"Yes-No" Game for teaching OTSM-TRIZ and various regular school subjects

JL-Project for European branch
of the international network:

OTSM-TRIZ for Kids and Education

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Den Haag, Netherlands.

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Table of Content

- Introduction to OTSM-TRIZ for Kids and basic concepts of OTSM-TRIZ education.

- What is "Yes-No" game and how it could be useful in education for teaching various regular school subjects and students of various ages.

- How create your own Yes-No games to teach different subjects and develop thinking and problem solving skills.

Comment:
We have just 1.5 day for everything. So, we will touch some of inevitable theoretical background of OTSM-TRIZ just shortly and dedicate most of time for practice. However better result could be achieved if teachers are familiar with deep theoretical fundamentals.

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Introduction to OTSM-TRIZ for Kids and basic concepts of OTSM-TRIZ education.

Short introduction to some of main concepts of Classical TRIZ and OTSM.

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Why a Non-Typical (Creative) Problem appear?

…The problems that exist in the world today

cannot be solved

by the level of thinking

that created them…

attributed to Albert Einstein

Conclusions:

1. New thinking technology
   for non typical problem solving process is requested by today reality.

2. Dynamic self evolving mind is required
   to survive in the world of accelerated rapid changes..

OTSM-TRIZ perception of a problem solving process

- Solving of non typical problems require imagination to conduct mental experiments, involve specific knowledge and based on analytic and synthetic skills of problem solver.

- In the Context of OTSM a Problem solving process considered as a transformation of an initial innovative (problem) situation description into description of satisfactory solution.

- OTSM-TRIZ is a theoretical basis to create appropriate instruments to support this transformation.
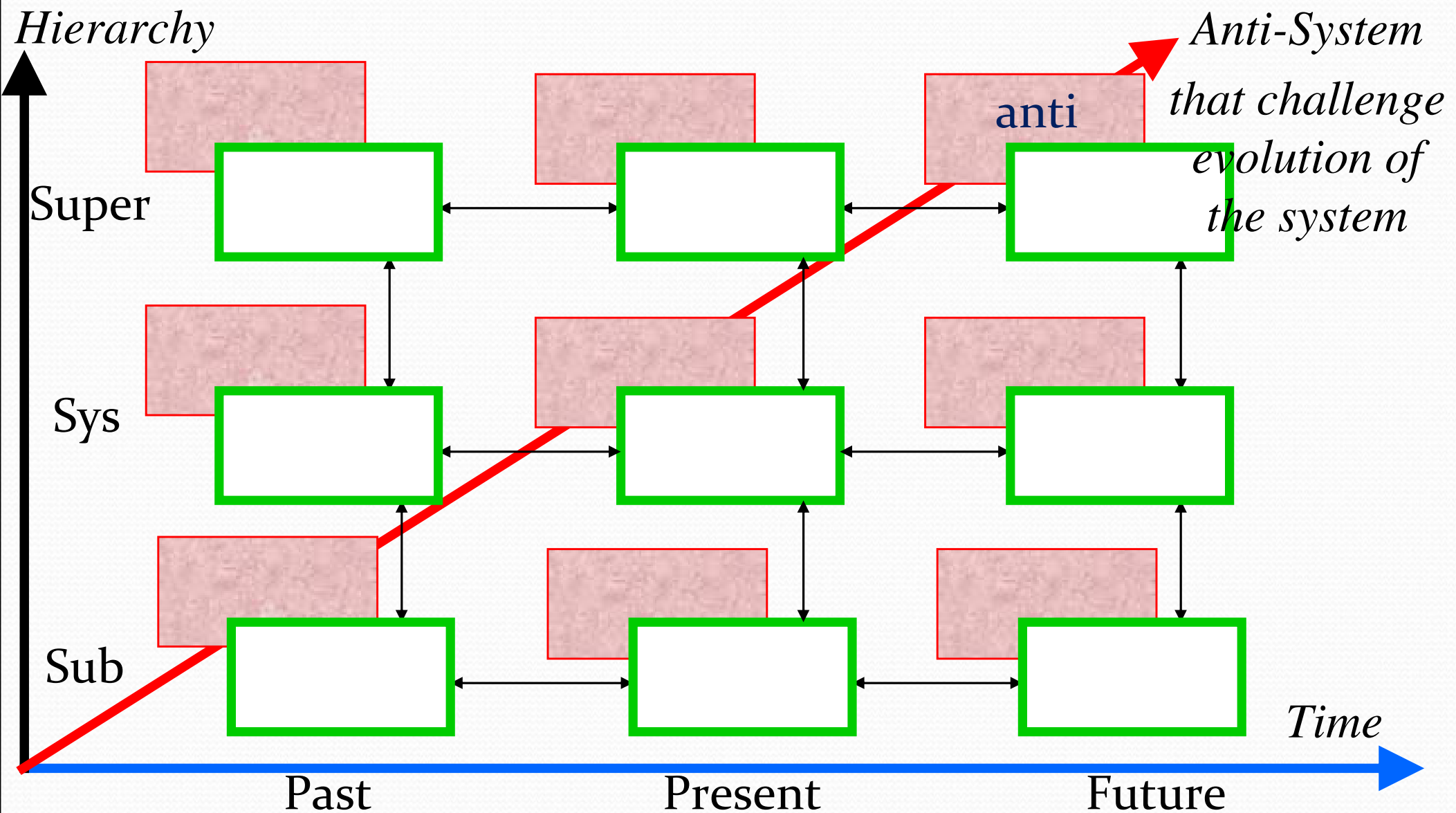
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Main Concepts of OTSM-TRIZ we will use during this trainiong:

- System Operator (Multi-screen Schema of powerful thinking.

- The key Problem of a problem solving process.

- Three postulates of Classical TRIZ and how they could be useful to pose the problem to be solved.

- "Tongs" and "Hill" models of problem solving process and Three Postulates of Classical TRIZ as a general instrument solving various non typical problems.

- Some of Main Analytical Lines of OTSM-TRIZ process.

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System operator – the goal of Classical TRIZ education. ARIZ is an instrument to apply the model efficiently.

