kuryan - to understand why was originally invented the system. When you poke a Nagan on a switch, then the GPF Nagan - "throwing bullets" should hint to you that you are not using the Nagan in its direct destination. Therefore, this is a reason to use instead of Nagan in the system something simpler, like a wooden stick.

Nikolay Shpakovsky - I understand this for finding resources ... a little bit narrow but also necessary ... FOS everything is normal since the problem is probably that we are talking from different positions about our approach to the concept of a system (technical, functioning, complete, harmful, etc.). This plays a key role.

Nikolay Bogatyrev - Of course, Nagan has many supersystems: premium weapons, "stick" to turn off the light, goods for profit in the store, threat, sinker for fishing, etc. - But this is known about anyone object, process, phenomenon ...

Well, and again I repeat. For the simplest artificial systems you can find / understand / discover / prescribe its purpose, GPF ... But for natural, complex and / or biological systems to find / understand / prove function, goal, purpose is often very difficult ...

Nikolay Shpakovsky - and not needed you need to understand its function in circumstances of the task to be solved.

Nikolay Bogatyrev - well, yes ... That's what many biological systems do and those who describe them ... True, here you can make a mistake ... :) (But everyone can make a mistake, always, everywhere and in everything ... :)).

Andrei Kuryan - goals for the artificial system are defined at the supersystem level. The function of the system is determined by its structure, which, in its turn is determined by the limitations of nature. At the system level the requirements and functions are coordinated. Until for a natural system a supersystem is not yet defined, we cannot talk about its purpose and requirements for it. But nothing prevents to define its functions. That's just what? :))

Sergey Simakov - There is such a thing ...

1. Brains require completeness of the model. When it is not complete, and it is felt - the fuss begins. The composition of the model includes the answer to the question - "what for" from the point of view of higher forces. So to speak meaning. And surely - why am I doing this. But this is less so. That's reason for seeking meaning. Like a "heart requires."
2. Another reason is the appearance of goals that allow you to dramatically simplify the prediction. In fact, IKR (ideal final result - HGG) is about that. If we say that the goal is to preserve the species, then all has to be rejected that not corresponds to that goal. But life is more complicated ... :)

Alexander Karmazanov - the goal for the artificial system is determined by the creator of the system. A supersystem is a source of constraints, and even if the supersystem is recognized correctly. And for the natural system, or some third-party, the observer determines the purpose of an alien system.

Nikolay Bogatyrev - "But nothing prevents defining its functions." But why? :)) Well then - To, "explain" this incomprehensible, slurred, volatile, indifferent, hostile world, try to find a way to avoid blows, losses, disappointments, pain, and if you're lucky, then play and experience the delightful feeling that you own something, have and control it! ... After all, human is the sovereign of nature, human - it sounds proudly, well and further in the same vein ... :)

Andrei Kuryan - if as a supersystem for the natural systems we define the observer and society, and as goals - the ability to predict future states of this system, then there is only one small step left to take advantage from this system. Actually, knowledge about the future states of a natural system is already beneficial to society at least by the fact that it reduces risks. Then the boundary between artificial and natural systems becomes vanishingly thin. Moreover, natural systems can be considered as a subset of artificial ones, that is not yet adapted by the society for their needs :))

@Alexander Karmazanov: the system has many creators (interested parties), which are just in the supersystem. Moreover, the system has exactly as many super-systems as it has creators.

Alexander Karmazanov - that is, if the design bureau created the blueprints, the design bureau the project, the factory produced it ... and the customer used the system, now there are a lot of supersystems to the created system ... I think you got off the ground with this thesis.

Andrei Kuryan - you have listed far from all the stages of the system life cycle. But in general, it is true: at different stages and stages of the life cycle of systems are different supersystems.

Alexander Karmazanov - at different stages of the life cycle also the system itself is different, it is changed by the creators .. so you need to fix the system and the creator. How in programming, any algorithm contains at least one error, someone later fixed, new system, new creator ...

Andrei Kuryan - in TRIZ we consider different stages and system stages as one system. Moreover, even the evolution of the system we consider as one system.

