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TRIZ Card workshop

2012/5/26 @ Yeungnam University

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Representative of IDEAPLANT (Sendai, Japan)



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TRIZ Card

A tool that makes creative ideas, using the essence of
TRIZ

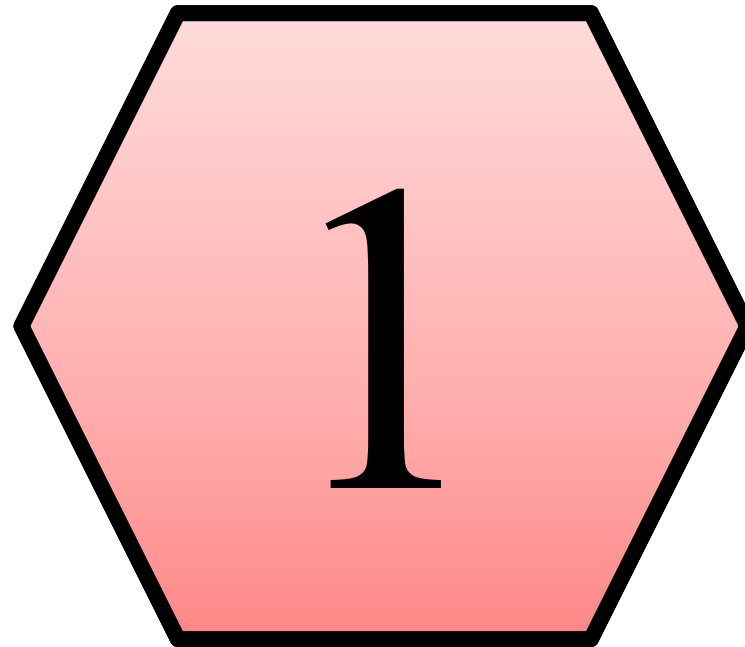
TRIZ Card (智慧カード)



TRIZ Card List



1. Divide it.
2. Separate it.
3. Change a part of it.
4. Make it unbalanced.
5. Join the two.
6. Make it useful for others.
7. Put it inside.
8. Make it balanced.
9. Step back before you go.
10. Expect and prepare beforehand.
11. Protect the important part.
12. Do it at the same level.
13. Make it reverse.
14. Make it curved and rotated.
15. Make it flexible.
16. Do it roughly first.
17. Use the direction perpendicular to the plane.
18. Make it vibrated.
19. Do it repeatedly.
20. Continue the good work.
21. Finish it in a very short time.
22. Extract something good from the bad situation.
23. Feed back the information.
24. Use something strong at the contact place.
25. Arrange things to do good for themselves.
26. Use copies of it.
27. Use many of cheap short-living things.
28. Move it without touching.
29. Use pressure effects of water or air.
30. Use a flexible cover.
31. Introduce something adhesive.
32. Change the color.
33. Match the qualities.
34. Stop getting out or put it back.
35. Change the temperature, flexibility, etc.
36. Change a solid into a gas or a liquid.
37. Expand it with heat.
38. Use more concentrated one.
39. Fill the space with a non-reactive thing.
40. Use something combined.



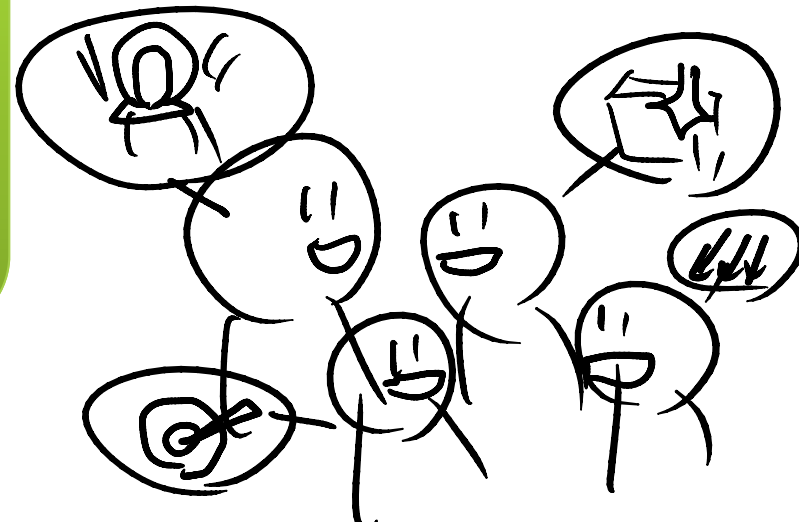
Experience thinking of ideas in the form
of playing a card game

Imaginary setting

These four people, will solve an issue with a trash bin
They are members of a venture, trying to come up with
and sell “a new trash bin”

I hate the trash bin I have now!
Let's think of a new trash bin that makes
everyone want it!

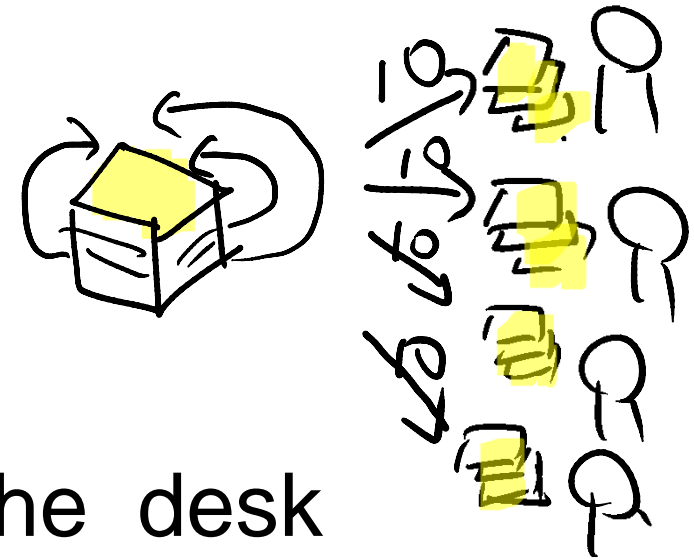
(Don't worry if it has low feasibility or
profitability)



Preparation

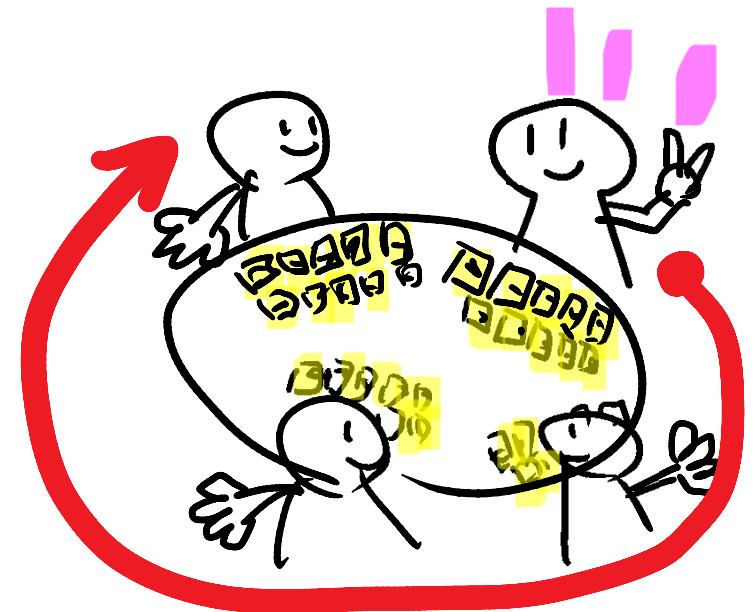
1. Shuffle the cards well, and hand it out to everyone

(If the number of people playing isn't even, leave the remaining cards on the side)



2. Each person lays their cards on the desk
(Put them faced up)

3. Rock, paper, scissor.
(Start with the person who wins the most, then go clockwise)



How to play

On your turn, **First choose one card**

Use that to begin stating your idea, give an idea that solves an issue of existing trash bins

(The quality of the idea can be low. Don't worry if the idea is plain, or has low effectiveness and feasibility. Think of it as training for your imagination. Even if it's farfetched, just come up with any idea.)

The time you have: One minute

If you say it within one minute...

Throw away your card in the middle

(You can use only one card on your turn. It becomes the next person's turn, regardless of the time remaining)

If you cannot say it within one minute...