Hierarchy

Super

Sys

Sub

anti

Anti-System that challenge evolution of the system

Time

Past   Present   Future

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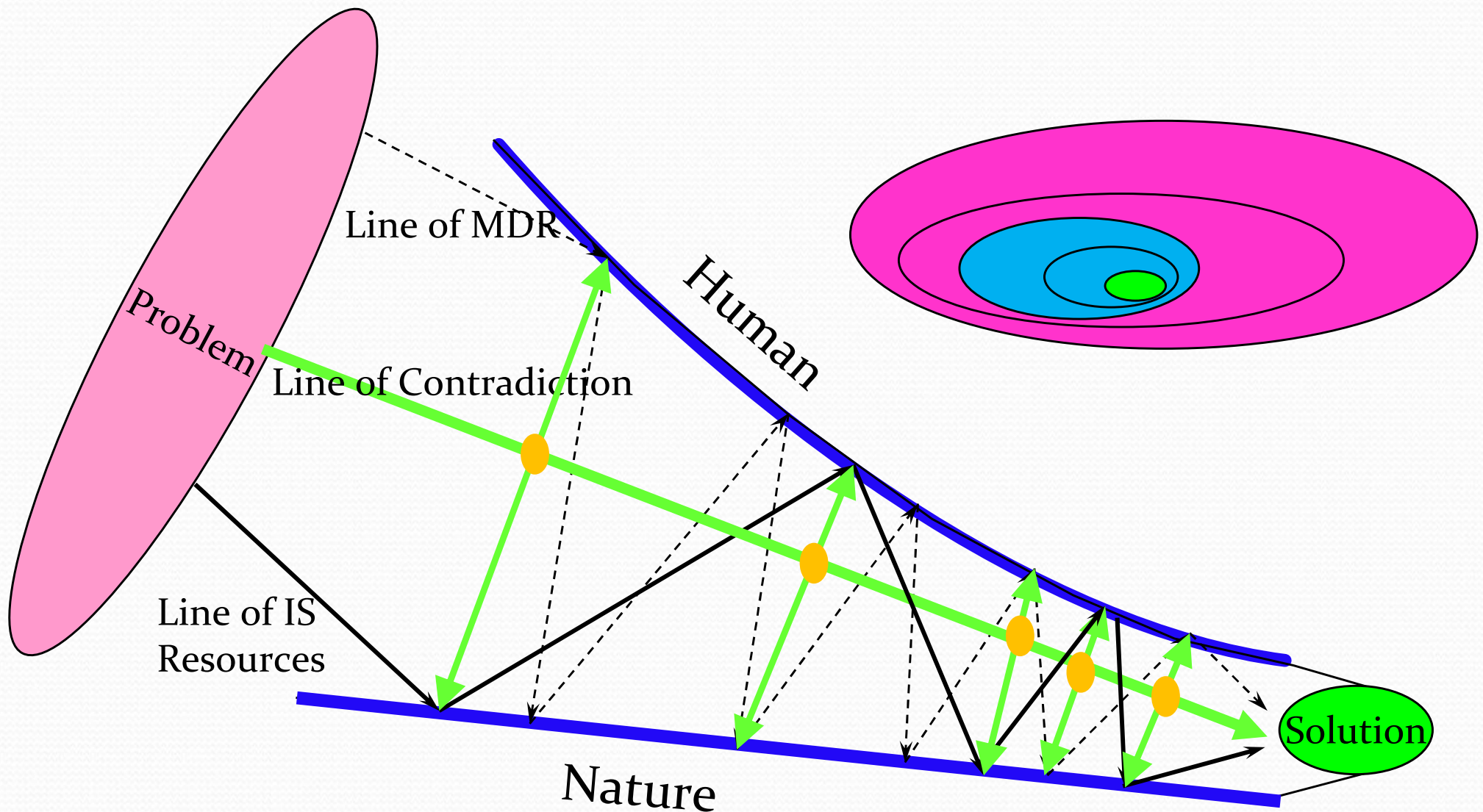
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System Operator

- System operator could be used as an independent instruments during OTSM-TRIZ problem solving process. However it is a most general goals to be achieved during OTSM-TRIZ education: developing skills for thinking according this model of powerful thinking.

- To develop this way of thinking ARIZ was proposed by Genrich Altshuller. During this training we will touch just initial stages of ARIZ learning: "Tongs" and "Hill" Models.

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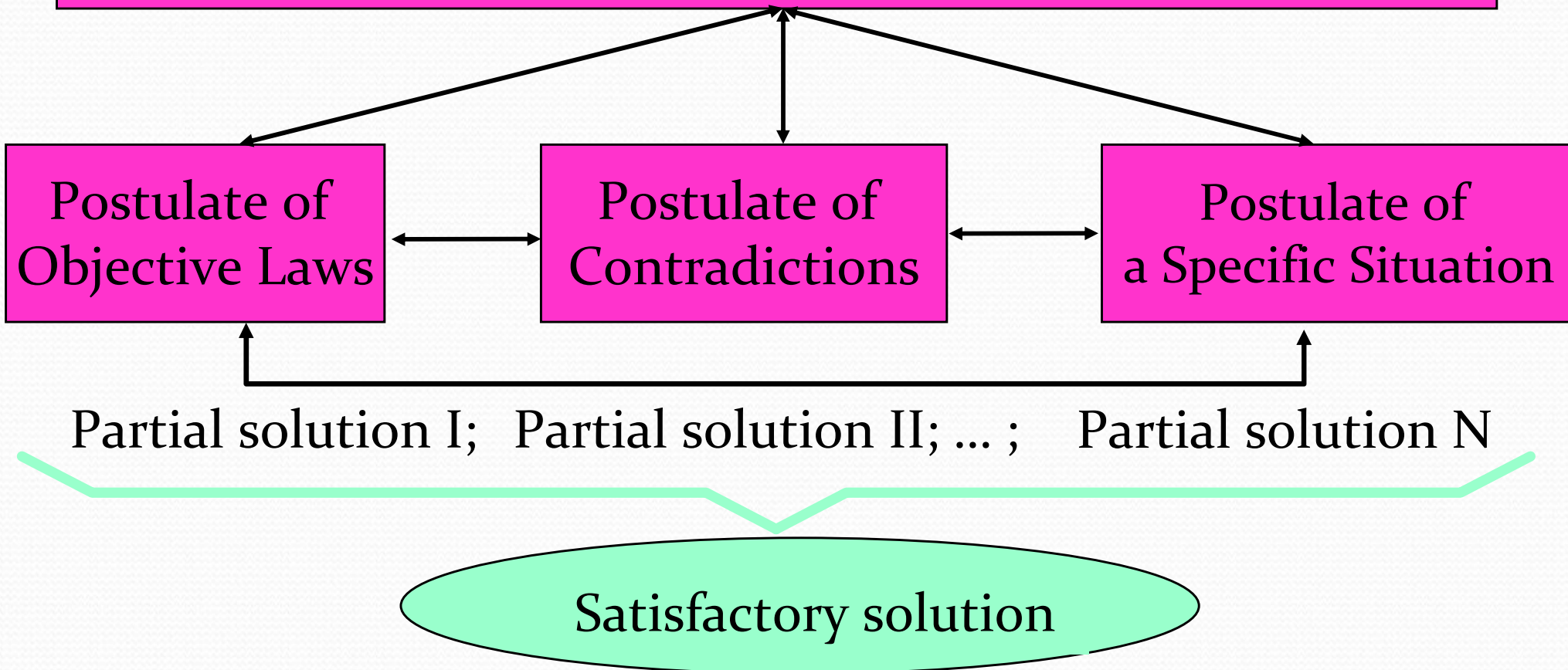# Classical TRIZ Fundamentals and OTSM "New Problem" Technology

