Terms which are used in TRIZ

In it is **additional**[*)] – section the general-system terms used in TRIZ are shown. Special TRIZ terms are shown in a full training course.

Attention: **not all terms shown in section, are classical for TRIZ**. They are shown to give representation about possible ***system of TRIZ terms***.

The explanatory of each term is given in such sense in what this term is used in TRIZ in general and in ARIZ in particular. In some cases the same term is used in TRIZ in various senses – these a situation each time are explained separately. Use of different terms for identical concepts also is separately explained.

All explanatories of terms – whenever possible short, help. Detailed, full explanations together with necessary examples are shown in a full training course. Latin conformity are shown for simplification of translation.

Object (objectum).

Any part of space, and also change of a part of space in time (process) can be object. Generally coordinates of space and time can have any nature (***natura***).

[*)] *This section is not obligatory for elementary education, but acquaintance to it facilitates understanding of TRIZ.*

Property (proprietas).

Some action made by object and causing changes in other objects or in the given object refers to as Property.

Interaction (interactio).

Process of change of properties of objects as a result of action of objects against each other refers to as interaction. Various interactions between the same objects are possible.

The Combination (combinatio).

The Certain accommodation of objects in space not resulting (bringing) to interaction refers to as a combination. Various combinations of the same objects are possible.

System (systema).

Some objects refer to as system in that case when their interaction or a combination has some property which is not to properties of one of these objects. The objects forming system, refer to as elements of this system.

Complex system (compositus systema).

The System refers to complex if it has (shows) some various properties which are not reduced to one of properties of this system. In turn properties of one or several systems can be elements of new system (can form new system).

The Environment (externa).

Objects and the interactions which are not included in the given system, refer to as an environment concerning the given system. Elements of an environment can form some other systems. In some cases elements of an environment can be placed inside system or inside its separate elements without interaction. Elements of an environment also can cooperate with elements of the given system or with all system (thus it is formed one or several new systems).

Process of reception the information on system.

Any action allowing the external observer to define property of system, its elements, and also properties of these elements, refers to as process of reception of the information on this system. For reception of one «standard unit» of change of the information action which twice reduces uncertainty of a condition of system for the external observer is accepted.

The External observer (externus observator).

The Object (a part of an environment), having an opportunity to influence system for reception of the information on this system, refers to as the active external observer. The object (a part of an environment) not having an opportunity to influence system for reception of the information on this system, but receiving such information, refers to as the passive external observer. The external observer can be any object of an environment having necessary properties.

Operation (operatio).

Any change in the system, caused by the active external observer, refers to as operation.

Properties of system.

For the external observer of property of system can be obvious and unevident. In the second case elements of system can look like vaguely long time group of objects independent from each other (can be an environment the friend for the friend). However properties of system are objective, i.e. these properties exist irrespective of the external observer. At the same time, process of active supervision can make changes to system (in its elements and properties). Character and size of these changes depend on objective properties of the system and process of supervision.

Elements of system (elementum …).

Each element of system in turn can be system. On the other hand - each system can be an element of other system. Elements of system can change under influence of internal and external influences change the

interaction and a combination. Such changes can result in change of properties of system.

Model of system (schema …).

Each system it is possible to describe as model in which elements are conditional «substances», and influences – conditional «fields». Such models refer vepol. Thus conditional «substances» can be any objects (including real fields or processes), and conditional «fields» – any processes. Models of simple systems can coincide with systems practically. For construction of model of complex system, as a rule, are limited to its one property and those elements which provide this property.

Levels of systems (gradus …).

Each system a priori is considered system of a base level (a level «zero»). In this case its(her) elements have a under – system level (a level «a minus unit»), and systems into which it enters as an element, have an above – system level (a level «plus unit»). Each system can have unlimited quantity(amount) of positive and negative levels. Changes at one level of system can result in changes at other levels (positive and negative). Character and size of these changes depend on objective properties of various levels of system, and also from objective properties of interaction of these levels.

Layers (floors) of a level of system (stratum …).

At one level of system its(her) elements can be divided and be united, forming new groups, but not creating thus of qualitatively new property – there is only a quantitative change of property existing. Such groups refer to as layers (floors) of the given level of system. At each level of system there can be some layers (floors).

Development of systems (evolutio …).

Under action of external and internal influences of system vary. Changes of systems (their elements and properties at different levels) occur naturally. Each observably(notice) law of change of systems represents model of some process which is carried out under certain conditions. These laws operate simultaneously, influence against each other and in turn form system.

Objectivity of laws of development of systems.

Laws of development of systems depend on objective properties of systems and do not depend on the external observer. For the external observer these laws can be obvious and unevident. Process of supervision and controlled change of properties and elements of system can not change laws of development of systems. Therefore the result of development of system due to controlled change depends first of all on objective natural development of this system. Constantly it is necessary for active external observer to collect the information on systems to reveal laws of development (to do their obvious) for systematic purposeful development of systems.

Ideal system (perfectus …).

If properties of system are obvious to the external observer, and elements of this system for it are unevident (are not-observably), such system refers to ideal. Ideality can depend on properties of the external observer (subjective ideality), but also can be real, objective feature of the system. In the second case property (properties) of system at a base level is realized by elements of sublevels (negative levels) that allows to reduce quantity of elements of system of a base level. The size of ideality of system is directly proportional to quantity of properties of system and in inverse proportion to quantity(amount) of elements of a base level.