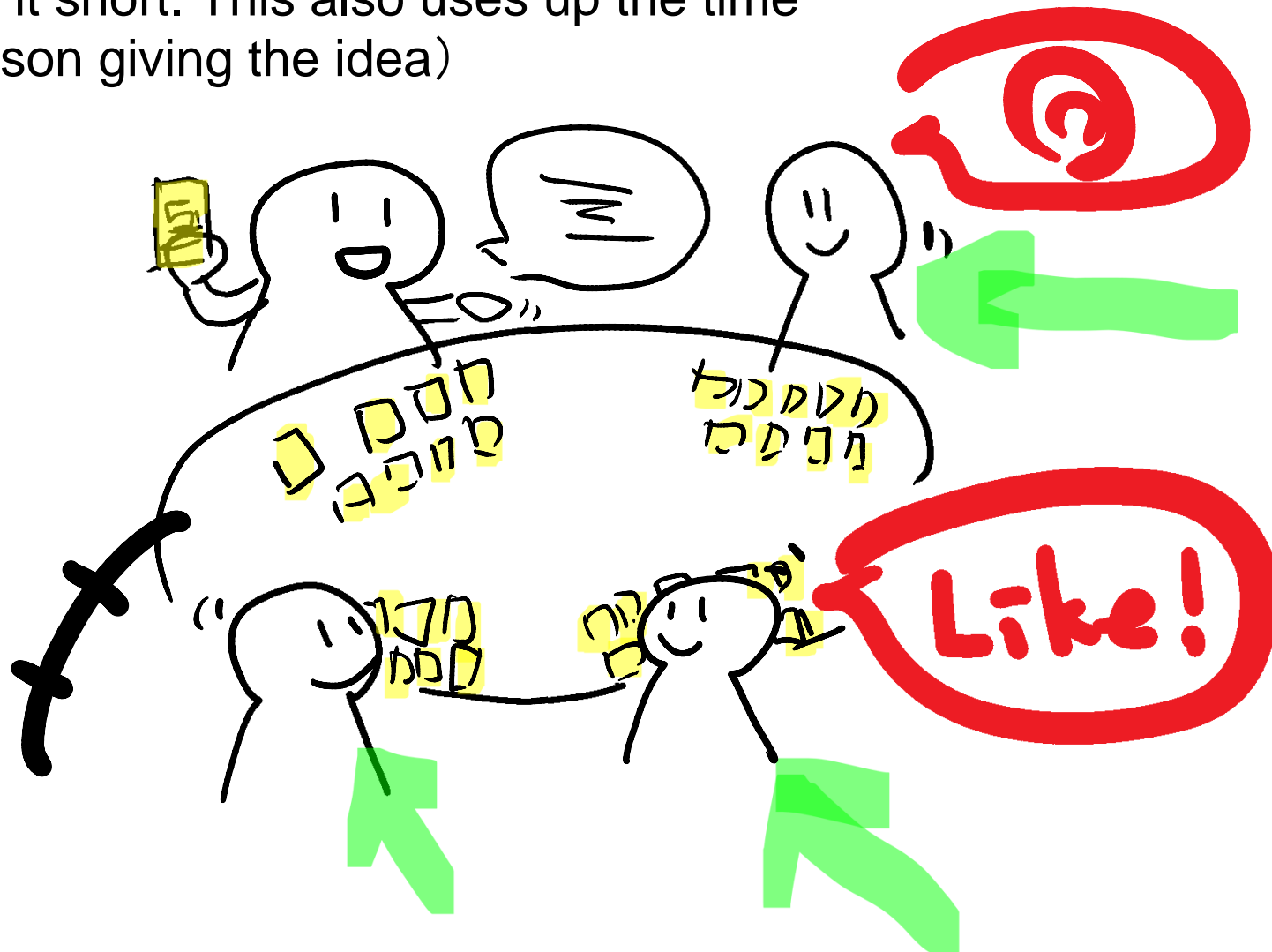
Pass. Put your card back into your hands



If it's not your turn...

If you give supportive comments on the person's idea, it can lift up the mood and help come up with ideas more easily.

(Just keep it short. This also uses up the time of the person giving the idea)



How to win

The game ends in 20 minutes.

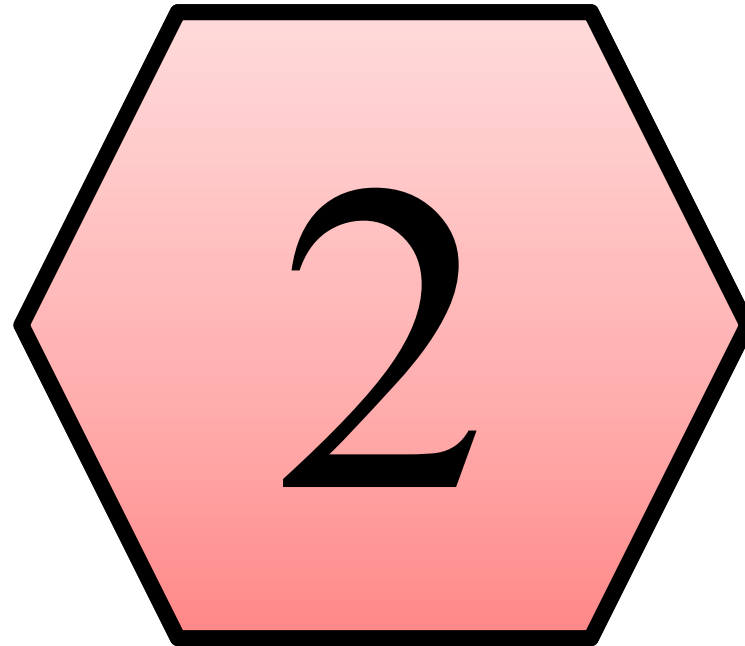
The person with the least cards wins.

Give a hand to the winner!

(Also, if anybody manages to use all their cards, that person wins.
Then continue the game with the remaining people until time is up.)

Additional note)

If you get confused with the rules or how to proceed with the game, the leader (the person who won rock, paper, scissors) can choose the rules each time.
Focus on enjoying a creative conversation, rather than being strict with the rules.



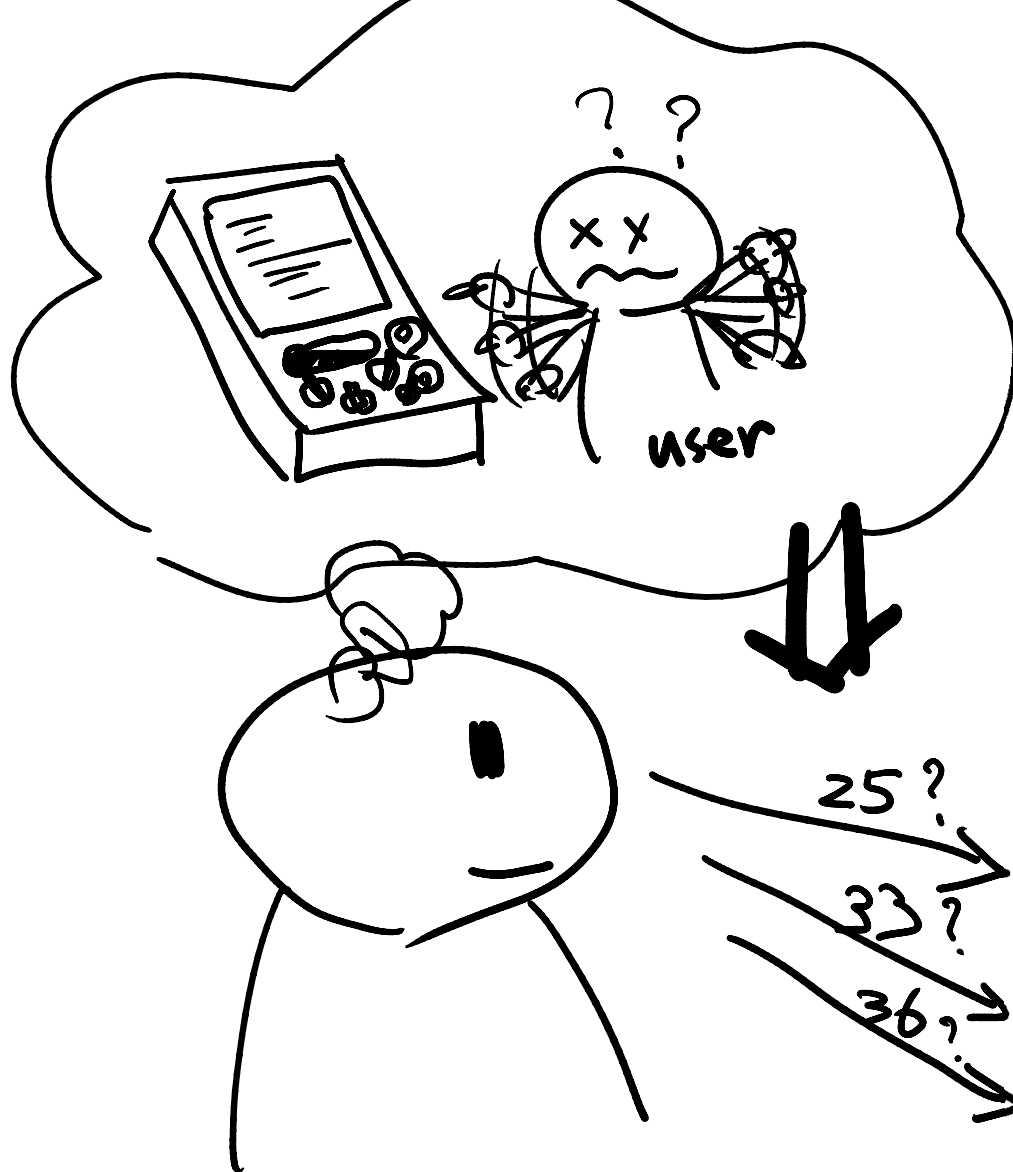
A powerful way to use

If you can pinpoint what you want to solve, TRIZ will give you a promising “idea hint”

The situation it is used:



I want to make it easier to use!