Some main principles underlining the "New Problem" technology – the core of the technology.

OTSM-TRIZ gives us direction

Problem

Line of MDR

Line of Contradiction

Human

Line of IS Resources

Nature

Solution

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System of rules for understanding a "New Problem"

The Key Task of Classical TRIZ problem solving process:
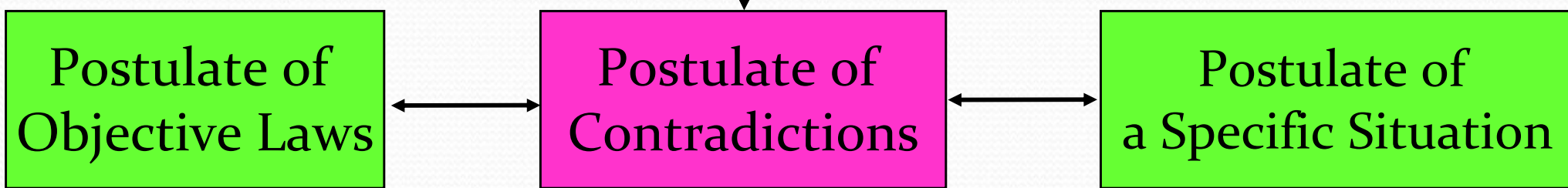How can we narrow an Area of a "New Problem" Analysis ?

Postulate of
Objective Laws

Postulate of
Contradictions

Postulate of
a Specific Situation

Partial solution I;   Partial solution II; ... ;   Partial solution N

Satisfactory solution

There is information on LAWS and SPECIFIC SITUATION

The Key Task of Classical TRIZ problem solving process:
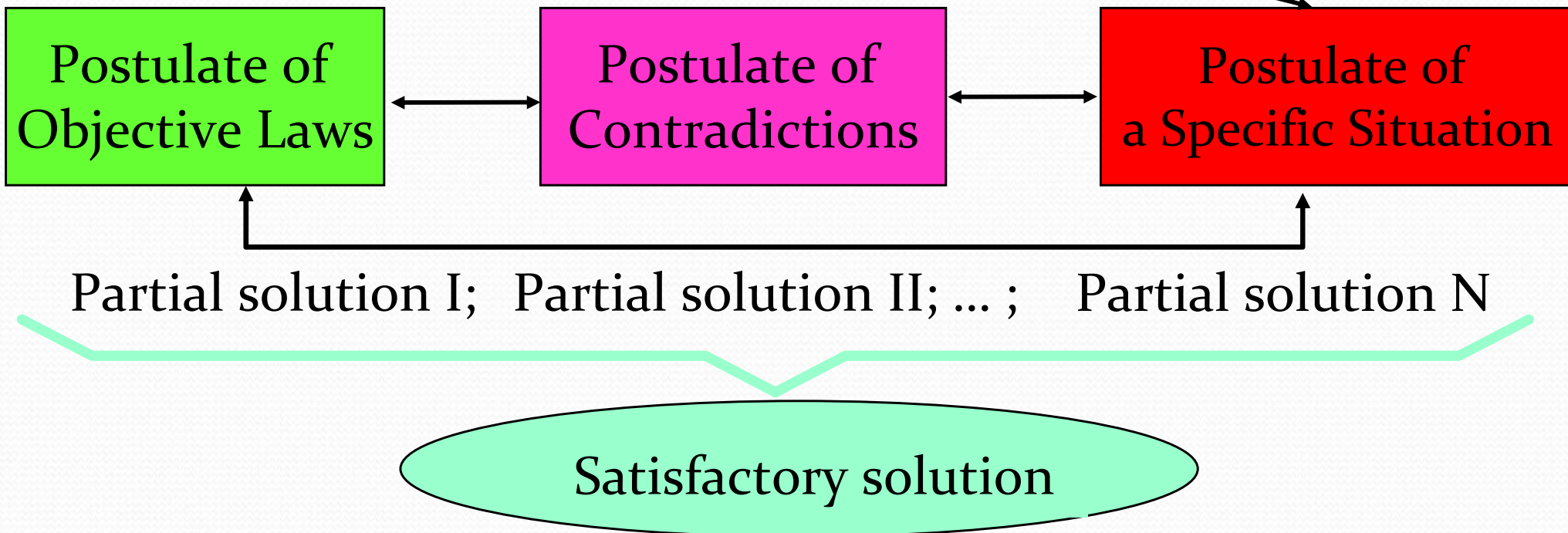How can we narrow an Area of a "New Problem" Analysis ?