Interaction of systems.

Systems of one level can have the general(common) elements. In that case ideality of each of these systems can raise. At the same time additional interactions between elements of systems can cause additional conflicts. In other cases (if the general(common) elements are not present) systems are the friend for the friend an environment.

Conflicts and contradictions (conflictus, controversia).

Interaction of elements of system creates various properties of this system. Thus active change of one of properties is accompanied by passive changes of other properties. Such phenomenon refers to as the conflict. Conflicts are objective (are independent of the external observer) and are defined(determined) by properties of elements and the interactions causing this conflict. In development of system both parties of the conflict can change quantitatively (without occurrence of new property) and is qualitative (with occurrence of new property). At qualitative changes conflicting elements or their interactions always have opposite properties. Such phenomenon refers to as the contradiction.

Development of systems - process of elimination of contradictions.

Development of system is qualitative change of this system (its properties and elements). Such change occurs by elimination (removal) of the objective contradictions arising in this system.

Natural, social and technical systems (natura, civilis, technicus).

All systems, arising and consisting of natural (natural) elements a priori refer to as natural way natural (natural). Natural systems for the development use ready external objects. Systems which for the development will transform external objects (systems), refer to as прото-social systems. These systems can have biological (albuminous) or not biological (not albuminous) structure. As a rule, such systems are capable to reproduction (creation self-like systems). The systems creating new (distinct from) the systems intended for transformation of external objects, refer to as social systems. Social systems contain social or proto-social elements. The systems created by social systems for transformation of external objects, refer to as technical systems.

The Subjective factor (subjectum factor).

The Overactive external observer can influence elements of various systems for the directed change of properties of these systems (in view of the general information on systems as laws and models, and also the concrete information on the given system). Such overactive observer refers to «the subjective factor». For realization of the directed influences the subjective factor uses technical systems. The subjective factor is social system.

The Solution of a task, approximation (approximare).

Complex process of subjective influence on objective development of systems of a different nature and a various level refers to as Approximation. The basic result of such process is objective reception (creation) of system with subjectively given properties. As a rule, reception of such system occurs by gradual approach – approximation to some ideal system having only given property (properties). At transition from initial system to ideal a lot of objective contradictions comes to light and eliminated. Process of approximation is complex system of operations. Usually, this process in TRIZ refers to as the decision of a task.

Quality of result and process of approximation (qualitas).

Quality of result of approximation is defined by size of ideality of the received system, and also in direct ratio to a maximum level of the changed above - system (concerning a base level). Quality of process of approximation also depends on a maximum level of the changed subsystem and in direct ratio to the module of this level.

Tools of approximation (instrumentum …).

Elements (subsystems) of process of approximation refer to as tools of approximation. Technological the tools focused mainly on systems which is exposed to change refer to. Organizational the tools focused mainly on the subjective factor refer to. Process of reception of the information is the separate tool group having both technological, and organizational properties. All tools are divided(shared) also on «classical» and «non-classical». Classical tools which at correct application practically always give a sufficient degree of quality refer to. The numerical size of a sufficient degree of quality can be various for different systems, and also

for one system in different time. Generally separate tools can pass from one group in another.

Resources (supellex).

All conditional «substances» and «fields» which can be used for creation of system with the given property, refer to as resources. As a rule, the degree of availability of resources is inversely proportional to the module of a level of resources concerning a base level of created system. There can be other special conditions also influencing a degree of availability of resources.

Conditions of a problem(task) (conditio).

The List of necessary and existing elements of process refers to as conditions of a problem(task). In most cases initial conditions are not sufficient for reception of the decision (existing elements insufficiently, necessary all are known not). Conditions of a problem(task) form system which will transform to minimally necessary model.

Types of models of problems(tasks) (typus …).

There Are three basic such as models of the problems(tasks) decided(solved) during approximation:

1. Construction of the system having given property, at presence of the certain resources (in an ideal - reception of the given property without construction of new system).
2. Definition of the resources necessary for construction of system with given property (in an ideal – reception of the given property without use of resources).
3. Definition of properties of systems which can be constructed from existing resources (in an ideal – a maximum quantity of new properties for the given quantity(amount) of resources).

Kinds of problems(tasks) (species …).

The Trivial problem(task) – concrete conditions, concrete operations for the given conditions and concrete result earlier were known. For the decision it is necessary to execute concrete operations precisely.

The Standard problem(task) – the model of the conditions, typical operations for the given models of conditions and model of result earlier

were known. For the decision it is necessary to transform typical operations in concrete (for the given concrete conditions) with the help of known tools.

All other problems(tasks) - non-standard. For the decision it is necessary to create new operations with the help of known or new tools.

Standarding and a non-standarding of tasks can be objective and subjective.

System of tasks.

For development of complex system it is necessary to solve many problems which also can form system. At this system there can be various kinds and types of tasks.

WARNING!

Please, use it for preliminary reading only.

Unfortunately, we have no opportunity for qualitative translation now.
Therefore for some parts of the book we used computer translation.

For the advanced reading try to use the original Russian text.

You can use any opportunities for translation.