| | | Which TRIZ Card is effective? | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Improvement needs | | Very effective | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Moving object's weight | 35 | 28 | 18 | 26 | 27 | 29 | 31 | 34 | 2 | 3 | 10 | 1 | 8 | 19 | 36 | 5 | 15 | 24 | 37 | 38 | 40 | 6 | 11 | 12 | 22 | 32 | 39 | 4 | 14 | 17 | 20 | 21 | 30 | 7 | 9 | 13 | 16 | 23 | 25 | 33 | |
| 2 | Motionless object's weight | 35 | 10 | 19 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 6 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 | |
| 3 | Moving object's length | 1 | 29 | 15 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 28 | 14 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 3 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 36 | 38 | |
| 4 | Motionless object's length | 35 | 28 | 14 | 1 | 28 | 3 | 10 | 15 | 2 | 7 | 29 | 40 | 8 | 17 | 18 | 24 | 25 | 30 | 32 | 6 | 12 | 13 | 27 | 37 | 38 | 39 | 4 | 5 | 9 | 11 | 16 | 19 | 20 | 21 | 22 | 23 | 31 | 33 | 34 | 36 | |
| 5 | Moving object's surface area | 2 | 15 | 13 | 26 | 30 | 4 | 10 | 14 | 17 | 29 | 32 | 1 | 18 | 19 | 28 | 3 | 34 | 39 | 6 | 16 | 35 | 36 | 5 | 7 | 9 | 11 | 22 | 23 | 24 | 33 | 40 | 8 | 12 | 20 | 21 | 25 | 27 | 31 | 37 | 38 | |
| 6 | Motionless object's surface area | 18 | 2 | 35 | 10 | 16 | 30 | 40 | 4 | 36 | 38 | 1 | 7 | 15 | 17 | 32 | 14 | 26 | 38 | 3 | 9 | 19 | 22 | 23 | 27 | 28 | 29 | 37 | 5 | 6 | 8 | 11 | 12 | 13 | 20 | 21 | 24 | 25 | 31 | 33 | 34 | |
| 7 | Moving object's volume | 1 | 35 | 2 | 10 | 29 | 4 | 15 | 34 | 6 | 7 | 13 | 40 | 16 | 25 | 26 | 28 | 36 | 39 | 14 | 17 | 18 | 22 | 30 | 37 | 9 | 11 | 12 | 21 | 24 | 27 | 38 | 3 | 5 | 8 | 19 | 20 | 23 | 31 | 32 | 33 | |
| 8 | Motionless object's volume | 35 | 2 | 10 | 14 | 34 | 18 | 19 | 1 | 4 | 6 | 16 | 17 | 30 | 37 | 39 | 3 | 7 | 8 | 9 | 15 | 24 | 25 | 26 | 27 | 28 | 31 | 32 | 38 | 40 | 5 | 11 | 12 | 13 | 20 | 21 | 22 | 23 | 29 | 33 | 36 | |
| 9 | Velocity | 28 | 13 | 35 | 10 | 19 | 34 | 38 | 2 | 1 | 8 | 15 | 18 | 32 | 3 | 14 | 26 | 27 | 29 | 24 | 30 | 4 | 5 | 6 | 7 | 11 | 12 | 16 | 20 | 21 | 23 | 25 | 33 | 36 | 40 | 9 | 17 | 22 | 31 | 37 | 38 | |
| 10 | Force (strength) | 35 | 18 | 37 | 10 | 1 | 36 | 15 | 19 | 28 | 3 | 13 | 21 | 2 | 14 | 17 | 40 | 8 | 9 | 11 | 12 | 24 | 29 | 5 | 16 | 20 | 23 | 25 | 26 | 27 | 34 | 4 | 6 | 7 | 22 | 30 | 31 | 32 | 33 | 38 | 39 | |
| 11 | Stress or pressure | 35 | 10 | 36 | 37 | 2 | 14 | 19 | 1 | 3 | 6 | 15 | 18 | 40 | 4 | 13 | 16 | 24 | 25 | 27 | 28 | 33 | 8 | 11 | 21 | 22 | 29 | 34 | 39 | 5 | 7 | 8 | 12 | 17 | 20 | 23 | 26 | 30 | 31 | 32 | 38 | |
| 12 | Shape | 10 | 1 | 14 | 15 | 32 | 34 | 35 | 2 | 4 | 29 | 40 | 13 | 22 | 26 | 5 | 17 | 28 | 3 | 6 | 7 | 16 | 18 | 30 | 8 | 9 | 19 | 25 | 33 | 36 | 37 | 39 | 11 | 12 | 20 | 21 | 23 | 24 | 27 | 31 | 38 | |
| 13 | Stability of the object's composition | 35 | 2 | 39 | 27 | 40 | 1 | 13 | 15 | 16 | 32 | 10 | 23 | 28 | 30 | 3 | 19 | 22 | 4 | 14 | 16 | 21 | 26 | 34 | 6 | 8 | 9 | 11 | 17 | 29 | 31 | 33 | 37 | 5 | 7 | 12 | 20 | 24 | 25 | 26 | 36 | 38 |
| 14 | Durability | 3 | 35 | 10 | 40 | 15 | 27 | 28 | 14 | 26 | 1 | 29 | 2 | 8 | 11 | 13 | 18 | 32 | 9 | 17 | 19 | 30 | 7 | 16 | 22 | 31 | 34 | 37 | 4 | 5 | 6 | 12 | 20 | 21 | 23 | 24 | 25 | 33 | 36 | 38 | 39 | |
| 15 | Moving object's operating time | 19 | 35 | 3 | 10 | 27 | 2 | 28 | 4 | 13 | 16 | 18 | 29 | 39 | 1 | 5 | 6 | 14 | 15 | 17 | 22 | 40 | 9 | 11 | 12 | 20 | 21 | 25 | 26 | 30 | 31 | 33 | 34 | 38 | 7 | 8 | 23 | 24 | 32 | 36 | 37 | |
| 16 | Motionless object's operating time | 35 | 1 | 10 | 16 | 40 | 6 | 27 | 34 | 38 | 3 | 18 | 19 | 20 | 2 | 17 | 22 | 23 | 24 | 25 | 26 | 28 | 31 | 33 | 36 | 39 | 4 | 5 | 7 | 8 | 9 | 11 | 12 | 13 | 14 | 15 | 21 | 29 | 30 | 32 | 37 | |
| 17 | Temperature | 35 | 19 | 2 | 3 | 22 | 17 | 18 | 21 | 32 | 38 | 10 | 15 | 16 | 27 | 30 | 36 | 24 | 28 | 38 | 40 | 4 | 6 | 9 | 14 | 26 | 31 | 1 | 13 | 23 | 25 | 29 | 33 | 34 | 5 | 7 | 8 | 11 | 12 | 20 | 37 | |
| 18 | Intensity of illumination | 19 | 32 | 1 | 35 | 15 | 26 | 2 | 6 | 13 | 16 | 10 | 3 | 17 | 28 | 39 | 11 | 25 | 27 | 30 | 4 | 5 | 7 | 8 | 9 | 12 | 14 | 18 | 20 | 21 | 22 | 23 | 24 | 29 | 31 | 33 | 34 | 36 | 37 | 38 | 40 | |
| 19 | Moving object's energy consumption | 35 | 19 | 18 | 2 | 15 | 28 | 12 | 6 | 24 | 1 | 13 | 16 | 17 | 27 | 32 | 3 | 5 | 14 | 21 | 23 | 25 | 26 | 29 | 38 | 8 | 9 | 11 | 22 | 30 | 31 | 34 | 37 | 4 | 7 | 10 | 20 | 23 | 36 | 39 | 40 | |
| 20 | Motionless object's energy consumption | 19 | 35 | 18 | 27 | 1 | 2 | 4 | 6 | 10 | 22 | 31 | 36 | 37 | 3 | 9 | 16 | 23 | 25 | 28 | 29 | 32 | 5 | 7 | 8 | 11 | 12 | 13 | 14 | 15 | 17 | 20 | 21 | 24 | 26 | 30 | 33 | 34 | 38 | 39 | 40 | |
| 21 | Output | 35 | 19 | 2 | 10 | 38 | 26 | 34 | 6 | 17 | 16 | 28 | 31 | 32 | 15 | 16 | 20 | 22 | 25 | 27 | 29 | 30 | 36 | 37 | 1 | 4 | 8 | 13 | 14 | 24 | 40 | 3 | 5 | 7 | 9 | 11 | 12 | 21 | 23 | 33 | 38 | |
| 22 | Energy loss | 17 | 35 | 2 | 6 | 18 | 19 | 38 | 10 | 15 | 32 | 23 | 1 | 3 | 13 | 17 | 21 | 22 | 26 | 28 | 30 | 9 | 11 | 14 | 16 | 25 | 27 | 29 | 36 | 37 | 39 | 4 | 5 | 8 | 12 | 20 | 24 | 31 | 33 | 34 | 40 | |
| 23 | Object loss | 10 | 35 | 18 | 28 | 31 | 2 | 24 | 27 | 3 | 29 | 39 | 40 | 6 | 15 | 34 | 1 | 13 | 14 | 30 | 36 | 38 | 5 | 16 | 22 | 23 | 32 | 33 | 12 | 21 | 37 | 4 | 7 | 8 | 9 | 11 | 17 | 19 | 20 | 25 | 26 | |
| 24 | Information loss | 10 | 26 | 35 | 22 | 19 | 24 | 28 | 32 | 1 | 23 | 30 | 2 | 5 | 13 | 15 | 16 | 21 | 27 | 33 | 3 | 4 | 6 | 7 | 8 | 9 | 11 | 12 | 14 | 17 | 18 | 20 | 25 | 29 | 31 | 34 | 36 | 37 | 38 | 39 | 40 | |
| 25 | Time loss | 10 | 35 | 18 | 28 | 4 | 5 | 32 | 34 | 20 | 24 | 26 | 16 | 29 | 17 | 30 | 37 | 1 | 2 | 3 | 6 | 19 | 22 | 36 | 38 | 39 | 14 | 15 | 21 | 7 | 8 | 9 | 11 | 12 | 13 | 23 | 25 | 27 | 31 | 33 | 40 | |
| 26 | Object quantity | 35 | 3 | 29 | 18 | 10 | 14 | 27 | 40 | 2 | 15 | 28 | 31 | 25 | 34 | 6 | 13 | 16 | 17 | 24 | 33 | 39 | 1 | 4 | 7 | 8 | 20 | 26 | 30 | 32 | 36 | 38 | 5 | 9 | 11 | 12 | 19 | 21 | 22 | 23 | 37 | |
| 27 | Reliability | 35 | 11 | 10 | 3 | 20 | 40 | 27 | 1 | 2 | 8 | 13 | 21 | 24 | 32 | 4 | 14 | 25 | 15 | 16 | 17 | 19 | 23 | 26 | 6 | 9 | 25 | 30 | 31 | 34 | 36 | 38 | 39 | 5 | 7 | 12 | 16 | 20 | 22 | 33 | 37 | |
| 28 | Measurement accuracy | 32 | 28 | 6 | 26 | 3 | 10 | 13 | 24 | 35 | 34 | 1 | 2 | 16 | 5 | 11 | 25 | 27 | 17 | 18 | 19 | 22 | 23 | 31 | 33 | 39 | 4 | 7 | 8 | 9 | 12 | 14 | 15 | 20 | 21 | 29 | 30 | 36 | 37 | 38 | 40 | |
| 29 | Production accuracy | 32 | 28 | 10 | 2 | 18 | 26 | 35 | 3 | 27 | 25 | 30 | 36 | 1 | 13 | 19 | 23 | 25 | 34 | 40 | 4 | 9 | 11 | 17 | 24 | 31 | 33 | 37 | 39 | 5 | 6 | 7 | 8 | 12 | 14 | 15 | 16 | 20 | 21 | 22 | 38 | |
| 30 | Harmful factors the object will receive | 22 | 35 | 2 | 1 | 33 | 18 | 19 | 24 | 28 | 35 | 27 | 40 | 10 | 13 | 97 | 21 | 29 | 31 | 34 | 3 | 17 | 23 | 26 | 4 | 6 | 11 | 15 | 25 | 30 | 32 | 5 | 7 | 8 | 9 | 12 | 14 | 16 | 20 | 36 | 38 | |
| 31 | Harmful factors the object will release | 32 | 35 | 2 | 1 | 39 | 18 | 40 | 15 | 17 | 19 | 21 | 24 | 3 | 27 | 33 | 4 | 10 | 16 | 26 | 28 | 31 | 34 | 6 | 23 | 29 | 30 | 32 | 5 | 7 | 8 | 9 | 11 | 12 | 13 | 14 | 20 | 25 | 36 | 37 | 38 | |
| 32 | Production facility | 1 | 35 | 13 | 27 | 28 | 16 | 24 | 12 | 15 | 26 | 2 | 4 | 11 | 18 | 29 | 8 | 10 | 17 | 19 | 32 | 34 | 40 | 3 | 5 | 6 | 9 | 23 | 33 | 36 | 37 | 7 | 14 | 20 | 21 | 22 | 25 | 30 | 31 | 38 | 39 | |
| 33 | Control facility | 1 | 13 | 2 | 12 | 25 | 28 | 32 | 34 | 15 | 35 | 16 | 17 | 3 | 4 | 10 | 18 | 24 | 27 | 39 | 8 | 26 | 29 | 40 | 5 | 6 | 19 | 22 | 23 | 30 | 31 | 7 | 9 | 11 | 14 | 20 | 21 | 23 | 36 | 37 | 38 | |
| 34 | Repair facility | 1 | 10 | 2 | 11 | 35 | 13 | 15 | 25 | 16 | 32 | 27 | 28 | 4 | 34 | 7 | 9 | 3 | 12 | 18 | 19 | 26 | 29 | 31 | 5 | 6 | 8 | 14 | 17 | 20 | 21 | 22 | 23 | 24 | 30 | 33 | 36 | 37 | 38 | 39 | 40 | |
| 35 | Adaptability or flexibility | 35 | 1 | 15 | 29 | 16 | 13 | 2 | 8 | 3 | 5 | 10 | 19 | 28 | 37 | 7 | 14 | 27 | 30 | 31 | 32 | 34 | 4 | 5 | 9 | 11 | 17 | 18 | 20 | 22 | 24 | 26 | 12 | 21 | 23 | 25 | 33 | 36 | 38 | 39 | 40 | |
| 36 | Device complexity | 13 | 26 | 1 | 28 | 2 | 10 | 19 | 29 | 15 | 24 | 34 | 35 | 17 | 27 | 6 | 16 | 22 | 30 | 36 | 37 | 3 | 4 | 9 | 12 | 14 | 20 | 32 | 39 | 40 | 5 | 7 | 8 | 11 | 16 | 21 | 23 | 25 | 31 | 33 | 38 | |
| 37 | Detection and measurement difficulty | 28 | 35 | 16 | 26 | 27 | 1 | 2 | 18 | 19 | 3 | 29 | 13 | 15 | 24 | 39 | 10 | 22 | 32 | 4 | 5 | 6 | 11 | 17 | 21 | 25 | 30 | 34 | 36 | 37 | 40 | 8 | 9 | 12 | 31 | 33 | 38 | 7 | 14 | 20 | 23 | |
| 38 | Automation range | 35 | 13 | 28 | 26 | 1 | 2 | 10 | 18 | 27 | 32 | 33 | 34 | 5 | 12 | 14 | 15 | 17 | 19 | 24 | 25 | 33 | 3 | 4 | 6 | 8 | 9 | 11 | 16 | 30 | 7 | 20 | 21 | 22 | 29 | 31 | 36 | 37 | 38 | 39 | 40 | |
| 39 | Productivity | 10 | 35 | 28 | 1 | 18 | 2 | 26 | 38 | 24 | 34 | 37 | 7 | 14 | 15 | 17 | 19 | 22 | 3 | 13 | 20 | 23 | 27 | 29 | 32 | 39 | 4 | 5 | 6 | 12 | 16 | 21 | 25 | 30 | 31 | 36 | 40 | 8 | 9 | 11 | 23 | |