Postulate of Objective Laws	Postulate of Contradictions	Postulate of a Specific Situation

Partial solution I;   Partial solution II; ... ;   Partial solution N

Satisfactory solution

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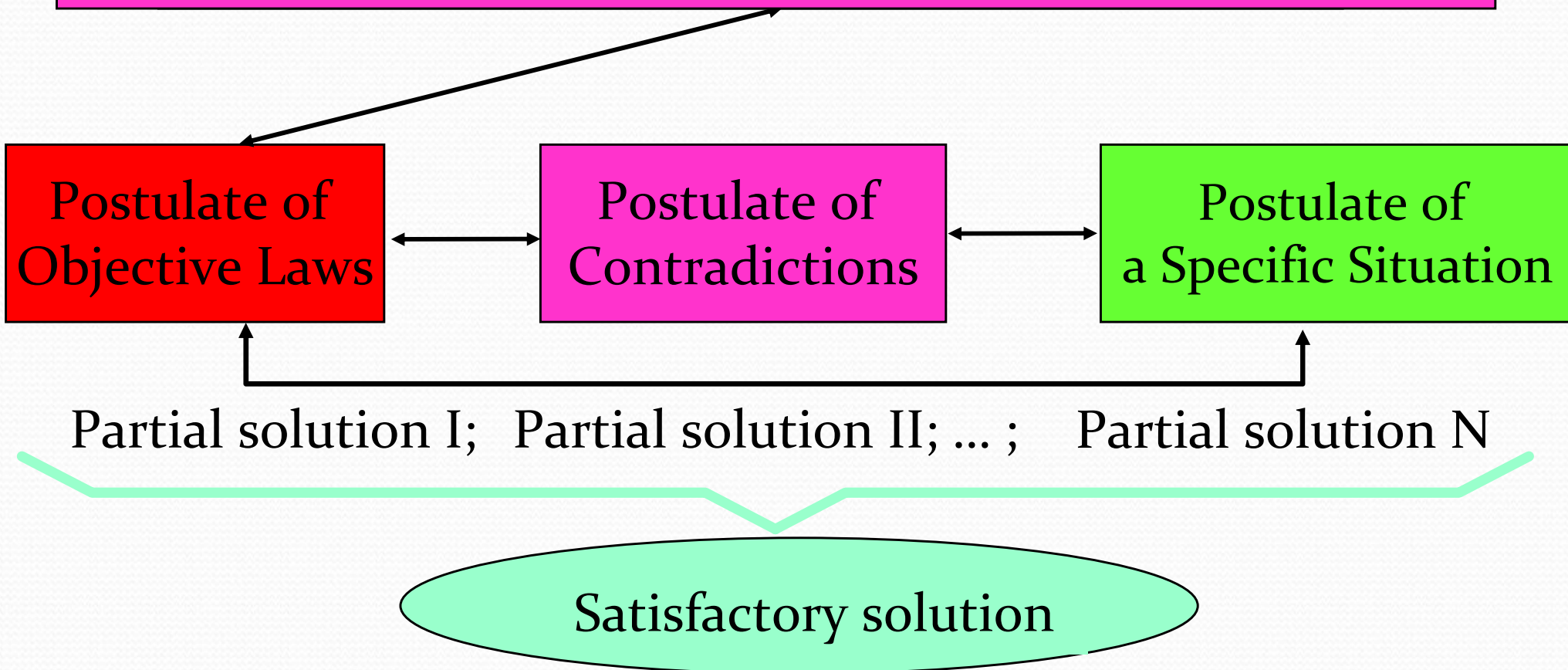
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There is information on objective LAWS only

The Key Task of Classical TRIZ problem solving process:
How can we narrow an Area of a "New Problem" Analysis ?

Postulate of Objective Laws	Postulate of Contradictions	Postulate of a Specific Situation

Partial solution I; Partial solution II; … ;   Partial solution N

Satisfactory solution

There is information on SITUATION only

The Key Task of Classical TRIZ problem solving process:
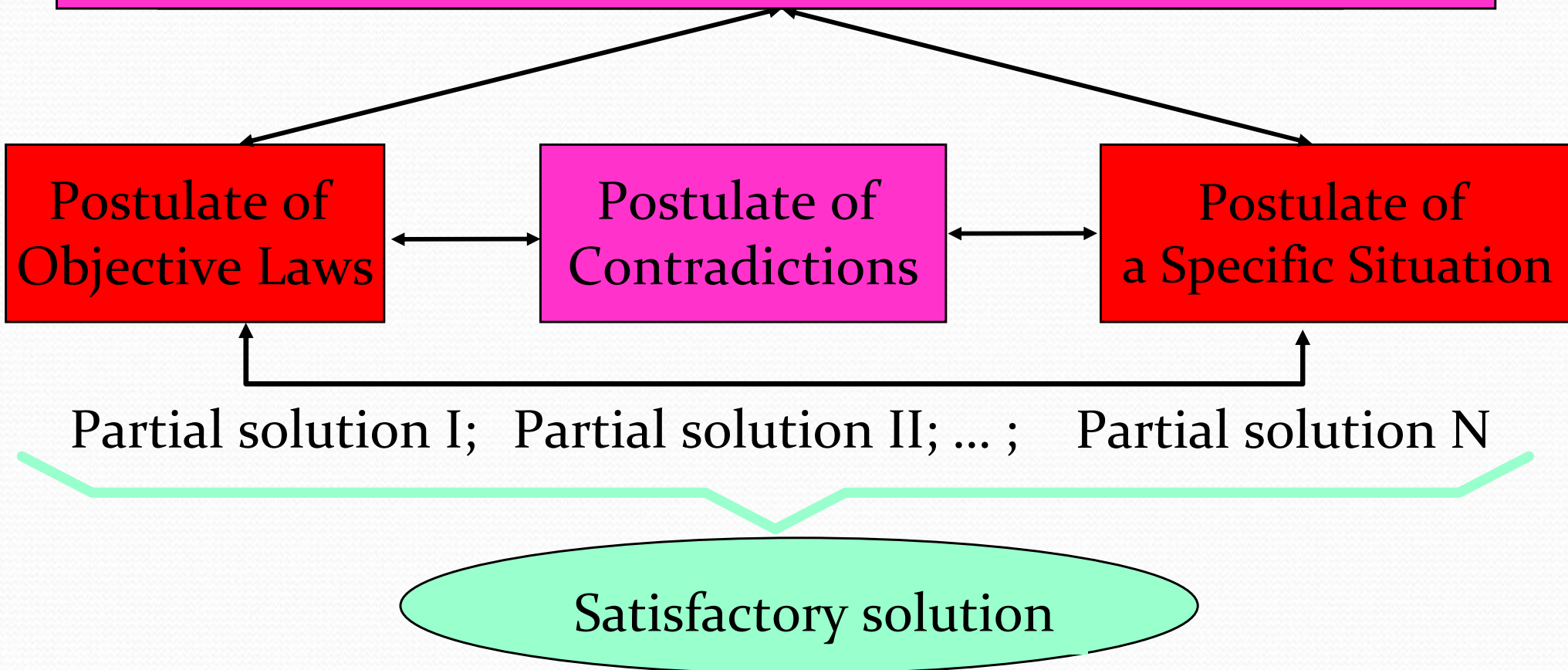How can we narrow an Area of a "New Problem" Analysis ?