Alexander Karmazanov - well, if in TRIZ you consider all stages as one system, so the creator is one, generalized.

Sergey Simakov - Just about this all they whined above. What if an attempt to create a comprehensive and even conscious model requires an infinite time and resources? Therefore, there are so many ways to God. And each has its own context. Someone can't eat without IKR, and someone saw him even not in the coffin. Someone draws algorithms of 10 sheets with books of comments and draws big figures confusing himself, and who is in 4 lines :) How convenient, do it. Only if suddenly it doesn't work, look for the reasons and change the approach.

Unfortunately, the above approach has a wrong side. Weak negotiability by the TRIZniks, poor interchangeability. If in engineering in principle, one builder can replace another, then in projects with TRIZ - everything is worse. Clients will howl. :) Here are the reasons for another crying ... Such discussions here somehow allow to synchronize the understanding of the boundaries of the heterogeneous comrades. Not adherents of one style of TRIZ Kung Fu. For it is one thing when there is a list of terms, and the other is live communication.

Alexander Karmazanov - but didn't they organize Ma TRIZ, other societies ... There are no common developments by groups of authors ... Each shuffles, adds in its own way .. In the modern world scientists can no longer make discoveries alone. It's only they who can choose someone who will be the "face." Where is the collective development and development of TRIZ?

Andrei Kuryan - "Well, if in TRIZ you consider all stages as one system, it means the creator is one, generalized." Why this strange conclusion? I wrote above that the system has as many stakeholders as supersystems.

Alexander Karmazanov - reason logically. If the system is each times changing, creators are changing. Different supersystems. And then we look at one generalized system in its development ... Hence therefore one generalized creator, and one generalized supersystem should be, otherwise it turns out on the left behind us the trees are a forest, and on the right behind the trees remain other trees.

Andrei Kuryan - the life cycle and evolution of the system are different axes of the measurement system. I still do not understand what is wrong?

Nikolay Bogatyrev - "Actually, knowledge of future conditions of the natural system is already benefiting society, even since it reduces risks." - Well, yes, agricultural, meteorology, medicine, ballistics, chemistry - all these areas have more or less strong prognostic devices than and attractive ... :)

"Then the border between artificial and natural systems becomes disappearingly thin. Moreover, natural systems can be considered as a subset of artificial ones that are not yet adapted by society to its needs :))" - Yes, in the field of biology, medicine, genetic engineering, bionics it is especially noticeable.

Alexander Karmazanov - is it not true that the whole TRIZ is built on generalization or induction? And it began with Altshuller who decided to identify common methods, and laws ... You can't apply the particular somewhere, but somewhere the general .. There must to be a transition .. From particular to general, and vice versa .. you get in different locations assertions without such transition ..

Andrei Kuryan - the life cycle of the system is analogous to ontogenesis, evolution - an analogue of phylogenesis. The 3rd axis of the system operator describes the hierarchical relationships between a supersystem, a system and subsystems, the 4th axis - between systems and its anti-systems. The modern system operator is a 4-dimensional space in which we consider the system. (Unlike 3-dimensional in classic TRIZ). By the way, it syncs well with approaches in traditional systems engineering. N. Khomenko at OTSM-TRIZ proposed a generalized N-dimensional system operator and its 7-dimensional implementation. Although his approach was not widespread.

Alexander Karmazanov - great all of this ... We just started by that there is a generalized system, but why, then this generalized system according to your new axis of reference, there were many super-systems, and many creators that contrary to the fact that a transition to a generalized "system" was made, without generalizing everything else. I regret that I was not able to show you and convey this mistake.

Andrei Kuryan - see,

1) if we consider the system at different stages of the life cycle, highlighting for each stage a certain state of the system, then for each such state we can define a supersystem. This will be different supersystems.

2) analysis of the use of such an operation to systems demonstrated that these super-systems are different from each other for the stakeholders.

3) A reverse analysis of such an operation shows that we can in the framework of the traditional stages of the life cycle system highlight some intermediate stage. For example, a smartphone at the stage of use can be used as camera, card or phone. We can consider such states as small stages of life cycle as part of the general stage. And for each stage we can highlight different stakeholders: photographer, tourist, subscriber. (Physically, it could be one person, but with different roles.)