Myagi-TRIZ 2011.3.11

“Make it easier to use”. Which one is this issue out of the 39 ?
Choose one that applies to the “39 improvement needs”.
 It can be more than one.

Which TRIZ Card is effective?

| Improvement needs | | Very effective | | | | | | | | | | Effective | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Somewhat effective | | | | | | | | | | Not effective | | | | | | | | | |
|-------------------|---|----------------|----|----|----|----|----|----|----|----|----|-----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--------------------|--|--|--|--|--|--|--|--|--|---------------|--|--|--|--|--|--|--|--|--|
| 1 | Moving object's weight | 35 | 28 | 18 | 26 | 27 | 29 | 31 | 34 | 2 | 3 | 10 | 1 | 8 | 19 | 36 | 5 | 15 | 24 | 37 | 38 | 40 | 6 | 11 | 12 | 22 | 32 | 39 | 4 | 14 | 17 | 20 | 21 | 30 | 7 | 9 | 13 | 16 | 23 | 25 | 33 | | | | | | | | | | | | | | | | | | | | |
| 2 | Motionless object's weight | 35 | 10 | 19 | 26 | | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 6 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 | | | | | | | | | | | | | | | | | | | | |
| 3 | Moving object's length | 1 | 29 | 15 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 26 | 4 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 3 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 36 | 38 | | | | | | | | | | | | | | | | | | | | |
| 4 | Motionless object's length | 35 | 28 | 14 | 1 | 26 | 3 | 10 | 15 | 2 | 7 | 29 | 40 | 8 | 17 | 18 | 24 | 25 | 30 | 32 | 6 | 12 | 13 | 27 | 37 | 38 | 39 | 4 | 5 | 9 | 11 | 16 | 19 | 20 | 21 | 22 | 23 | 31 | 33 | 34 | 36 | | | | | | | | | | | | | | | | | | | | |
| 5 | Moving object's surface area | 2 | 15 | 13 | 26 | 30 | 4 | 10 | 14 | 17 | 29 | 32 | 1 | 18 | 19 | 29 | 3 | 34 | 39 | 6 | 16 | 35 | 36 | 5 | 7 | 9 | 11 | 22 | 23 | 24 | 33 | 40 | 8 | 12 | 20 | 21 | 25 | 27 | 31 | 37 | 38 | | | | | | | | | | | | | | | | | | | | |
| 6 | Motionless object's surface area | 13 | 2 | 35 | 18 | 16 | 30 | 40 | 4 | 36 | 39 | 1 | 7 | 15 | 17 | 32 | 14 | 26 | 38 | 3 | 8 | 19 | 22 | 23 | 27 | 28 | 29 | 37 | 5 | 6 | 8 | 11 | 12 | 13 | 20 | 21 | 24 | 25 | 31 | 33 | | | | | | | | | | | | | | | | | | | | | |
| 7 | Moving object's volume | 1 | 35 | 2 | 10 | 29 | 4 | 15 | 34 | 6 | 7 | 13 | 40 | 16 | 25 | 26 | 28 | 36 | 39 | 14 | 17 | 18 | 22 | 30 | 37 | 9 | 11 | 12 | 21 | 24 | 27 | 38 | 3 | 5 | 8 | 19 | 20 | 23 | 31 | 32 | | | | | | | | | | | | | | | | | | | | | |
| 8 | Motionless object's volume | 35 | 2 | 10 | 14 | 34 | 18 | 19 | 1 | 4 | 6 | 16 | 7 | 30 | 37 | 39 | 3 | 7 | 8 | 9 | 15 | 24 | 25 | 26 | 27 | 28 | 31 | 32 | 38 | 40 | 5 | 11 | 12 | 13 | 20 | 21 | 22 | 23 | 29 | 30 | | | | | | | | | | | | | | | | | | | | | |
| 9 | Velocity | 28 | 13 | 35 | 10 | 19 | 34 | 38 | 2 | 1 | 8 | 15 | 18 | 32 | 3 | 14 | 26 | 27 | 29 | 24 | 30 | 4 | 5 | 6 | 7 | 11 | 12 | 16 | 20 | 21 | 23 | 25 | 33 | 36 | 40 | 9 | 17 | 22 | 31 | 17 | 35 | | | | | | | | | | | | | | | | | | | | |
| 10 | Force (strength) | 35 | 18 | 37 | 10 | 1 | 36 | 15 | 19 | 28 | 3 | 13 | 21 | 2 | 14 | 17 | 40 | 8 | 9 | 11 | 12 | 24 | 29 | 5 | 16 | 20 | 23 | 25 | 26 | 27 | 34 | 4 | 6 | 7 | 22 | 30 | 31 | 32 | 33 | 38 | 39 | | | | | | | | | | | | | | | | | | | | |
| 11 | Stress or pressure | 35 | 10 | 36 | 37 | 2 | 14 | 19 | 1 | 3 | 6 | 15 | 18 | 40 | 4 | 13 | 16 | 24 | 25 | 27 | 28 | 33 | 9 | 11 | 21 | 22 | 29 | 34 | 39 | 5 | 7 | 8 | 12 | 17 | 20 | 23 | 28 | 30 | 31 | | 38 | | | | | | | | | | | | | | | | | | | | |
| 12 | Shape | 10 | 1 | 14 | 15 | 32 | 34 | 35 | 2 | 4 | 29 | 40 | 13 | 22 | 26 | 5 | 17 | 28 | 3 | 6 | 7 | 16 | 18 | 30 | 8 | 9 | 19 | 25 | 33 | 36 | 37 | 39 | 11 | 12 | 20 | 21 | 23 | 24 | 27 | 31 | 33 | | | | | | | | | | | | | | | | | | | | |
| 13 | Stability of the object's compsiton | 35 | 2 | 39 | 27 | 40 | 1 | 13 | 15 | 18 | 32 | 10 | 23 | 28 | 30 | 3 | 19 | 22 | 4 | 14 | 16 | 21 | 26 | 34 | 6 | 8 | 9 | 11 | 17 | 29 | 31 | 33 | 37 | 5 | 7 | 12 | 20 | 24 | 25 | 36 | 38 | | | | | | | | | | | | | | | | | | | | |
| 14 | Durability | 3 | 35 | 10 | 40 | 15 | 27 | 28 | 14 | 26 | 1 | 29 | 2 | 3 | 11 | 13 | 18 | 32 | 9 | 17 | 19 | 30 | 7 | 16 | 22 | 31 | 34 | 37 | 4 | 5 | 6 | 12 | 20 | 21 | 23 | 24 | 25 | 33 | 36 | 38 | 39 | | | | | | | | | | | | | | | | | | | | |
| 15 | Moving object's operating time | 19 | 35 | 3 | 10 | 27 | 2 | 28 | 4 | 13 | 16 | 18 | 29 | 39 | 1 | 5 | 6 | 14 | 15 | 17 | 22 | 40 | 9 | 11 | 12 | 20 | 21 | 25 | 26 | 30 | 31 | 33 | 34 | 38 | 7 | 8 | 23 | 24 | 32 | 36 | 37 | | | | | | | | | | | | | | | | | | | | |
| 16 | Motionless object's operating time | 35 | 1 | 10 | 16 | 40 | 6 | 27 | 34 | 38 | 3 | 18 | 19 | 20 | 2 | 17 | 22 | 23 | 24 | 25 | 26 | 28 | 31 | 33 | 36 | 39 | 4 | 5 | 7 | 8 | 9 | 11 | 12 | 13 | 14 | 15 | 21 | 29 | 30 | 32 | 37 | | | | | | | | | | | | | | | | | | | | |
| 17 | Temperature | 35 | 19 | 2 | 3 | 27 | 17 | 18 | 21 | 32 | 39 | 10 | 15 | 16 | 27 | 30 | 36 | 24 | 28 | 38 | 40 | 4 | 6 | 9 | 14 | 26 | 31 | | 13 | 23 | 25 | 29 | 33 | 34 | 5 | 7 | 8 | 11 | 12 | 20 | 31 | | | | | | | | | | | | | | | | | | | | |
| 18 | Intensity of illumination | 19 | 32 | | 35 | 15 | 28 | 2 | 6 | 13 | 16 | 10 | 8 | 17 | 28 | 39 | 11 | 25 | 27 | 30 | 4 | 5 | 7 | 8 | 9 | 12 | 14 | 18 | 20 | 21 | 22 | 23 | 24 | 29 | 31 | 33 | 34 | 35 | 37 | 38 | 40 | | | | | | | | | | | | | | | | | | | | |