| Postulate of Objective Laws | Postulate of Contradictions | Postulate of a Specific Situation |

Partial solution I; Partial solution II; ... ; Partial solution N

Satisfactory solution

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NO INFORMATION ON BOTH laws and situation

The Key Task of Classical TRIZ problem solving process:
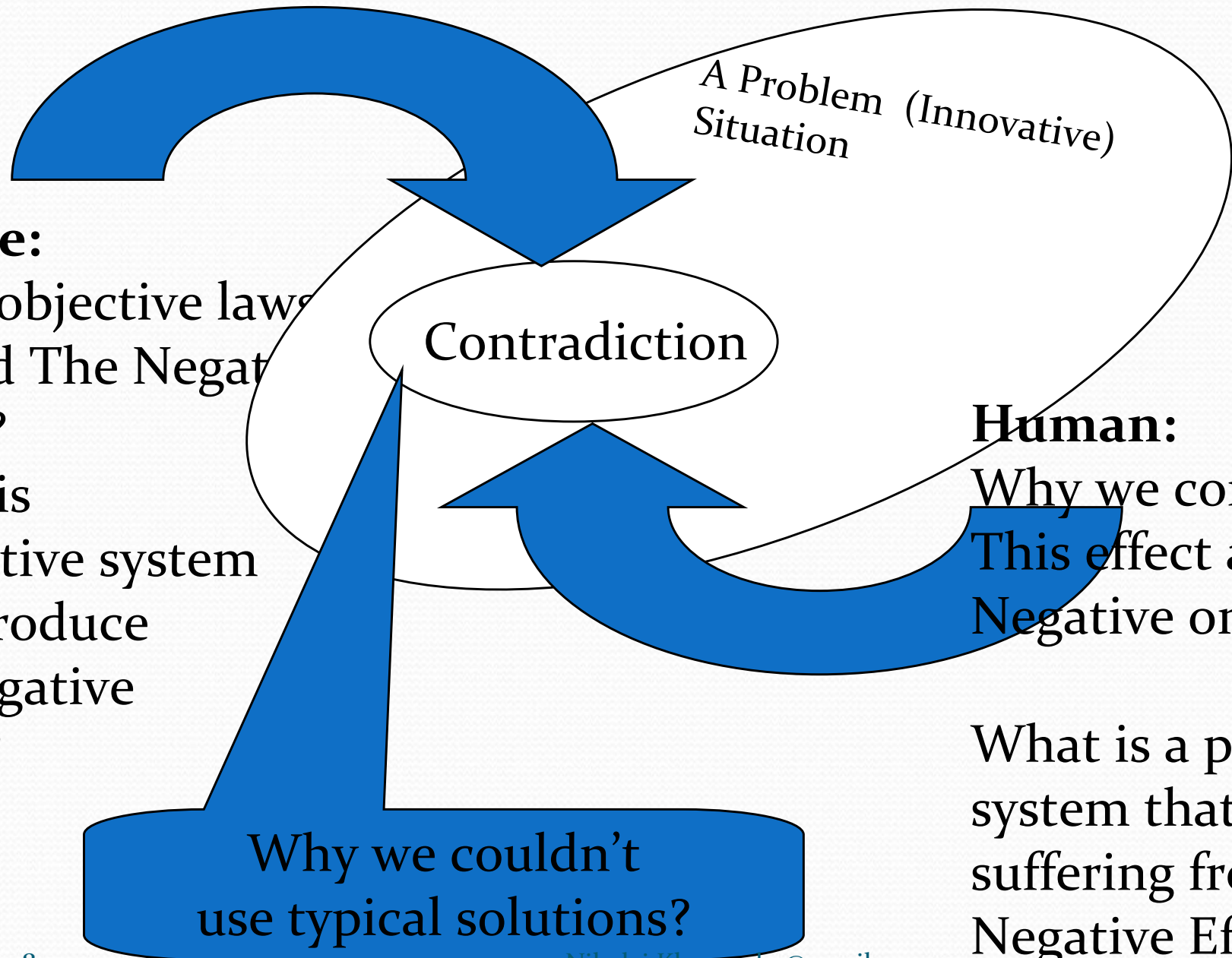How can we narrow an Area of a "New Problem" Analysis ?

| Postulate of Objective Laws | Postulate of Contradictions | Postulate of a Specific Situation |

Partial solution I; Partial solution II; ... ; Partial solution N

Satisfactory solution

Main goal of OTSM-TRIZ "New Problem" technology

- Identify what a Negative Effect is and what is the specific Objective ("Natural") law(s) we have to "broke" in order to eliminate the Negative Effect.
  It means we have to identify contradiction between human desire and objective ("natural") law(s).

- For this we have to clarify what is our desire? What result we would like to achieve within available resources?

- For this we have to clarify which resources available in this very specific situation.

- Then we could use "Typical Solution" technology, "Contradiction" technology and "Problem Flow" technology (for complex problem) for resolving the system of contradictions that is a core of a problem.

A Problem (Innovative) Situation

Nature:
What objective laws
Behind The Negat
Effect?
What is
a negative system
that produce
the negative
effect?

Contradiction

Human:
Why we consider
This effect as a
Negative one?

What is a positive
system that
suffering from the
Negative Effect?

Why we couldn't
use typical solutions?

