Value Model

Triz philosophy

Function

Many technical problems arise from dissatisfaction with a product, component, or system. Common questions include:

· How can I increase efficiency?
· How can I prevent breakdowns?
· How can I make the product more production-friendly?

Often, the real issue is elsewhere. Focus on what the system should do — its functions. Functions are described as "noun - verb - noun," e.g., the membrane dampens pressure shocks.

Ideality

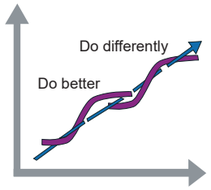
The purpose of a product, component, or system is to perform functions that serve customers. The ideal solution only provides value increasing functions and does this with minimal resources. All systems evolve toward greater ideality over time.

The S-Curve

Systems evolve either through incremental refinement (leading to diminishing returns) or radical changes. The S-curve illustrates this evolution in four phases:

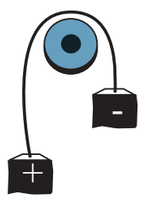
· Infancy
· Growth
· Maturity
· Retirement.

Knowing a system's position helps avoid mistakes.



System Conflicts

Solving technical problems often involves trade-offs, such as improving performance but increasing weight. TRIZ methodology looks to bypass conflicts in time, space, or structure, enabling a leap to the next S-curve.



Scales

Analyzing problems from different perspectives (micro/macro, timeframes, reverse/invert) deepens understanding and fosters creative solutions.

Problem solving process

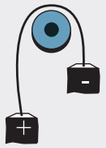
Step 1 Define the challenge

Formulate the challange in the following way: How to … (direction of improvement) (functional provider) (function of the provider to be improved) (functional receiver).
- *How to stop the membrane from making noise.*

Step 2 Formulate the conflict

The challenge can be solved but in doing so a new challenge arises or another feature is impaired. Formulate the conflict. We must have a (subsystem to be improved) to be able to (wanted function of the subsystem) but we can't have a (subsystem to be improved) because (feature or function impaired).

We must have a membrane to dampen pressure shocks but we can´t have a membrane because it makes noise.



Step 3 List all resources

List all freely available resources in and around the system that can be utilized to solve the problem.

Step 4 Get rid of the "troublemaker"

Can you eliminate the need for the "troublemaker" (subsystem to be improved) and take it out of the system?

A. Maybe the need is already eliminated?
There are no pressure shocks or there is no need to dampen them. The membrane can be eliminated.

B. Let the receiver of the function perform the function instead? *Let the pressure shocks eliminate themselves.*

C. Have an already existing resource perform the function instead? *X (another already existing resource) dampens pressure shocks.*

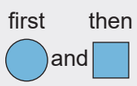
D. Carry out the function using a different physical phenomena without impairing any functions?

Step 5 Educate the "troublemaker"

Sharpen the conflict. The "troublemaker" should have two apparently opposing features simultaneously. M should be ..... in order to ..... and M should be .....in order to .....

The membrane should be soft in order to dampen pressure shocks and the membrane should be hard to eliminate noise.

A. Separate the conflicting requirements in time? Must M be ..... and ..... all the time? *Must the membrane be hard and soft all the time?*

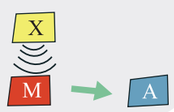


B. Separate the conflicting requirements in space? Must M be ..... and ..... all over? *Can one end be soft an the other end hard?*

C. Separate the conflicting requirements in structure? Can the parts of M be ..... and the whole be .....? *Can the parts be hard and the whole soft?*