| 19 | Moving object's energy consumption | 35 | 19 | 13 | 2 | 15 | 28 | 12 | 6 | 24 | 1 | 13 | 16 | 17 | 27 | 32 | 3 | 5 | 14 | 21 | 23 | 25 | 26 | 29 | 38 | 6 | 9 | 11 | 22 | 30 | 31 | 34 | 37 | 4 | 7 | 10 | 20 | 33 | 36 | 39 | 41 | | | | | | | | | | | | | | | | | | | | |
| 20 | Motionless object's energy consumption | 19 | 35 | 13 | 27 | 1 | 2 | 4 | 6 | 10 | 22 | 31 | 36 | 37 | 3 | 9 | 16 | 23 | 25 | 28 | 29 | 32 | 5 | 7 | 8 | 11 | 12 | 13 | 14 | 15 | 17 | 20 | 21 | 24 | 26 | 30 | 33 | 34 | 38 | 39 | 40 | | | | | | | | | | | | | | | | | | | | |
| 21 | Output | 35 | 19 | 2 | 10 | 38 | 26 | 34 | 6 | 17 | 16 | 28 | 31 | 32 | 15 | 19 | 20 | 22 | 25 | 27 | 29 | 30 | 36 | 37 | 1 | 4 | 8 | 13 | 14 | 24 | 40 | 3 | 5 | 7 | 9 | 11 | 12 | 21 | 23 | 39 | 43 | | | | | | | | | | | | | | | | | | | | |
| 22 | Energy loss | 7 | 35 | 2 | 6 | 6 | 19 | 38 | 10 | 15 | 32 | 23 | 1 | 3 | 13 | 17 | 21 | 22 | 26 | 28 | 30 | 9 | 11 | 14 | 16 | 25 | 27 | 29 | 36 | 37 | 39 | 4 | 5 | 8 | 12 | 20 | 24 | 31 | 33 | 34 | 40 | | | | | | | | | | | | | | | | | | | | |
| 23 | Object loss | 10 | 35 | 18 | 28 | 31 | 2 | 24 | 27 | 3 | 29 | 39 | 40 | 6 | 15 | 34 | 1 | 13 | 14 | 30 | 36 | 38 | 5 | 16 | 22 | 23 | 32 | 33 | 12 | 21 | 37 | 4 | 7 | 8 | 9 | 11 | 17 | 19 | 20 | 25 | 26 | | | | | | | | | | | | | | | | | | | | |
| 24 | Information loss | 10 | 26 | 35 | 22 | 19 | 24 | 28 | 32 | 1 | 23 | 30 | 2 | 5 | 13 | 15 | 16 | 21 | 27 | 33 | 3 | 4 | 6 | 7 | 8 | 9 | 11 | 12 | 14 | 17 | 18 | 20 | 25 | 29 | 31 | 34 | 36 | 37 | 38 | 39 | 40 | | | | | | | | | | | | | | | | | | | | |
| 25 | Time loss | 10 | 35 | 13 | 28 | 4 | 5 | 32 | 34 | 20 | 24 | 26 | 16 | 29 | 17 | 30 | 37 | 1 | 2 | 3 | 6 | 19 | 22 | 36 | 38 | 39 | 14 | 15 | 21 | 7 | 8 | 9 | 11 | 12 | 13 | 23 | 25 | 27 | 31 | 33 | 40 | | | | | | | | | | | | | | | | | | | | |
| 26 | Object quantity | 35 | 3 | 29 | 18 | 10 | 14 | 27 | 40 | 2 | 15 | 28 | 31 | 25 | 34 | 6 | 13 | 16 | 17 | 24 | 33 | 39 | 1 | 4 | 7 | 8 | 20 | 26 | 30 | 32 | 36 | 38 | 5 | 9 | 11 | 12 | 19 | 21 | 22 | 23 | | | | | | | | | | | | | | | | | | | | | |
| 27 | Reliability | 35 | 11 | 10 | 3 | 28 | 40 | 27 | 1 | 2 | 8 | 13 | 21 | 24 | 32 | 4 | 14 | 29 | 15 | 16 | 17 | 19 | 23 | 26 | 6 | 9 | 25 | 30 | 31 | 34 | 36 | 38 | 39 | 5 | 7 | 12 | 18 | 20 | 22 | 33 | 37 | | | | | | | | | | | | | | | | | | | | |
| 28 | Measurement accuracy | 32 | 28 | 6 | 26 | 3 | 10 | 13 | 24 | 35 | 34 | 1 | 2 | 16 | 5 | 11 | 25 | 27 | 17 | 18 | 19 | 22 | 23 | 31 | 33 | 39 | 4 | 7 | 8 | 9 | 12 | 14 | 15 | 20 | 21 | 29 | 30 | 36 | 37 | 38 | 40 | | | | | | | | | | | | | | | | | | | | |
| 29 | Production accuracy | 32 | 28 | 10 | 2 | 18 | 26 | 35 | 3 | 27 | 29 | 36 | 1 | 13 | 19 | 23 | 25 | 34 | 40 | 4 | 9 | 11 | 17 | 24 | 31 | 33 | 37 | 39 | 5 | 6 | 7 | 8 | 12 | 14 | 15 | 16 | 20 | 21 | 22 | 38 | | | | | | | | | | | | | | | | | | | | | |
| 30 | Harmful factors the object will receive | 22 | 35 | 2 | 1 | 33 | 18 | 19 | 24 | 28 | 39 | 27 | 40 | 10 | 13 | 37 | 21 | 29 | 31 | 34 | 3 | 17 | 23 | 26 | 4 | 6 | 11 | 15 | 29 | 30 | 32 | 5 | 7 | 8 | 9 | 12 | 14 | 16 | 20 | 36 | 38 | | | | | | | | | | | | | | | | | | | | |
| 31 | Harmful factors the object will release | 22 | 35 | 2 | 1 | 39 | 18 | 40 | 15 | 17 | 19 | 21 | 24 | 5 | 27 | 33 | 4 | 10 | 16 | 26 | 28 | 31 | 34 | 6 | 23 | 29 | 30 | 32 | 5 | 7 | 8 | 9 | 11 | 12 | 13 | 14 | 20 | 25 | 36 | 37 | 38 | | | | | | | | | | | | | | | | | | | | |
| 32 | Production facility | 1 | 35 | 13 | 27 | 28 | 16 | 24 | 12 | 15 | 25 | 2 | 4 | 11 | 18 | 29 | 8 | 10 | 17 | 19 | 32 | 34 | 40 | 3 | 5 | 6 | 9 | 23 | 33 | 36 | 37 | 7 | 14 | 20 | 21 | 22 | 25 | 30 | 31 | 38 | 39 | | | | | | | | | | | | | | | | | | | | |
| 33 | Control facility | 1 | 13 | 2 | 12 | 25 | 28 | 32 | 34 | 15 | 35 | 18 | 17 | 3 | 4 | 10 | 18 | 24 | 27 | 39 | 8 | 26 | 29 | 40 | 5 | 6 | 19 | 22 | 23 | 30 | 31 | 7 | 9 | 11 | 14 | 20 | 21 | 33 | 36 | 37 | 38 | | | | | | | | | | | | | | | | | | | | |
| 34 | Repair facility | 1 | 10 | 2 | 11 | 35 | 13 | 15 | 25 | 16 | 32 | 27 | 28 | 4 | 34 | 7 | 9 | 3 | 12 | 18 | 19 | 26 | 29 | 31 | 5 | 6 | 8 | 14 | 17 | 20 | 21 | 22 | 23 | 24 | 30 | 33 | 36 | 37 | 38 | 39 | 40 | | | | | | | | | | | | | | | | | | | | |
| 35 | Adaptability or flexibility | 35 | 1 | 15 | 29 | 16 | 13 | 2 | 6 | 3 | 8 | 10 | 19 | 28 | 37 | 7 | 14 | 27 | 30 | 31 | 32 | 34 | 4 | 5 | 9 | 11 | 17 | 9 | 20 | 22 | 24 | 26 | 12 | 21 | 23 | 25 | 33 | 36 | 38 | 39 | 40 | | | | | | | | | | | | | | | | | | | | |
| 36 | Device complexity | 13 | 26 | | 28 | 2 | 10 | 19 | 29 | 15 | 24 | 34 | 35 | 17 | 27 | 6 | 16 | 22 | 30 | 36 | 37 | 3 | 4 | 9 | 12 | 14 | 20 | 32 | 39 | 40 | 5 | 7 | 8 | 11 | 18 | 21 | 23 | 25 | 31 | 33 | 38 | | | | | | | | | | | | | | | | | | | | |
| 37 | Detection and measurement difficulty | 28 | 35 | 16 | 26 | 27 | 1 | 2 | 18 | 19 | 3 | 29 | 13 | 15 | 24 | 39 | 10 | 22 | 32 | 4 | 5 | 6 | 11 | 17 | 21 | 25 | 30 | 34 | 36 | 37 | 40 | 8 | 9 | 12 | 31 | 33 | 38 | 7 | 14 | 20 | 23 | | | | | | | | | | | | | | | | | | | | |
| 38 | Automation range | 35 | 13 | 29 | 26 | 1 | 2 | 10 | 18 | 27 | 32 | 23 | 34 | 5 | 12 | 14 | 15 | 17 | 19 | 24 | 25 | 33 | 3 | 4 | 6 | 8 | 9 | 11 | 16 | 30 | 7 | 20 | 21 | 22 | 29 | 31 | 36 | 37 | 38 | 39 | 40 | | | | | | | | | | | | | | | | | | | | |
| 39 | Productivity | 10 | 35 | 28 | 1 | 18 | 2 | 26 | 38 | 24 | 34 | 37 | 7 | 14 | 15 | 17 | 19 | 22 | 3 | 13 | 20 | 23 | 27 | 2 | 32 | 39 | 4 | 5 | 6 | 12 | 16 | 21 | 25 | 30 | 31 | 36 | 40 | 8 | 9 | 11 | 30 | | | | | | | | | | | | | | | | | | | | |