4) As a result, the following rule was formulated: the appearance of (another) stakeholder is a sign for the presence (one more) supersystem of the system. Where do you see the contradiction here?

Alexander Karmazanov - The contradiction is that the new stakeholder is a private phenomenon in a certain period of time, with some new private system, or a new reference point. When the generalization is done anyway one stakeholder will remain as a general concept. Otherwise, the theory is not formulated consistently. Perhaps this is some beginning of a new theory, but not the old one.

Andrei Kuryan - I do not understand what generalization of the system you are talking about say it.

Alexander Karmazanov - you consider different systems in different points of time, as it changes ... Say that there are different stakeholders, and different supersystems Then you conclude that there is a generalized system, which if a new stakeholder has appeared, means there is a new supersystem. But why? The system was different each time. If we are in a single life cycle and we consider a generalized system, then why the supersystem is not generalized, and the stakeholder too? And yes there were no such concepts in TRIZ .. accordingly, it's even not TRIZ. Well, there is Lobachevsky's geometry and no one else argues .. But it's not TRIZ.

Andrei Kuryan - I brought a smartphone as an example. At different points in time the smartphone (system) is still the same, but its use is different (different states of the smartphone). As part of the LC (live cycle - HGG), we are considering a specific, not a generalized system. Actually, the concept of a system and its life cycle (hundred states of the system) in TRIZ is borrowed from system engineering; we didn't invent anything and we use these concepts in TRIZ in their original interpretation.

Alexander Karmazanov - So what if you have a system = "many-hands-many-legs", then you have one stakeholder = "many-hands-many-legs", the same system over ... We summarized this ...

Andrei Kuryan - for the purpose of solving invention tasks for stakeholders it is better to distinguish, not to generalize.

Sergey Simakov - I just suggest that each applies his own logic to solve a specific problem. If everyone succeeds, well, thank God. You can't consider all this without solving specific problems. I repeat, this is about creating and using some rules that for some reason are called TRIZ, and each one has its own, to build more accurate models with restrictions in time. If it works well, okay. To distinguish - not to distinguish ... That's all depends on the context, task, experience, knowledge, time etc. Problems have to be solved. That's all.

Andrei Kuryan - we are not only dealing with the personal experience to solve problems, but also the replication of such experience.

Alexander Karmazanov - Yes, it's sad all that .. that there are no joint collectives that develop a theory ... If the system is interdependent, or multidimensional yet ... it is called the old concept,

they make some conclusions, including new concepts ... in the end, all are gurus, everyone has its own Zen ...

Sergey Simakov - Times when the TRIZ brand was in one strong hand passed. And will not return. So what is what is.

Valeri Souchkov - This is completely natural. Theory in TRIZ almost does not develop at all. Tools are being developed, mostly already existing ones. TRIZ practices themselves develop - companies or freelancers, who receive income from their customers. The size of such businesses does not allow to be engaged in theoretical research. In addition, they are interested in creating your own intellectual property. To budget organizations, specializing in research, for example, universities, TRIZ so far penetrated weakly, and that, basically, at the level of teaching. I wrote about the reasons above. There are a number of associations uniting TRIZniks with similar views. (rather ideological than theoretical), but even there the level of any research is still very very low. This happens by one reason. Despite a long time of existence, TRIZ has not yet reached a critical mass, which would allow a high-quality leap, go to a new level of development, a new S-curve.

Alexander Karmazanov - You know the experience with free software providing ... If people around the world did not help to develop an operating system, such as Linux ... it wouldn't exist .. Yes there were some separate programs that were free, but there was little sense from them ...

Valery, tell me if there are any developments or research on a theme like that, is there any dependence on the form of product presentation, the form of representation out there, for example, a working body, and methods to resolve such conflicts of requirements?