Other applications of an OTSM "New Problem" technology

- Eliminate negative (undesirable) effect (result).
- Explanation of causes of certain events, (results, effects) as well as research problems.
- Market analysis and competitive analysis of patents and products.
- Forecasting.
- Developing strategy and tactics for crating (1) business model, (2) product (service) and (3) organizational structure for Sustainable Innovation Organizations and regions.
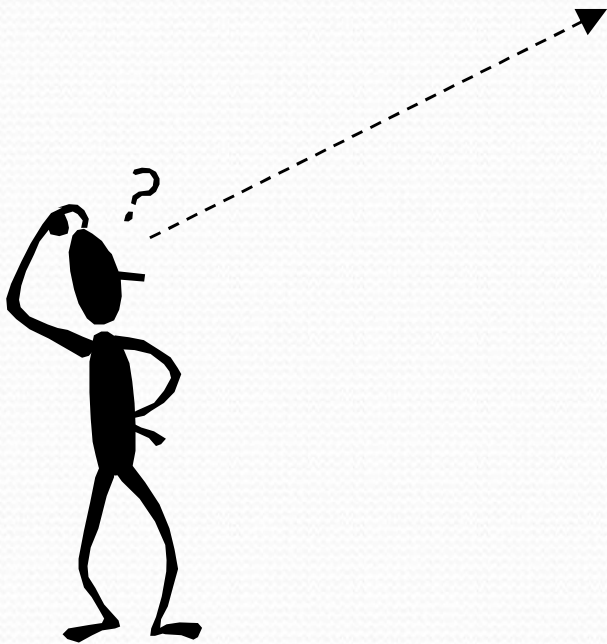
Those and other application include Axiom of a Core of Problem technique as a main component of the technology. The new problem technology also include some special techniques to transform various innovative (problem) situations into canonical shape and apply OTSM Network of Problems techniques to chose the right pr problems to be solved out of initial innovative situation.

Why OTSM-TRIZ is so efficient?

"Tongs" and "Hill" models of a problem solving process.

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How OTSM-TRIZ can lead us around mental inertia?

Solution

Mental inertia

?

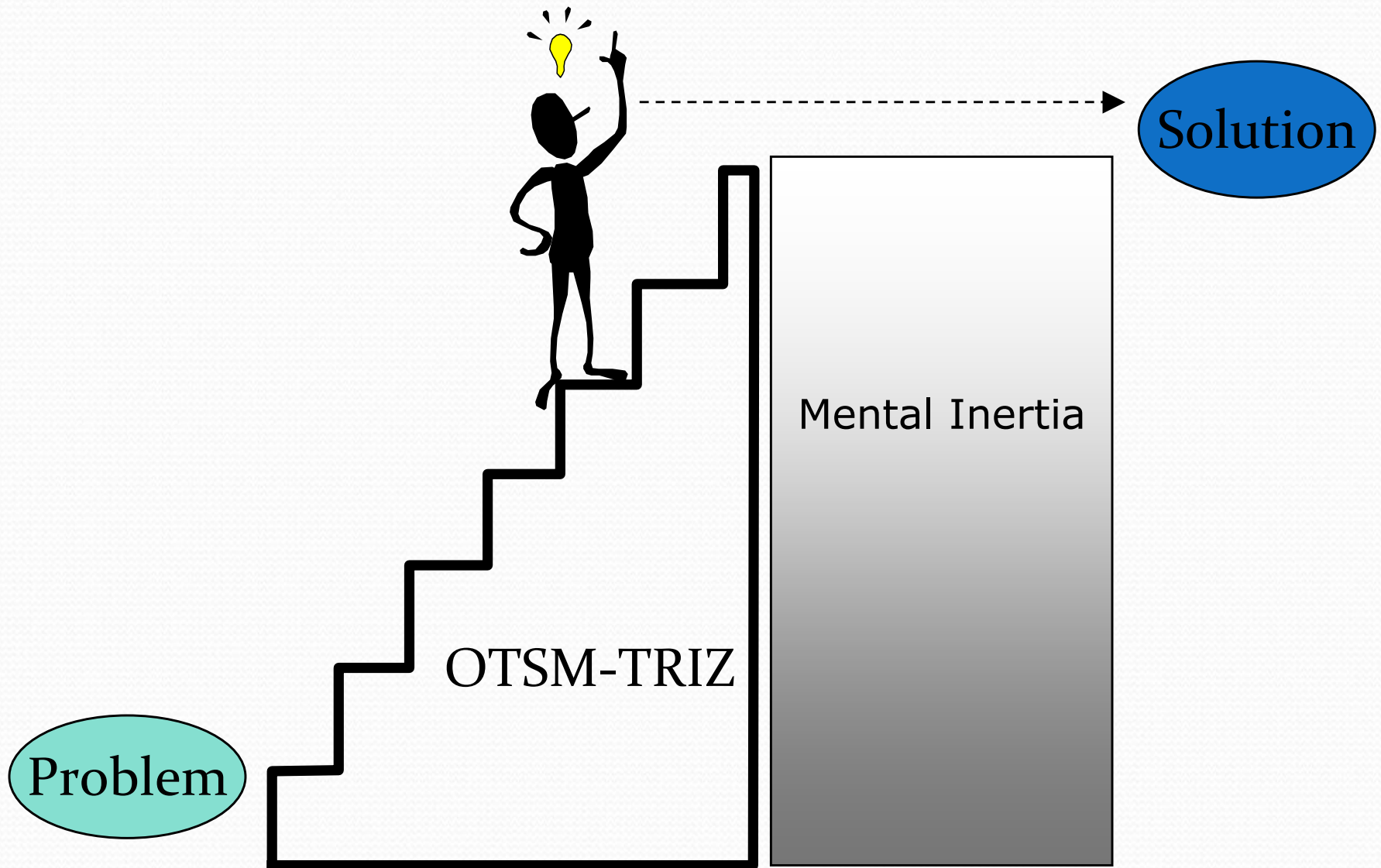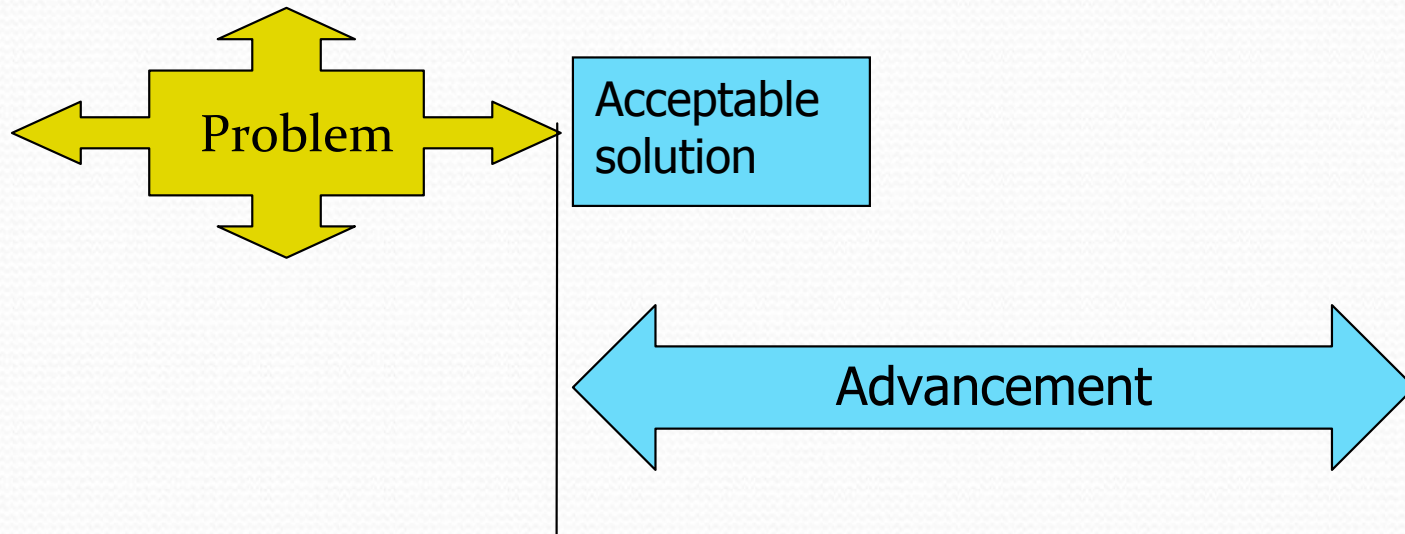**Problem**

