TRIZ SUMMIT 2022

TRIZ Developers SUMMIT

TRIZ BIOPHARMA

Innovation Management and Triz Institute

TRIZ MASTER

TRIZ SUMMIT 2022

Mikhail RUBIN

- TRIZ Master, Moscow
- Started TRIZ since 1974
- President of TRIZ Developers Summit
- President of TRIZ Masters Union
- Co-author of G. Altshuller in research and publications in TRIZ
- Author of 12 patents,
- Author of 100+ publications n TRIZ

Andrei KURYAN

- TRIZ 4 specialist, Gdansk
- Started TRIZ since 1987
- Co-founder of EPAM TRIZ Club
- Presidium member of TRIZ Developers Summit

TRIZ BIOPHARMA

INNOVATION MANAGEMENT AND TRIZ INSTITUTE

TRIZ SUMMIT 2022

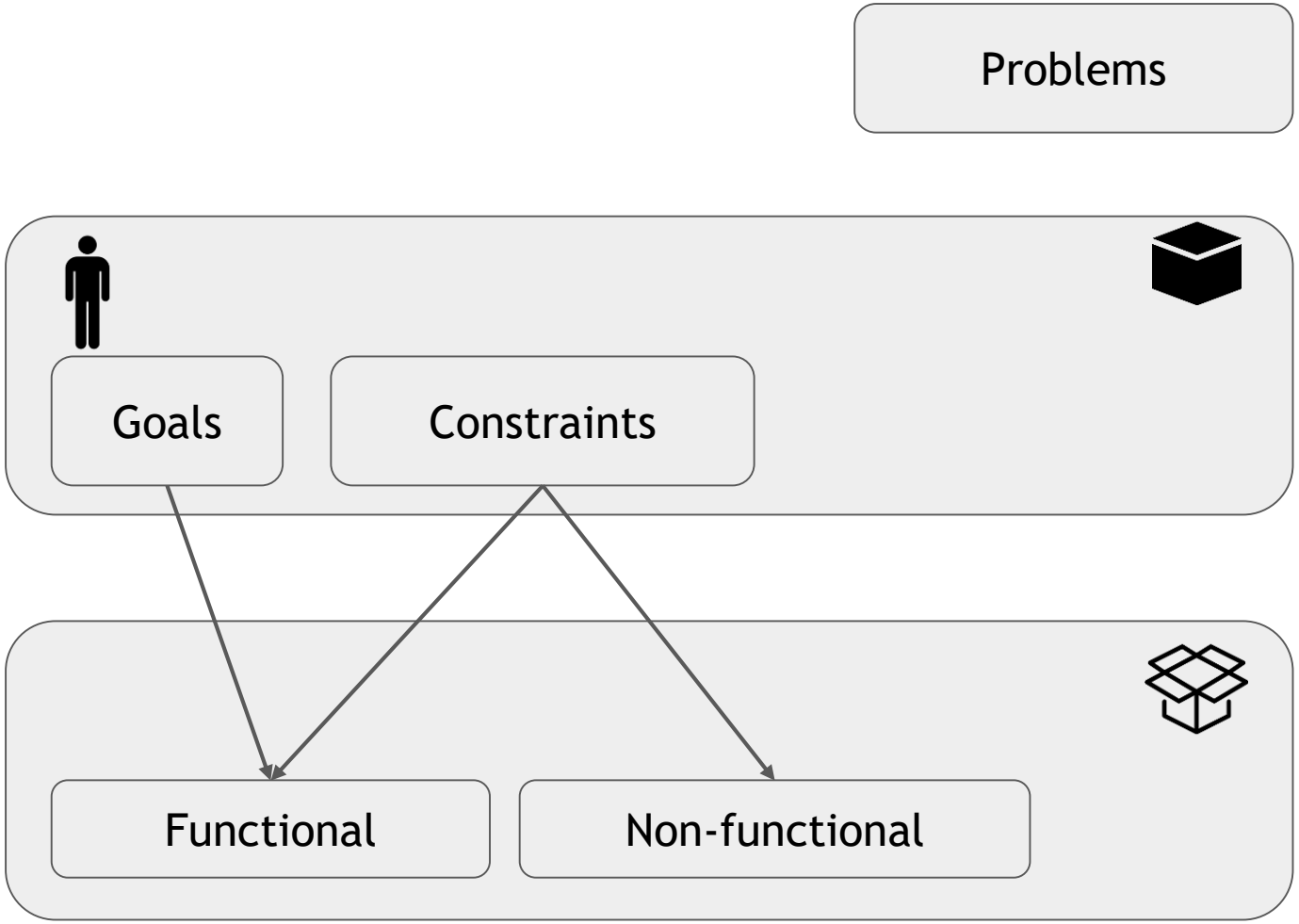
Source Problem Situation in TRIZ

Analysis & Ontology

TRIZ BIOPHARMA

INNOVATION MANAGEMENT AND TRIZ INSTITUTE

Requirements in engineering

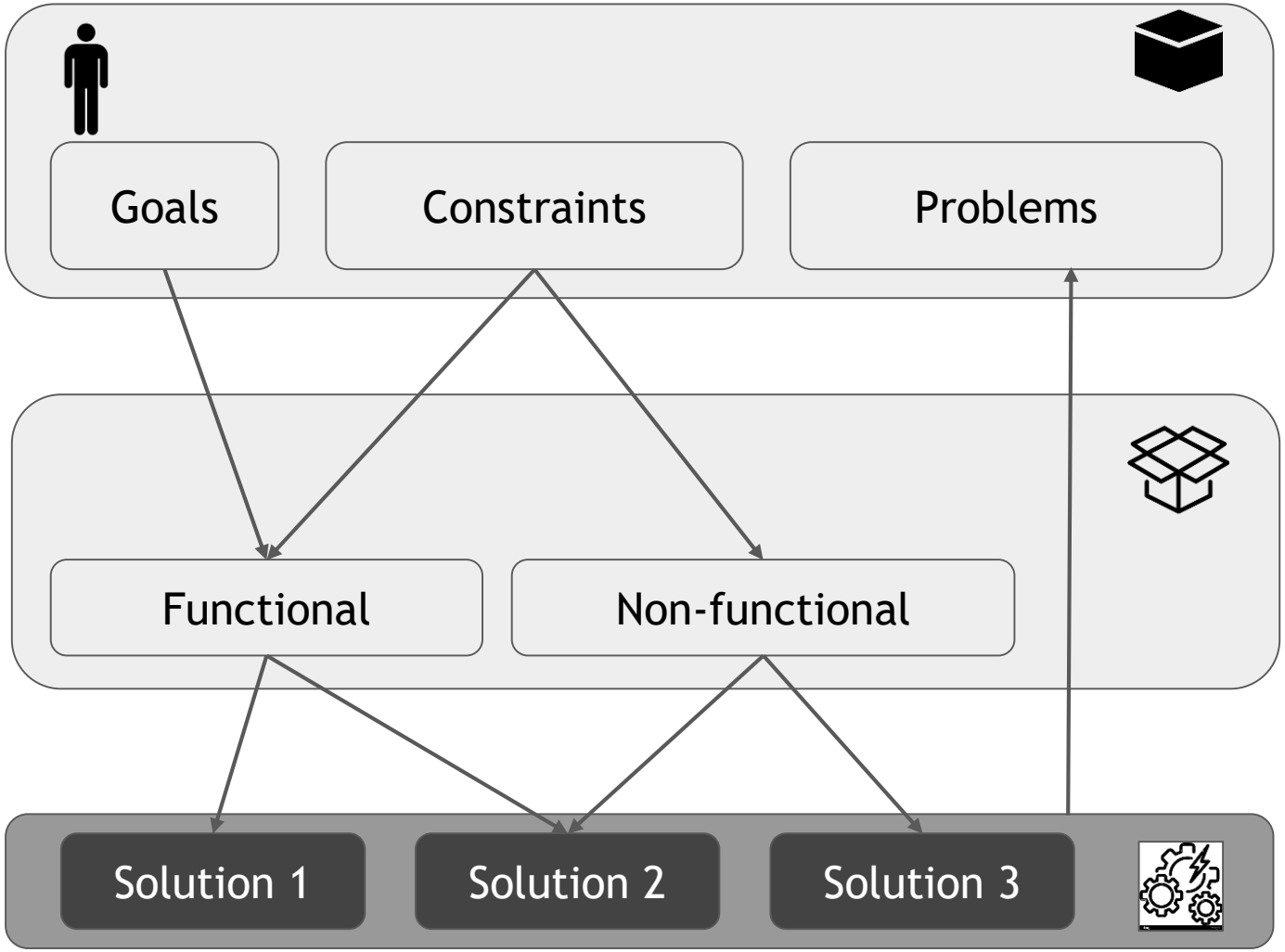


FMEA, ToC, ASQ 4-step model, Lean Six Sigma, Engineering Design Process, RCA

On the level of stakeholder`s requirements the subject considers the system as a “black box”