Which TRIZ Card is effective?

Improvement needs

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1 | Moving object's weight | 35 | 28 | 13 | 20 | 27 | 29 | 31 | 34 | 2 | 3 | 10 | 1 | 8 | 19 | 36 | 5 | 15 | 24 | 37 | 38 | 40 | 6 | 11 | 12 | 22 | 32 | 39 | 4 | 14 | 17 | 20 | 21 | 30 | 7 | 9 | 13 | 16 | 23 | 25 | 33 |
| 2 | Motionless object's weight | 35 | 10 | 15 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 5 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 |
| 3 | Moving object's length | 1 | 23 | 15 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 25 | 14 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 3 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 35 | 38 |
| 4 | Motionless object's length | 35 | 2 | 15 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 5 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 |
| 5 | Moving object's surface area | 2 | 23 | 15 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 25 | 14 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 3 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 35 | 38 |
| 6 | Motionless object's surface area | 35 | 10 | 15 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 5 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 |
| 7 | Moving object's volume | 1 | 23 | 15 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 25 | 14 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 3 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 35 | 38 |
| 8 | Motionless object's volume | 35 | 2 | 15 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 5 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 |
| 9 | Velocity | 2 | 23 | 15 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 25 | 14 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 3 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 35 | 38 |
| 10 | Force (strength) | 35 | 10 | 15 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 5 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 |
| 11 | Stress or pressure | 1 | 23 | 15 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 25 | 14 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 3 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 35 | 38 |
| 12 | Shape | 35 | 2 | 15 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 5 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 |
| 13 | Stability of the object's composition | 2 | 23 | 15 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 25 | 14 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 3 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 35 | 38 |
| 14 | Durability | 35 | 10 | 15 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 5 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 |
| 15 | Moving object's operating time | 1 | 23 | 15 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 25 | 14 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 3 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 35 | 38 |
| 16 | Motionless object's operating time | 35 | 2 | 15 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 5 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 |
| 17 | Temperature | 2 | 23 | 15 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 25 | 14 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 3 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 35 | 38 |
| 18 | Intensity of illumination | 35 | 10 | 15 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 5 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 |
| 19 | Moving object's energy consumption | 1 | 23 | 15 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 25 | 14 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 3 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 35 | 38 |
| 20 | Motionless object's energy consumption | 35 | 2 | 15 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 5 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 |
| 21 | Output | 2 | 23 | 15 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 25 | 14 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 3 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 35 | 38 |
| 22 | Energy loss | 35 | 10 | 15 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 5 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 |
| 23 | Object loss | 1 | 23 | 15 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 25 | 14 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 3 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 35 | 38 |
| 24 | Information loss | 35 | 2 | 15 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 5 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 |
| 25 | Time loss | 10 | 35 | 18 | 28 | 4 | 5 | 32 | 34 | 20 | 24 | 26 | 16 | 29 | 17 | 30 | 37 | 1 | 2 | 3 | 6 | 19 | 22 | 36 | 38 | 39 | 14 | 15 | 21 | 7 | 8 | 9 | 11 | 12 | 13 | 23 | 25 | 27 | 31 | 33 | 40 |
| 26 | Object quantity | 35 | 10 | 15 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 5 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 |
| 27 | Reliability | 1 | 23 | 15 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 25 | 14 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 3 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 35 | 38 |
| 28 | Measurement accuracy | 35 | 2 | 15 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 5 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 |
| 29 | Production accuracy | 2 | 23 | 15 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 25 | 14 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 3 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 35 | 38 |
| 30 | Harmful factors the object will receive | 35 | 10 | 15 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 5 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 |
| 31 | Harmful factors the object will release | 1 | 23 | 15 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 25 | 14 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 3 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 35 | 38 |
| 32 | Production facility | 35 | 2 | 15 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 5 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 |
| 33 | Control facility | 1 | 23 | 15 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 25 | 14 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 3 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 35 | 38 |
| 34 | Repair facility | 35 | 10 | 15 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 5 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 |
| 35 | Adaptability or flexibility | 2 | 23 | 15 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 25 | 14 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 3 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 35 | 38 |
| 36 | Device complexity | 35 | 2 | 15 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 5 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 |
| 37 | Detection and measurement difficulty | 1 | 23 | 15 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 25 | 14 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 3 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 35 | 38 |
| 38 | Automation range | 35 | 10 | 15 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 5 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 |
| 39 | Productivity | 2 | 23 | 15 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 25 | 14 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 3 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 35 | 38 |

A breakthrough pattern which has a high possibility of solving this type of improvement need



Which TRIZ Card is effective?