OTSM and TRIZ provide us with stairs:
it is easy and useful to overcome mental inertia doing small steps toward right direction, than make big jump toward a wrong one.
What is all of those steps about?

Solution

Mental Inertia

OTSM-TRIZ

Problem

Typical stereotype on problem solving:
Generate as many ideas in different direction!!!

Problem

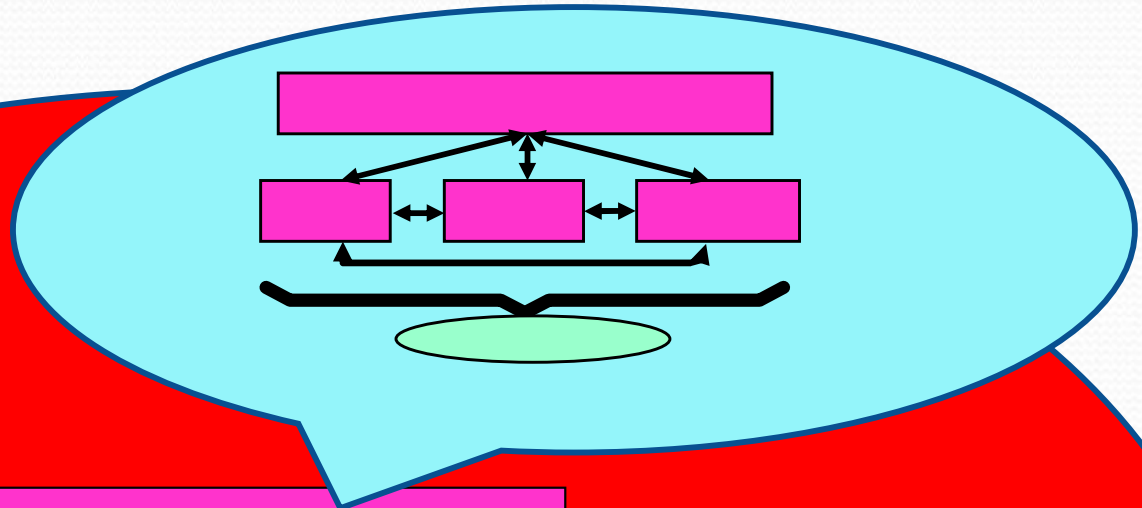**Acceptable solution**

Advancement

OTSM-TRIZ Problem solving process: (oversimplified)

Initial Situation (IS) Description

Satisfactory Solution Description

Most Desirable Result (MDR) Description

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Classical TRIZ Problem Solving Process: "Tongs" Model

An Initial Situation (IS) DESCRIPTION
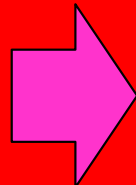
A Barrier (Contradiction) that prevent from Achievement of the Most Desirable Result

A Most Desirable Result (DESCRIPTION)

A Conceptual Solution DESCRIPTION

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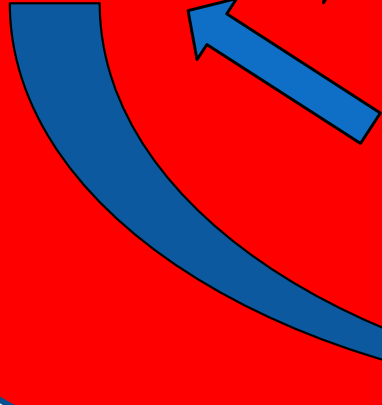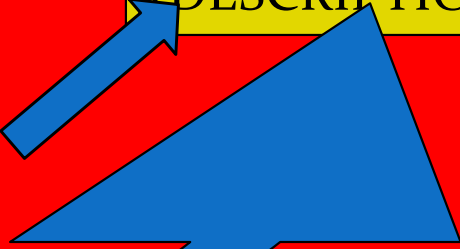
Discover the core of the problem

OTSM

Administrative
Contradiction
(Contradiction
of a problem solver)

Technical
Contradiction
(Contradiction
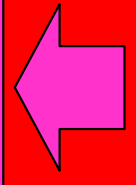of a specific System)

Driving
Contradiction
(Contradiction
of a Family
of systems).

Physical
Contradiction
(Contradiction
of a Specific parameters
of a certain specific element of the system)

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When "Tongs" Model are not efficient: "Hill" model

(This model was in use before ARIZ-85-C)

Level of generalization

Problem

Physical contradiction.
11 models

Typical conceptual solution

"Tongs" Model on different levels

for teaching various regular school subjects and students of various ages.