On the level of system requirements the subject considers the system as a “white box”

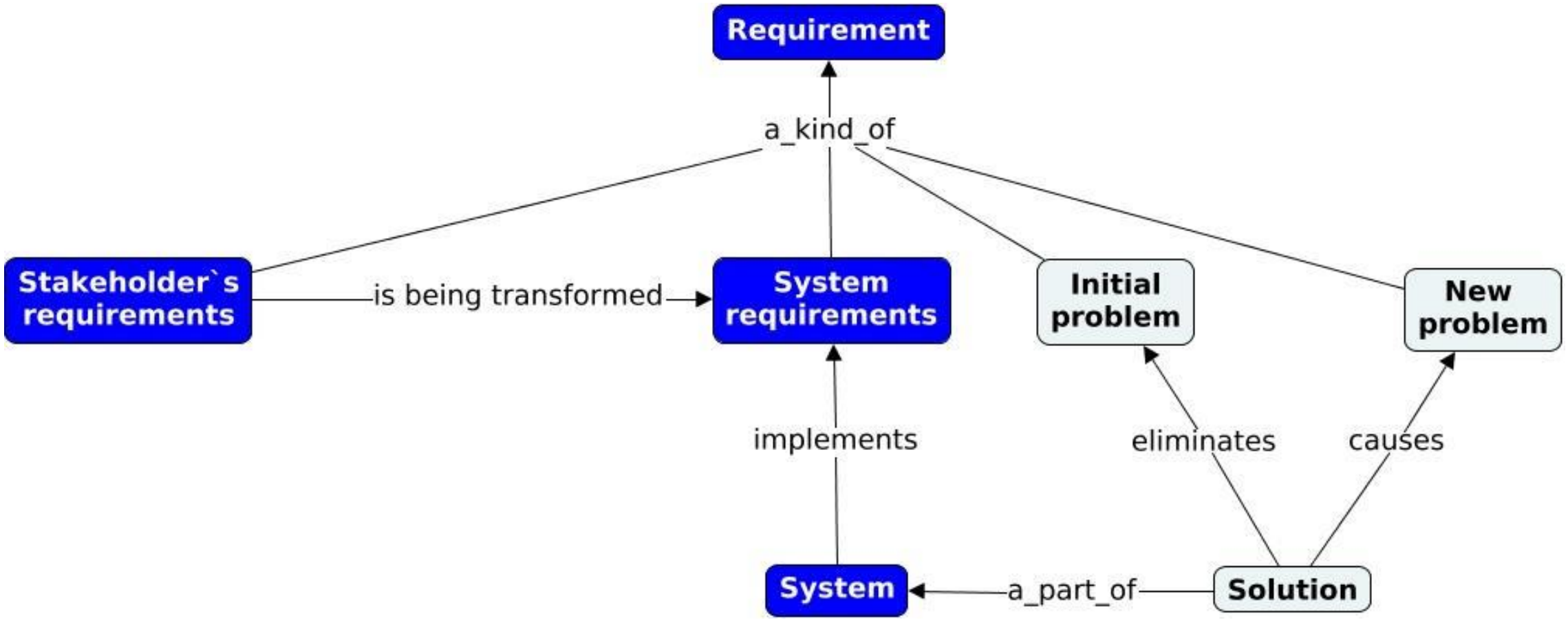
Requirements in TRIZ



In TRIZ stakeholder`s requirements consider as a requirements of super-system

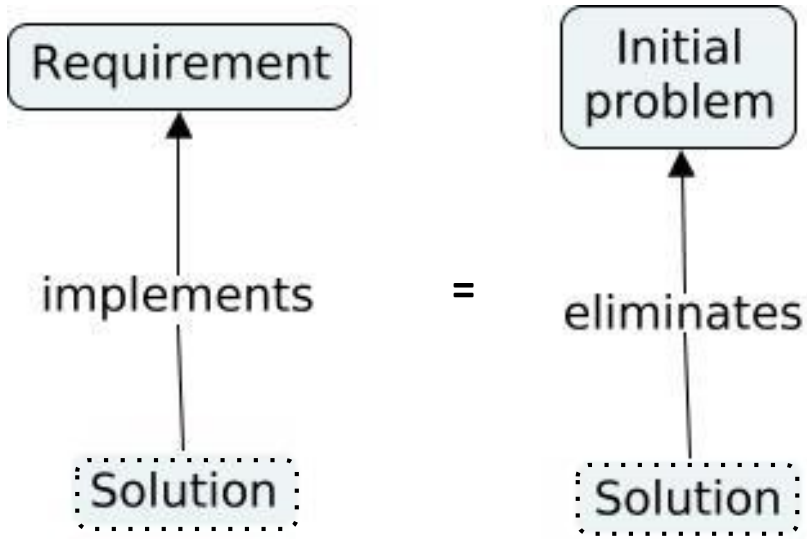
During inventive problem solving process the subject considers the system as a set of solutions where each solution implements the requirement or eliminates the problem

