

# AI-00141 TRIZ Problem-Solving Methodology

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## TRIZ Problem-Solving Methodology

user: What is TRIZ

assistant: TRIZ (pronounced TREEZ) is a problem-solving methodology that stands for "Theory of Inventive Problem Solving" in Russian. It was developed by Genrich Altshuller, a Soviet engineer and scientist, in the 1940s and 1950s, and it has since been refined and expanded by other researchers and practitioners.

TRIZ is based on the observation that many problems and contradictions in engineering and other fields have been solved before, and that there are patterns and principles that can be extracted from these solutions and applied to new problems. TRIZ provides a systematic approach for identifying and resolving contradictions and improving technical systems through a set of principles and tools.

TRIZ consists of several components, including the use of functional analysis to break down a problem into its component parts, the identification of contradictions that exist within a system, and the use of a set of 40 inventive principles to generate potential solutions to the problem. TRIZ also emphasizes the importance of identifying and eliminating root causes of problems rather than just treating their symptoms.

TRIZ has been used successfully in a wide range of industries, including manufacturing, engineering, software development, and healthcare, among others. It is a valuable tool for anyone seeking to innovate and improve processes, products, and systems.

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assistant: One of the key principles of TRIZ is the concept of ideality, which refers to the degree to which a system or solution meets the needs and desires of its stakeholders while minimizing its drawbacks and negative consequences. Ideality is measured as the

ratio of the system's benefits to its costs and is used to guide the selection of potential solutions.

Another important aspect of TRIZ is the use of inventive standards, which are patterns or templates for solving specific types of problems. These standards are derived from the analysis of past inventions and solutions and can be used to generate new ideas for solving similar problems.

TRIZ also emphasizes the importance of simplification and reducing the number of components in a system or solution, as this can reduce the potential for problems and increase reliability.

Overall, TRIZ provides a structured and systematic approach to problem-solving that can help individuals and organizations overcome technical and other types of challenges in a more efficient and effective manner. Its principles and tools can be applied across a wide range of industries and contexts and can lead to innovative and impactful solutions.

user: List all TRiZ principles

assistant: TRIZ (Theory of Inventive Problem Solving) provides 40 inventive principles that are used to generate potential solutions to problems. These principles are grouped into four categories, as follows:

1. Principles of segmentation: These principles involve dividing a system into smaller, more manageable parts. They are:
  - Segmentation
  - Taking out
  - Local quality
  - Asymmetry
  - Merging
  - Universality
1. Principles of taking out: These principles involve removing something from the system or process. They are:
  - Extraction
  - Contradiction

- Local quality
  - Asymmetry
  - Degradation
  - Anti-weight
1. Principles of transitioning: These principles involve changing the state or condition of a system or process. They are:
    - Preliminary anti-action
    - Preliminary action
    - Cushioning
    - Inversion
    - Spheroidality
    - Dynamics
  1. Principles of increasing ideality: These principles involve increasing the degree to which a system meets its objectives while minimizing its drawbacks. They are:
    - Segmentation
    - Taking out
    - Local quality
    - Asymmetry
    - Merging
    - Universality
    - Nesting
    - Counterweight
    - Prior action
    - Prior counter-action
    - Equipotentiality
    - Continuity of useful action

- Feedback
- Leading
- Self-service
- Copying
- Cheap short-living
- Replace mechanical system
- Use of porous materials
- Use of composite materials
- Change of color
- Homogeneity
- Heterogeneity
- Solution of contradictions
- Thermal expansion
- Strong oxidants
- Inert atmosphere
- Composite materials
- Curvature
- Thin film
- Use of the intermediate substance
- Mechanical vibration
- Periodic action
- Accelerated oxidation

These principles are not intended to be used as a fixed set of rules, but rather as a guide for creative problem-solving. By applying these principles in combination with functional analysis and other TRIZ tools, individuals and organizations can develop innovative and effective solutions to complex problems.