| Improvement needs | | Very effective | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------|---|----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|--|--|--|--|--|
| 1 | Moving object's weight | 35 | 23 | 3 | 28 | 27 | 29 | 31 | 34 | 2 | 3 | 10 | 1 | 8 | 19 | 36 | 5 | 15 | 24 | 37 | 38 | 40 | 6 | 11 | 12 | 22 | 32 | 39 | 4 | 14 | 17 | 20 | 21 | 30 | 7 | 9 | 13 | 16 | 23 | 25 | 32 | | | | | | | | |
| 2 | Motionless object's weight | 35 | 10 | 19 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 6 | 8 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 | | | | | | | | |
| 3 | Moving object's length | 1 | 29 | 15 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 25 | 14 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 5 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 36 | 38 | | | | | | | | |
| 4 | Motionless object's length | 35 | 28 | 14 | 1 | 26 | 3 | 10 | 15 | 2 | 7 | 23 | 40 | 8 | 17 | 18 | 24 | 25 | 30 | 32 | 6 | 12 | 13 | 27 | 37 | 38 | 39 | 4 | 8 | 9 | 11 | 16 | 19 | 20 | 21 | 22 | 23 | 31 | 33 | 34 | 38 | | | | | | | | |
| 5 | Moving object's surface area | 2 | 15 | 13 | 26 | 30 | 4 | 10 | 14 | 17 | 29 | 32 | 1 | 18 | 19 | 28 | 3 | 34 | 39 | 8 | 16 | 35 | 36 | 5 | 7 | 9 | 11 | 22 | 23 | 24 | 33 | 40 | 6 | 12 | 20 | 21 | 25 | 27 | 31 | 37 | 38 | | | | | | | | |
| 6 | Motionless object's surface area | 18 | 2 | 35 | 10 | 16 | 30 | 40 | 4 | 36 | 39 | 1 | 7 | 15 | 17 | 32 | 14 | 26 | 38 | 3 | 9 | 19 | 22 | 23 | 27 | 28 | 29 | 37 | 5 | 6 | 8 | 11 | 12 | 13 | 20 | 21 | 24 | 25 | 31 | 33 | | | | | | | | | |
| 7 | Moving object's volume | 1 | 35 | 2 | 16 | 29 | 4 | 15 | 34 | 6 | 7 | 13 | 40 | 16 | 25 | 26 | 28 | 36 | 39 | 14 | 17 | 18 | 22 | 30 | 37 | 9 | 11 | 12 | 21 | 24 | 27 | 38 | 3 | 5 | 8 | 19 | 20 | 23 | 31 | 32 | 35 | | | | | | | | |
| 8 | Motionless object's volume | 35 | 2 | 10 | 14 | 34 | 18 | 19 | 1 | 4 | 6 | 16 | 17 | 30 | 37 | 39 | 3 | 7 | 8 | 9 | 15 | 24 | 25 | 26 | 27 | 28 | 31 | 32 | 38 | 40 | 5 | 11 | 12 | 13 | 20 | 21 | 22 | 23 | 29 | 33 | 38 | | | | | | | | |
| 9 | Velocity | 28 | 13 | 35 | 10 | 19 | 34 | 38 | 2 | 1 | 8 | 15 | 18 | 32 | 3 | 14 | 26 | 27 | 29 | 24 | 30 | 4 | 5 | 6 | 7 | 11 | 12 | 16 | 20 | 21 | 23 | 25 | 33 | 36 | 40 | 9 | 17 | 22 | 31 | 37 | 38 | | | | | | | | |
| 10 | Force (strength) | 35 | 18 | 37 | 10 | 1 | 36 | 15 | 9 | 28 | 3 | 13 | 21 | 2 | 14 | 17 | 40 | 8 | 9 | 11 | 12 | 24 | 29 | 5 | 16 | 20 | 23 | 25 | 26 | 27 | 34 | 4 | 6 | 7 | 22 | 30 | 31 | 32 | 33 | 38 | 39 | | | | | | | | |
| 11 | Stress or pressure | 35 | 10 | 26 | 37 | 2 | 14 | 19 | 1 | 3 | 6 | 15 | 18 | 40 | 4 | 13 | 16 | 24 | 25 | 27 | 28 | 33 | 9 | 11 | 21 | 22 | 29 | 34 | 39 | 5 | 7 | 8 | 12 | 17 | 20 | 23 | 28 | 30 | 31 | 37 | 38 | | | | | | | | |
| 12 | Shape | 10 | 1 | 14 | 15 | 32 | 34 | 35 | 2 | 4 | 29 | 40 | 13 | 22 | 26 | 5 | 17 | 26 | 3 | 6 | 7 | 16 | 18 | 30 | 8 | 9 | 19 | 25 | 33 | 36 | 37 | 39 | 11 | 12 | 20 | 21 | 23 | 24 | 27 | 31 | 38 | | | | | | | | |
| 13 | Stability of the object's compsition | 35 | 2 | 39 | 27 | 40 | 1 | 13 | 15 | 18 | 32 | 10 | 23 | 28 | 30 | 3 | 19 | 22 | 4 | 14 | 16 | 21 | 26 | 34 | 6 | 8 | 9 | 11 | 17 | 29 | 31 | 33 | 37 | 5 | 7 | 12 | 20 | 24 | 25 | 36 | 38 | | | | | | | | |
| 14 | Durability | 3 | 35 | 10 | 40 | 15 | 27 | 28 | 14 | 26 | 1 | 29 | 2 | 8 | 11 | 13 | 18 | 32 | 9 | 17 | 19 | 30 | 7 | 16 | 22 | 31 | 34 | 37 | 4 | 5 | 6 | 12 | 20 | 21 | 23 | 24 | 25 | 33 | 36 | 38 | 39 | | | | | | | | |
| 15 | Moving object's operating time | 19 | 35 | 3 | 10 | 27 | 2 | 28 | 4 | 13 | 16 | 18 | 29 | 39 | 1 | 5 | 6 | 14 | 15 | 17 | 22 | 40 | 9 | 11 | 12 | 20 | 21 | 25 | 26 | 30 | 31 | 33 | 34 | 38 | 7 | 8 | 23 | 24 | 32 | 36 | 37 | | | | | | | | |
| 16 | Motionless object's operating time | 35 | 1 | 10 | 1 | 40 | 6 | 27 | 34 | 38 | 3 | 18 | 19 | 20 | 2 | 17 | 22 | 23 | 24 | 25 | 26 | 28 | 31 | 33 | 36 | 39 | 4 | 5 | 7 | 8 | 9 | 11 | 12 | 13 | 14 | 15 | 21 | 29 | 30 | 32 | 37 | | | | | | | | |
| 17 | Temperature | 35 | 19 | 7 | 22 | 17 | 18 | 21 | 32 | 39 | 10 | 15 | 16 | 27 | 30 | 36 | 24 | 28 | 36 | 40 | 4 | 6 | 9 | 14 | 26 | 31 | 1 | 13 | 23 | 25 | 29 | 33 | 34 | 5 | 7 | 8 | 11 | 12 | 20 | 37 | | | | | | | | | |
| 18 | Intensity of illumination | 19 | 32 | 1 | 15 | 28 | 2 | 6 | 13 | 16 | 10 | 3 | 17 | 28 | 39 | 11 | 25 | 27 | 30 | 4 | 5 | 7 | 8 | 9 | 12 | 14 | 18 | 20 | 21 | 22 | 23 | 24 | 29 | 31 | 33 | 34 | 36 | 37 | 38 | 48 | | | | | | | | | |
| 19 | Moving object's energy consumption | 35 | 19 | 10 | 15 | 29 | 12 | 6 | 24 | 1 | 15 | 16 | 17 | 27 | 32 | 3 | 5 | 14 | 21 | 23 | 25 | 26 | 29 | 38 | 8 | 9 | 11 | 22 | 30 | 31 | 34 | 37 | 4 | 7 | 10 | 20 | 33 | 36 | 39 | 48 | | | | | | | | | |
| 20 | Motionless object's energy consumption | 19 | 35 | 13 | 1 | 2 | 4 | 6 | 10 | 22 | 31 | 36 | 37 | 3 | 9 | 16 | 23 | 25 | 28 | 29 | 32 | 5 | 7 | 8 | 11 | 12 | 13 | 14 | 15 | 17 | 20 | 21 | 24 | 26 | 30 | 33 | 34 | 38 | 39 | 40 | | | | | | | | | |
| 21 | Output | 35 | 19 | 2 | 35 | 26 | 34 | 6 | 17 | 16 | 29 | 31 | 32 | 15 | 18 | 20 | 22 | 25 | 27 | 29 | 30 | 36 | 37 | 1 | 4 | 8 | 13 | 14 | 24 | 40 | 3 | 5 | 7 | 9 | 11 | 12 | 21 | 23 | 33 | 35 | | | | | | | | | |
| 22 | Energy loss | 7 | 35 | 2 | 18 | 19 | 38 | 10 | 15 | 35 | 3 | 1 | 3 | 13 | 17 | 21 | 22 | 26 | 28 | 30 | 9 | 11 | 14 | 16 | 25 | 27 | 29 | 36 | 37 | 39 | 4 | 5 | 8 | 12 | 20 | 24 | 31 | 33 | 34 | 40 | | | | | | | | | |
| 23 | Object loss | 10 | 35 | 18 | 31 | 2 | 24 | 27 | 37 | 1 | 40 | 6 | 15 | 34 | 1 | 13 | 14 | 30 | 36 | 38 | 5 | 16 | 22 | 23 | 32 | 33 | 12 | 21 | 37 | 4 | 7 | 8 | 9 | 11 | 17 | 19 | 20 | 25 | 28 | | | | | | | | | | |
| 24 | Information loss | 10 | 25 | 35 | 16 | 24 | 28 | 32 | 1 | 15 | 2 | 5 | 13 | 15 | 16 | 21 | 27 | 33 | 3 | 4 | 6 | 7 | 8 | 9 | 11 | 12 | 14 | 17 | 18 | 20 | 25 | 29 | 31 | 34 | 36 | 37 | 38 | 39 | 48 | | | | | | | | | | |
| 25 | Time loss | 10 | 35 | 18 | 31 | 2 | 24 | 27 | 37 | 1 | 40 | 6 | 15 | 34 | 1 | 13 | 14 | 30 | 36 | 38 | 5 | 16 | 22 | 23 | 32 | 33 | 12 | 21 | 37 | 4 | 7 | 8 | 9 | 11 | 17 | 19 | 20 | 25 | 28 | | | | | | | | | | |
| 26 | Object quantity | 35 | 3 | 29 | 30 | 14 | 27 | 40 | 2 | 19 | 31 | 25 | 34 | 6 | 15 | 17 | 24 | 33 | 39 | 1 | 4 | 7 | 8 | 20 | 26 | 30 | 32 | 36 | 38 | 5 | 9 | 11 | 12 | 19 | 21 | 22 | 23 | 35 | | | | | | | | | | | |
| 27 | Reliability | 35 | 11 | 10 | 1 | 40 | 27 | 1 | 2 | 1 | 21 | 24 | 32 | 4 | 15 | 15 | 16 | 17 | 18 | 23 | 26 | 6 | 9 | 25 | 30 | 31 | 34 | 36 | 38 | 39 | 5 | 7 | 12 | 18 | 20 | 22 | 33 | 37 | | | | | | | | | | | |
| 28 | Measurement accuracy | 5 | 11 | 6 | 3 | 10 | 13 | 24 | 35 | 2 | 16 | 5 | 11 | 25 | 17 | 18 | 19 | 22 | 23 | 31 | 33 | 39 | 4 | 7 | 8 | 9 | 12 | 14 | 15 | 20 | 21 | 29 | 30 | 36 | 37 | 38 | 40 | | | | | | | | | | | | |
| 29 | Production accuracy | 5 | 11 | 10 | 3 | 35 | 3 | 27 | 1 | 13 | 10 | 1 | 13 | 16 | 1 | 10 | 4 | 6 | 1 | 24 | 31 | 33 | 37 | 39 | 5 | 6 | 7 | 8 | 12 | 14 | 15 | 16 | 20 | 21 | 22 | 38 | | | | | | | | | | | | | |
| 30 | Harmful factors the object will receive | 22 | 35 | 1 | 18 | 19 | 24 | 1 | 10 | 13 | 37 | 1 | 10 | 13 | 37 | 1 | 10 | 13 | 37 | 1 | 10 | 13 | 37 | 1 | 10 | 13 | 37 | 1 | 10 | 13 | 37 | 1 | 10 | 13 | 37 | 1 | 10 | 13 | 37 | 1 | 10 | 13 | 37 | | | | | | |
| 31 | Harmful factors the object will release | 22 | 35 | 1 | 18 | 19 | 24 | 1 | 10 | 13 | 37 | 1 | 10 | 13 | 37 | 1 | 10 | 13 | 37 | 1 | 10 | 13 | 37 | 1 | 10 | 13 | 37 | 1 | 10 | 13 | 37 | 1 | 10 | 13 | 37 | 1 | 10 | 13 | 37 | 1 | 10 | 13 | 37 | | | | | | |
| 32 | Production facility | 1 | 35 | 13 | 27 | 28 | 16 | 24 | 12 | 15 | 20 | 34 | 11 | 18 | 29 | 8 | 10 | 17 | 15 | 52 | 34 | 4 | 5 | 6 | 9 | 23 | 33 | 36 | 37 | 7 | 14 | 20 | 21 | 22 | 25 | 30 | 31 | 38 | 38 | | | | | | | | | | |
| 33 | Control facility | 1 | 13 | 2 | 12 | 25 | 28 | 32 | 34 | 15 | 35 | 16 | 17 | 3 | 4 | 10 | 18 | 24 | 27 | 39 | 8 | 26 | 29 | 40 | 5 | 6 | 19 | 22 | 23 | 30 | 31 | 7 | 9 | 11 | 14 | 20 | 21 | 33 | 36 | 37 | 38 | | | | | | | | |
| 34 | Repair facility | 1 | 10 | 2 | 11 | 35 | 13 | 15 | 25 | 16 | 32 | 27 | 28 | 4 | 34 | 7 | 9 | 3 | 12 | 18 | 19 | 26 | 29 | 31 | 5 | 6 | 8 | 14 | 17 | 20 | 21 | 22 | 23 | 24 | 30 | 33 | 36 | 37 | 38 | 39 | 40 | | | | | | | | |
| 35 | Adaptability or flexibility | 35 | 1 | 15 | 29 | 10 | 13 | 2 | 6 | 3 | 8 | 10 | 19 | 28 | 37 | 7 | 14 | 27 | 30 | 31 | 32 | 34 | 4 | 5 | 9 | 11 | 17 | 18 | 20 | 22 | 24 | 26 | 12 | 21 | 23 | 25 | 33 | 36 | 38 | 39 | 40 | | | | | | | | |
| 36 | Device complexity | 13 | 26 | 1 | 28 | 2 | 10 | 19 | 29 | 15 | 24 | 34 | 35 | 7 | 27 | 6 | 16 | 22 | 30 | 39 | 37 | 3 | 4 | 9 | 12 | 14 | 20 | 32 | 39 | 40 | 5 | 7 | 8 | 11 | 18 | 21 | 23 | 25 | 31 | 33 | 38 | | | | | | | | |
| 37 | Detection and measurement difficulty | 28 | 35 | 16 | 26 | 27 | 1 | 2 | 18 | 19 | 3 | 29 | 13 | 15 | 24 | 39 | 10 | 22 | 32 | 4 | 5 | 6 | 11 | 17 | 21 | 25 | 30 | 34 | 36 | 37 | 40 | 8 | 9 | 12 | 31 | 33 | 38 | 7 | 14 | 20 | 23 | | | | | | | | |
| 38 | Automation range | 35 | 13 | 28 | 26 | 1 | 2 | 10 | 18 | 27 | 32 | 23 | 34 | 5 | 12 | 14 | 15 | 17 | 19 | 24 | 25 | 33 | 3 | 4 | 6 | 8 | 9 | 11 | 16 | 30 | 7 | 20 | 21 | 22 | 29 | 31 | 36 | 37 | 38 | 39 | 40 | | | | | | | | |
| 39 | Productivity | 10 | 35 | 28 | 1 | 16 | 2 | 26 | 38 | 24 | 34 | 37 | 7 | 14 | 15 | 17 | 19 | 22 | 3 | 13 | 20 | 23 | 27 | 28 | 32 | 39 | 4 | 5 | 6 | 12 | 16 | 21 | 25 | 30 | 31 | 36 | 40 | 8 | 9 | 11 | 33 | | | | | | | | |