Ontology of requirements in TRIZ



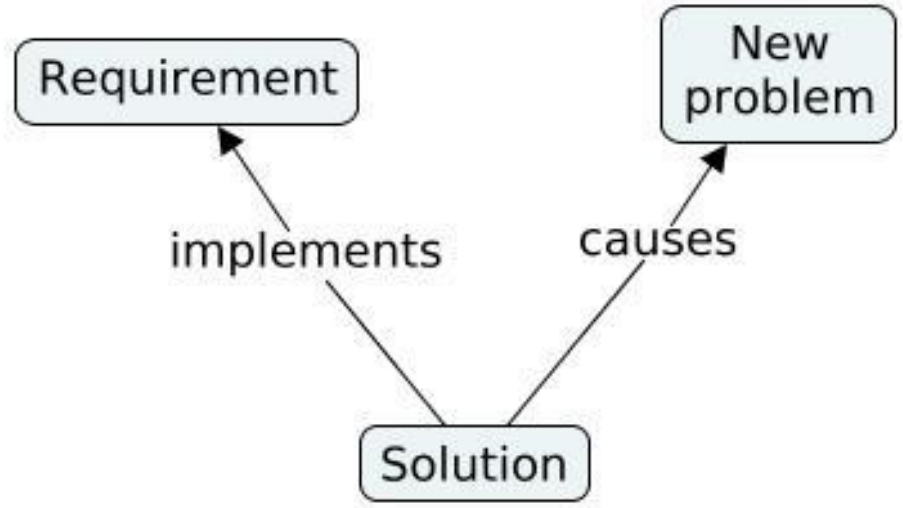
Ontology of contradiction types

Administrative contradiction = **Initial Problem situation**



The solution Is unknown

Contradiction in requirements



Example

Initial problem situation

Increasing the protection of the colonists from space radiation in the ship during the flight to Mars