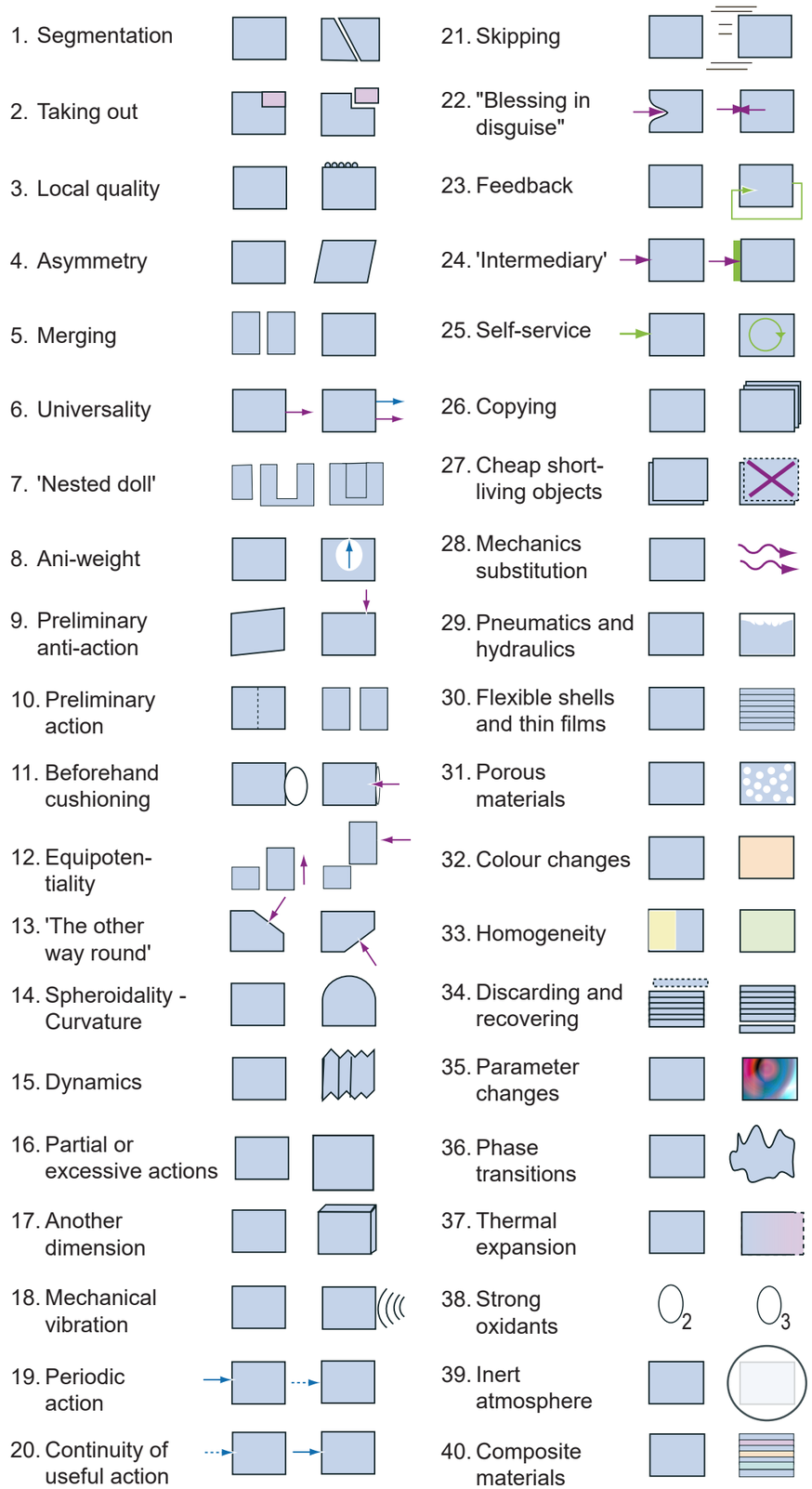
Step 6 Correct the "troublemaker"

Add a field (or component) to the "troublemaker" that eliminates the problem. *X eliminates noise.*



Inventive principles

1. Segmentation
2. Taking out
3. Local quality
4. Asymmetry
5. Merging
6. Universality
7. 'Nested doll'
8. Ani-weight
9. Preliminary anti-action
10. Preliminary action
11. Beforehand cushioning
12. Equipoten-tiality
13. 'The other way round'
14. Spheroidality - Curvature
15. Dynamics
16. Partial or excessive actions
17. Another dimension
18. Mechanical vibration
19. Periodic action
20. Continuity of useful action
21. Skipping
22. "Blessing in disguise"
23. Feedback
24. 'Intermediary'
25. Self-service
26. Copying
27. Cheap short-living objects
28. Mechanics substitution
29. Pneumatics and hydraulics
30. Flexible shells and thin films
31. Porous materials
32. Colour changes
33. Homogeneity
34. Discarding and recovering
35. Parameter changes
36. Phase transitions
37. Thermal expansion
38. Strong oxidants
39. Inert atmosphere
40. Composite materials



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