Matrix.
Approximately
1400 models

Standards.
76 models

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Analytical Lines of OTSM problem solving process

DESCRIPTION of an Innovative (Problem) Situation

Line of Contradictions (Barriers)

Line of Desirable Results (MDR)

Line of Resources (Initial specific situation)

Reflection line – underlining of entire thinking process

Line of Solutions (partial and satisfactory)

Line of Problems (Problem Reframing)

Line of Analysis and Synthesis of all above

DESCRIPTION of a Satisfactory Solution

INSA Strasbourg, AMID, Main course of OTSM and TRIZ: Module 6. By Nikolai Khomenko.

Basic concepts of OTSM-TRIZ education:

- We have to develop research skills in our students. This skills is important to learn how to solve non typical complex interdisciplinary problems.

- Educational process should be organized as a research game and team work to carry out research and investigations during the game.

- OTSM Non linear approach for education: Trainings should be organized the way that simultaneously develop system of skills in various combinations of using those skills to apply fundamental models of OTSM-TRIZ.

- Trainings should be oriented to develop both cerebral hemispheres.

- Analytic and Synthetic skills should be develop simultaneously with creative imagination and holistic approach. All of those above should be develop as a whole system.

- Kids must play a role of teacher and leader of the game in order to develop reflection skills and perception of the situation from various standing points.

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What is "Yes-No" game and how it could be useful in education.

Using "Yes-No" Game for teaching various regular school subjects and students of various ages.

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System of "Yes-No" games.

- In order to simplify educational process without degradation of the content of the educational process we should develop necessary skills step by step.

- For this purpose System of "Yes-No" games was created:

  - Spatial Games (one, two and three dimensions) for visualizing process of narrowing research area in the context of a certain problem situation.

  - "What I keep in Mind?" and "What is it?" for developing classification skills and narrowing research area in multidimensional space of parameters.

  - "Detective investigation" for develop skills to use all above and OTSM-TRIZ models for real life problem solving.

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Why "Yes-No" game is helpful to develop skills for solving non typical problems?

- Non typical (creative, wicked, thought) problems usually have very fuzzy description, lot of uncertainties, luck of important information and overflowed with less important information. Often they looks like research problems where something should be explained in order to continue solving the problem situation.

- Situational "Yes-No" game has all of those features. And in order to solve them certain thinking skills should be developed in advance or simultaneously. That is why we have developed system of "Yes-No" game.

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How "Yes-No" game related to inventive and research problems?

- As we mentioned in basic principles of OTSM-TRIZ education we must develop research skills and skills to solve research problems. Especially for situation when we have to find an explanation of a certain event or phenomenon.

- To find an explanation the problem "How to explain smith." should be replaced by the problem "How to create the same effect intentionally within resources of initial problem situation.

- Those we transform Research problem into inventive problem and then could use all power of OTSM-TRIZ based instruments for solving non typical problems.

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Spatial games: linear problem.

- Discover beginning and end of the interval of the parameter.

- For this purpose use knowledge you already have from your life experience.

- Use dichotomy algorithm to narrow interval of research.

Spatial games: Spatial problem.

- Use dichotomy algorithm to narrow interval of research.

- Identify criteria to split the research volume (Space) for dichotomy. Intervals of research in three dimensions.

- Do not switch to the specific other property to quick. Be patient it will save your time and increase efficiency.

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Spatial games: Planar problem.

- Use dichotomy algorithm to narrow interval of research.

- Identify criteria to split the research surface for dichotomy. Intervals of research in two dimensions.

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"What I keep in mind" and "What is it"?

- Think of the general rules of classification for any elements of the world (Real or Imaginary) in multi-dimensional fractal space of parameters.
- As soon as one general parameters (direction of classification) was chosen follow it step by step to make it more and more specific.
- Try to converge all property you have already discovered and imagine what it could be that fit all of this set of properties.
- Keep in mind "Riddle" model of a problem solving process: we have to collect partial description of satisfactory solution and solve the riddle: What is the satisfactory solution that fit all of those partial descriptions.

Comments:
Additional reading for this could be found at www.jlproj.org:
A. Nesterenko. Country of Riddles.

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Detective Situation

- Transform the problem from "Why" to "How". Transform the situation from research to inventive.
- Use "Tongs" and "Hill" model to clarify the problem situation and apply typical solutions.
- Follow all OTSM-TRIZ analytical lines .

- Chose one of the direction of work and follow it as long as possible to clarify particular situation of the situation: What is necessary to achieve? What are available resources? What contradictions should be eliminated to solve the inventive problem.
- Try to converge all property you have already discovered and imagine what it could be that fit all of this set of properties.
- Reframe the initial situation regularly according models and Lines.
- Keep in mind "Riddle" model of a problem solving process: we have to collect partial description of satisfactory solution and solve the riddle: What is the satisfactory solution that fit all of those partial descriptions.

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Some examples of "Yes-No" games for teaching various subjects at kindergarten, school and universities.

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How create your own Yes-No games?

Spatial "Yes-No" Games

- This kind of games could be useful for study and remembering something and train simultaneously problem solving skills on narrowing research space and reflection skills.

For detail see Handout:

T. Sidorchuk, N. Khomenko, S. Lelyuch.

Using Yes-No Game for teaching fundamentals of OTSM and Classical TRIZ.

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"What is it?" and "What in mind?"

- Use encyclopedias and various book to find some unusual words not often in use.

- Take as a Subject one of the element that should be studied according your educational programs and pedagogical purposes.

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Detective Situations.

- Collect interesting story on the history of subject you teach. Or just funny stories that happen with somebody (you can find this cases in the TV and Radio news in the various Podcasts and historical books.

- Subject of the story could be part of the educational subject you teach to your students.

- As soon as a subject or story was chosen describe the story in more general way. Use stereotypes of thinking and typical behavior of people and animals in order to produce mental inertia of participants.

Let practice with your own example.

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Additional Reading:

- T. Sidorchuk, N.Khomenko, S.Lelyuch. Using "Yes-No" Game for teaching fundamentals of OTSM and Classical TRIZ. Parts 1, 2, 3 and 4. (First part is in your handouts)

- www.trizminsk.org
- www.jlproj.org
- http://otsm-triz-sustainable-innovation.blogspot.com/

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Thank you for your attention!!!

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