+

Unknown solution

Contradiction in requirements

Increased colonist protection

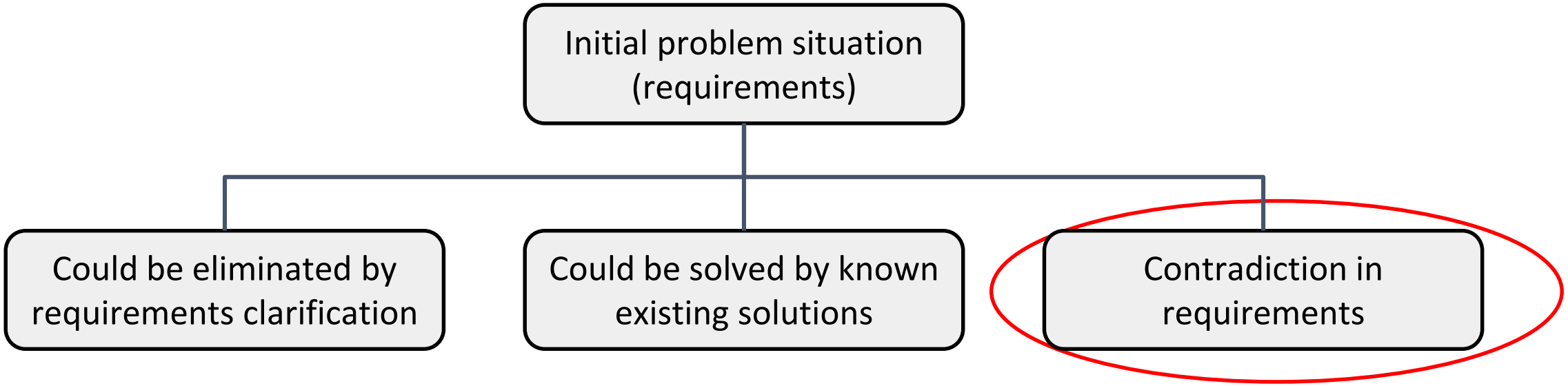
+

Unacceptable increasing of the spaceship launch weight

-

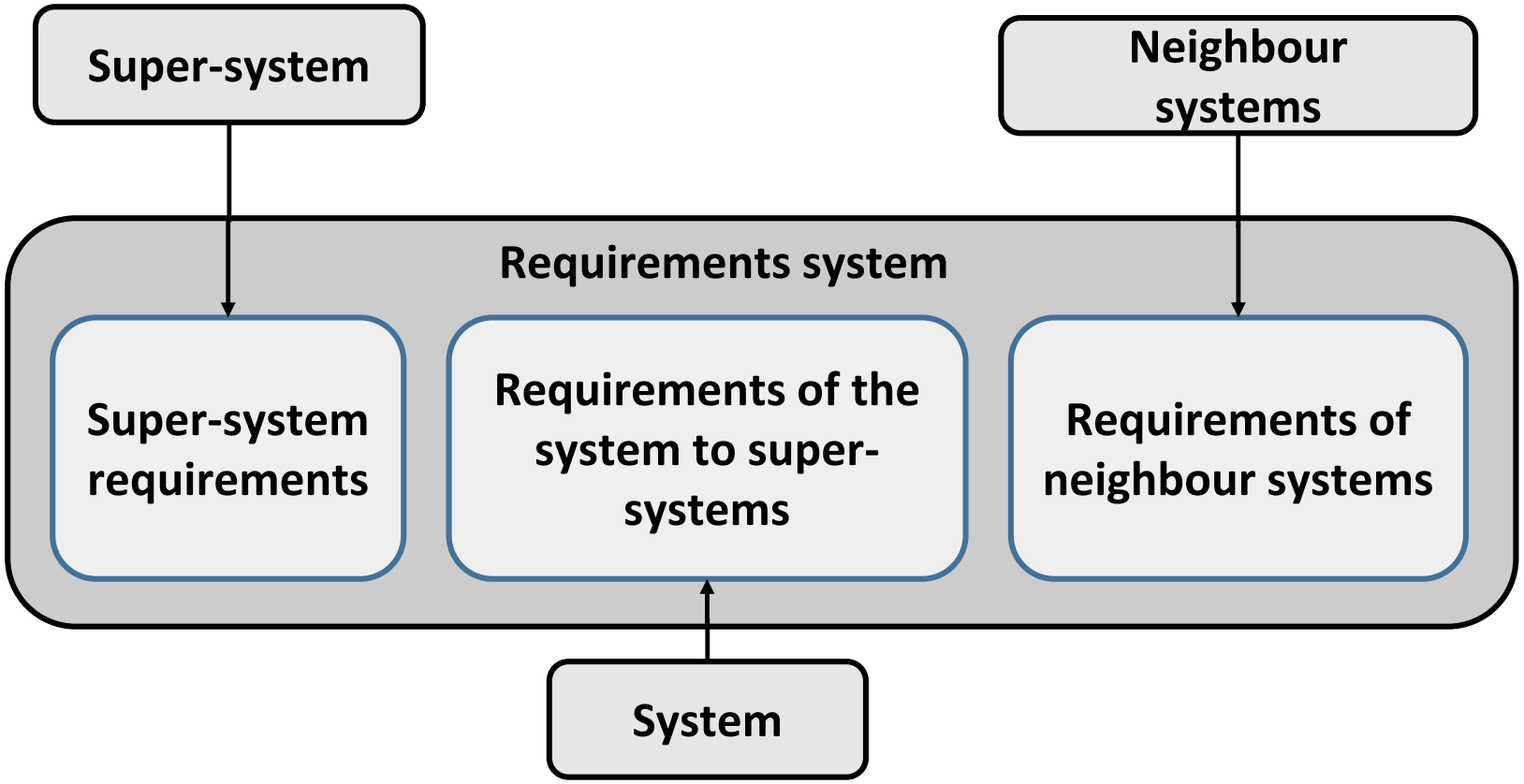
Lead spaceship body

Types of Initial Problem Situation



TRIZ focuses on this type of initial problem situation

Requirements as a system



Contradiction in requirements appears when we combine requirements from different sources systematically

Requirements system evolution

Super-system of requirements system in past	Super-system of requirements system	Super-system of requirements system in future
Requirements system in past	**Requirements System AS IS**	Requirements system in future
Subsystems of requirements system in past	Subsystems of requirements system	Subsystems of requirements system in future

Super-system includes:
- Legislation,
- Laws of nature
- etc.

Subsystems are:
- Depended requirements,
- Requirements of components
- etc.

The evolution occurs in accordance with evolution laws:
- dynamization of the system of requirements,
- folding,
- transitions to supersystems
- etc.

Examples of Initial Problem Situation

Example1

The grinding wheel does not work well on complex shapes with depressions and bulges, such as spoons. Replacing grinding with another type of processing is unprofitable, difficult. The use of lapping ice grinding wheels is too expensive in this case. Elastic inflatable circles with an abrasive surface are also not suitable - they wear out quickly. How to be?

Example 2

