

# TRIZ, distilled

*From forty inventive principles to seven, and really to two.*

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TRIZ is usually encountered as a catalogue: forty inventive principles, a contradiction matrix, and a lexicon of standard solutions drawn from hundreds of thousands of patents. Underneath the catalogue there is something much smaller and more useful. This is a short distillation.

## I. What TRIZ actually is

Strip the mechanism and TRIZ collapses into three claims.

### 1. Every hard technical problem hides a contradiction.

Improving one thing worsens another, and that conflict is the problem. Most people flatten the contradiction into a trade-off and stop. TRIZ treats the contradiction as the site of invention.

### 2. Contradictions dissolve when you separate the requirements.

Separate in space, in time, between scales, or between conditions. The two things no longer have to happen in the same place at the same moment. This is the single move that underlies almost every TRIZ solution.

### 3. The ideal state is the function delivered with no system at all.

Altshuller called this the Ideal Final Result. Every design move that pushes toward that ideal counts as progress, and it gives direction to a search that would otherwise be unbounded.

## II. The forty principles in seven

The forty inventive principles are a tactical library for executing the separation move. They compress cleanly into seven families. Numbers in parentheses refer to the original principle numbering.

### 1. Separate and segment (1, 2, 3, 17, 24)

Break the object, the function, or the dimension into parts so that conflicting requirements can live in different parts.

### 2. Combine and unify (5, 6, 7)

Merge objects, functions, or nested structures so that one thing does several jobs.

### 3. Asymmetry and local quality (4, 33 inverted)

Match each part of the system to its local job instead of making everything uniform.

**4. Shift in time** (9, 10, 11, 20, 21, 26)

Pre-act, post-act, act continuously, or compress into a brief moment. Decide when, not just what.

**5. Invert, and turn harm into use** (8, 13, 22, 34)

Do the opposite, counterbalance, or convert the waste of the problem into the resource that solves it.

**6. Change the substrate** (28, 29, 30, 31, 32, 35, 36, 37, 38, 39, 40)

Swap the material, phase, or field carrying the function. Mechanical becomes pneumatic, solid becomes porous, rigid becomes film.

**7. Let the system do the work** (15, 16, 18, 19, 23, 25, 27)

Add dynamism, feedback, periodicity, self-service, or accept partial and disposable parts so the system regulates and maintains itself.

### **III. What survives the boil**

Cut further and TRIZ is really two ideas. Find the contradiction, then resolve it by separation. Everything else is vocabulary for the second step.

The rare skill is spotting the contradiction at all. Once it is named, the seven families above will usually suggest three or four viable moves, and the Ideal Final Result tells you which of them to prefer.

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*A synthesis, not a reproduction. The forty principles and their numbering are Altshuller's; the seven-family grouping is one reading among several.*