Valeri Souchkov - I tracked the development of Torvalds and the whole community from the very beginning, and worked in Red Hat, and in Debian, and in Ubuntu. But there the community had a specific goal - to create an alternative to a very expensive Unix at that time. I myself started in 1995 at Solaris on a Sun Sparcstation, the price tag there for all was hellish. And the need was massive and very large. Is there a massive need for TRIZ? No. Is there a big need? No. TRIZ is still a very niche product. Therefore expect massive open source is not possible. What do you mean by presentation form - let's say working body? Geometric? As far as I know, work on such a level of dependency today does not exist, except for the old work of I. Vikentyev "Geometric spatial operator".

Sergey Simakov - Actually TRIZ started as a section of psychology. And with it it turned out as with psychology. For the subject is the same turbid. In psychology, too, a lot of schools and directions exist. Just now into it truly scientific methods begin to penetrate and it begins to approach the level of natural sciences. But the fee for this is an awesome price on research - the disappearance of the term psychology. For this is nowadays already some kind of synthesis of the whole body of knowledge. OS type software development is an orders of magnitude simpler task than developing scientifically sound, reliable, weakly dependent on subjective factors of the methodology for changing systems. If on the creation of Linux so much effort, time and money has been invested, what can we say about TRIZ ...

Alexander Karmazanov - you probably wanted to say that to solve a real problem, the brain needs to recognize phenomena, use concepts, to abstract, to lead to a task convenient for the brain, so that you can get an effective solution according to a previously known algorithm to the brain. At this, the algorithm itself must be executable for brain structures. Here again the problem appears that

algorithms available in TRIZ cannot be reduced to an exact solution. Or maybe algorithms diverge, that is, lead to different solutions.

Sergey Simakov - It is possible also in such a way. Just the word “algorithm” is inappropriate to me. This word in the usual sense is associated with a mechanistic understanding of systems, with formal logic. TRIZ algorithms are closer to art. Not even to soft logic. No wonder we have so much water here in a mortar with systems to push and can not agree to the end :). And I have a very big suspicion that any algorithm will not reduce to an exact solution. For by our knowledge is inaccurate by definition. And we can’t work exactly according to the algorithm etc. The only solutions are the wildest exception ...

Alexander Karmazanov - Moreover, to give an exact definition to yourself the concept of “algorithm” is impossible. But the accuracy of the decision depends on the performer - the brain, if the errors of the contractor in the amount give no significant discrepancy, then say the algorithm converges. And if in TRIZ the algorithms were completely artistic, there would be no standards, techniques, and ARIZ-85. And accordingly, based on the solution of problems by these algorithms, there would not be inventions brought to life. The question remains, but do they definitely exist? Embodied on the basis of these solutions of the invention?

Sergey Simakov - Actually, there are such art science. And when they teach art, there’s a tough drill and rules :) Like a brush keep, composition, rules, rules, rules ... Only after this drills you can accurately copy the landscape. In the style of some kind of artist. Not touches. And others will smear something carelessly - and the people’s stomach butterflies ...

The Original Discussion, a multilingual addendum

Hans-Gert Gräbe - Alexey Schinnikov “больше всего мне нравится подход объектно-ориентированного программирования (класс-объект)”.

The subtitle of Szyperski’s book [“Component Software”](#) is “beyond object oriented programming”. The reason is simple since he observed that in IT service structures the “customer” is responsible for the state (the “data”) and the supplier for functionality (the “behavior”). Hence there is a fundamental (!) contradiction from the business point of view and OOP is the wrong (!) solution. It is mere a compromise (once more). Time to apply TRIZ to solve *that* contradiction in a more sound way?

Hans-Gert Gräbe - Alexey Schinnikov “В своем системном подходе (Архитектура Событий) я так и сделал: системы разделил на системы-классы и системы-экземпляры (объекты)”

Since you are a very expert in OOP I suppose you know about the three ways objects come into live: constructors, factory objects and factory methods. Only the first is bound to the notion of class in your sense. For the second and third only the definition of *interfaces* is required, i.e., you need only a *description* of the function. In modern architectures (APIs) *this* is the main way objects come to live. Factory objects are used in the most cases even to monitor object live cycles - just another concept (evolution) that was used elsewhere in the discussion in a way completely unrelated to the questions discussed here. Time to compile a better “system theory” (using also the “well forgotten” old ideas)?