IT companies are trying to create more unique products to attract new customers and increase current sales. But a new product costs a lot of money, what to do?

Example 3

Wounds are sealed with plaster, and the skin does not “breathe”. How to be?

Initial Problem Situation analysis

ARIZ versions under analysis:

- ARIZ-62,
- ARIZ-63,
- ARIZ-64,
- ARIZ-65,
- ARIZ-68,
- ARIZ-71,
- ARIZ-77

Components of Initial Problem Situation:

- Object of the problem
- Metric (goal, economic feasibility, numerical indicators)
- Object characteristic
- Permissible costs and complexity of the solution
- More general problem
- Comparison and selection of problems
- Supersystems and environment
- Industry trends
- Requirements
- Elements (properties, what can be changed and what cannot)
- Tool - product pair
- Undesirable effect (harmful interaction)
- Description of the cause-and-effect relationship of the elements and the undesirable effect

Components of Initial Problem Situation

Components of Initial Problem Situation	Interval	Examples 1	2	3
1. Object	p. 1 – 5	4	3	3
2. Objective metric	p. 1 – 5	2	2	1
3. Super-systems	<= p. 1	2	1	1
4. Requirement 1 (function)	<= p. 1	4	3	2
5. Solutions for implementation R1	<= p. 4	4	1	1
6. Requirement 2 (function, constraint)	<= p. 4	4	3	1
7. Solutions for implementation R2	<= p. 6	3	2	1
8. Object and its property that causes implementation of R1 & R2	<= p. 7	3	1	1
9. Root-cause model of requirements	<= p. 5&7	3	1	1
10. Root-cause model of requirements and properties	<= p. 8&9	2	1	1
11. Problem aspects	<= p. 9&10	2	1	1

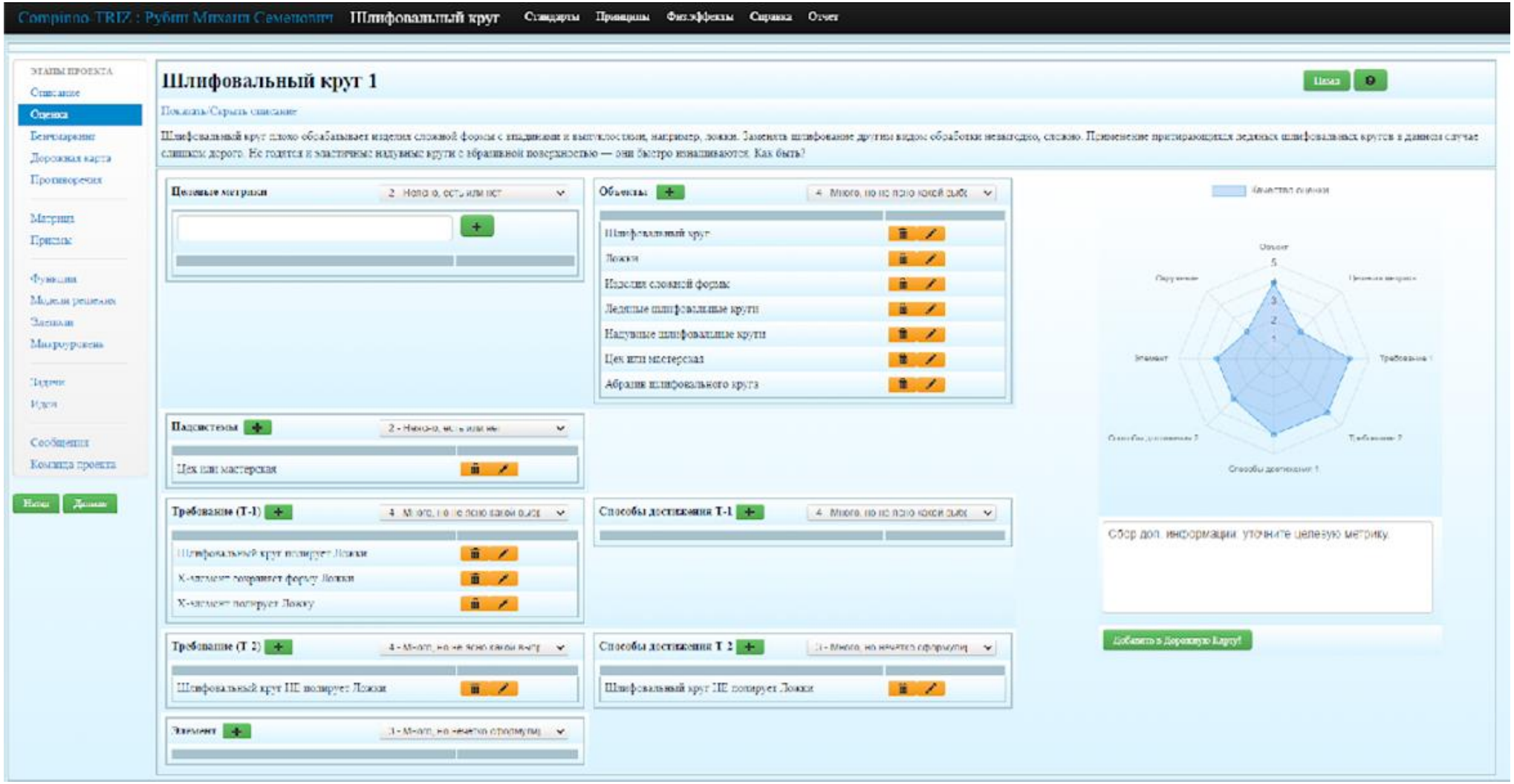
	ASSESSMENTS
1	No
2	Not enough information
3	A lot of uncertain information
4	A lot of non-systematic information
5	Yes

Initial Problem Situation visualisation

Completeness:

- Example 1 – 54,4% 
- Example 2 – 28,2% 
- Example 3 – 16,9% 

Initial Problem Situation in Compinno-TRIZ



Resume

1. Differences between the concepts such as requirement, inventive problem, solution, and system in engineering disciplines and TRIZ make a barrier for integration between TRIZ and engineering approaches

1. The authors proposed a general ontology for the definition of the Initial Problem Situation that joins these concepts and applicable both in TRIZ and in engineering disciplines

1. The authors proposed a method for formal definition, numerical evaluation and verification of the Initial Problem Situation.

TRIZ SUMMIT 2022

Q&A

SESSION

TRIZ BIOPHARMA

INNOVATION MANAGEMENT AND TRIZ INSTITUTE

TRIZ SUMMIT 2022

THANK YOU!

TRIZ BIOPHARMA

INNOVATION MANAGEMENT AND TRIZ INSTITUTE