Which TRIZ Card is effective?

| Improvement needs | | Very effective | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------|---|----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|--|--|--|--|--|
| 1 | Moving object's weight | 35 | 28 | 19 | 20 | 27 | 29 | 31 | 34 | 2 | 3 | 10 | 1 | 8 | 19 | 36 | 5 | 15 | 24 | 37 | 38 | 40 | 6 | 11 | 12 | 22 | 32 | 39 | 4 | 14 | 17 | 20 | 21 | 30 | 7 | 9 | 13 | 16 | 23 | 25 | 33 | | | | | | | | |
| 2 | Motionless object's weight | 35 | 10 | 19 | 28 | 1 | 2 | 15 | 18 | 26 | 13 | 22 | 29 | 6 | 6 | 27 | 32 | 39 | 5 | 14 | 17 | 30 | 3 | 9 | 11 | 20 | 25 | 37 | 40 | 4 | 7 | 12 | 16 | 21 | 23 | 24 | 31 | 33 | 34 | 36 | 38 | | | | | | | | |
| 3 | Moving object's length | 1 | 28 | 19 | 35 | 4 | 7 | 8 | 10 | 17 | 24 | 28 | 14 | 19 | 26 | 34 | 2 | 16 | 32 | 13 | 23 | 37 | 39 | 40 | 5 | 5 | 6 | 9 | 11 | 12 | 18 | 20 | 21 | 22 | 25 | 27 | 30 | 31 | 33 | 36 | 38 | | | | | | | | |
| 4 | Motionless object's length | 35 | 28 | 14 | 1 | 26 | 3 | 10 | 15 | 2 | 7 | 29 | 40 | 8 | 17 | 18 | 24 | 25 | 30 | 32 | 6 | 12 | 13 | 27 | 37 | 38 | 39 | 4 | 5 | 9 | 11 | 16 | 19 | 20 | 21 | 22 | 23 | 31 | 33 | 34 | 36 | | | | | | | | |
| 5 | Moving object's surface area | 2 | 15 | 13 | 26 | 30 | 4 | 10 | 14 | 17 | 29 | 32 | 1 | 18 | 19 | 28 | 3 | 34 | 39 | 6 | 16 | 35 | 36 | 5 | 7 | 9 | 11 | 22 | 23 | 24 | 33 | 40 | 5 | 12 | 20 | 21 | 25 | 27 | 31 | 37 | 38 | | | | | | | | |
| 6 | Motionless object's surface area | 18 | 2 | 35 | 10 | 16 | 30 | 40 | 4 | 36 | 35 | 1 | 7 | 15 | 17 | 32 | 14 | 26 | 38 | 3 | 9 | 19 | 22 | 23 | 27 | 28 | 29 | 37 | 5 | 6 | 8 | 11 | 12 | 13 | 20 | 21 | 24 | 25 | 31 | 33 | | | | | | | | | |
| 7 | Moving object's volume | 1 | 35 | 2 | 10 | 23 | 4 | 13 | 34 | 6 | 7 | 13 | 40 | 16 | 25 | 26 | 28 | 36 | 39 | 14 | 17 | 18 | 22 | 30 | 37 | 9 | 11 | 12 | 21 | 24 | 27 | 33 | 3 | 5 | 9 | 19 | 20 | 23 | 31 | 32 | 35 | | | | | | | | |
| 8 | Motionless object's volume | 35 | 2 | 10 | 14 | 34 | 18 | 19 | 1 | 4 | 6 | 16 | 17 | 30 | 37 | 39 | 3 | 7 | 8 | 9 | 15 | 24 | 25 | 26 | 27 | 28 | 31 | 32 | 38 | 40 | 5 | 11 | 12 | 13 | 20 | 21 | 22 | 23 | 29 | 33 | 36 | | | | | | | | |
| 9 | Velocity | 28 | 18 | 35 | 10 | 19 | 34 | 38 | 2 | 1 | 8 | 15 | 18 | 32 | 3 | 14 | 26 | 27 | 29 | 24 | 30 | 4 | 5 | 6 | 7 | 11 | 12 | 16 | 20 | 21 | 23 | 25 | 33 | 36 | 40 | 9 | 17 | 22 | 31 | 37 | 39 | | | | | | | | |
| 10 | Force (strength) | 35 | 18 | 37 | 10 | 1 | 36 | 15 | 19 | 28 | 3 | 13 | 21 | 2 | 14 | 17 | 40 | 8 | 9 | 11 | 12 | 24 | 29 | 5 | 16 | 20 | 23 | 25 | 26 | 27 | 34 | 4 | 6 | 7 | 22 | 30 | 31 | 32 | 33 | 38 | 39 | | | | | | | | |
| 11 | Stress or pressure | 35 | 10 | 36 | 37 | 2 | 14 | 19 | 1 | 3 | 6 | 15 | 18 | 40 | 4 | 13 | 16 | 24 | 25 | 27 | 28 | 33 | 9 | 11 | 21 | 22 | 29 | 34 | 39 | 5 | 7 | 8 | 12 | 17 | 20 | 23 | 26 | 30 | 31 | 37 | 38 | | | | | | | | |
| 12 | Shape | 10 | 1 | 14 | 15 | 32 | 34 | 35 | 2 | 4 | 29 | 40 | 13 | 22 | 26 | 5 | 17 | 28 | 3 | 6 | 7 | 16 | 18 | 30 | 8 | 9 | 19 | 25 | 33 | 36 | 37 | 39 | 1 | 12 | 20 | 21 | 23 | 24 | 27 | 31 | 38 | | | | | | | | |
| 13 | Stability of the object's compsition | 35 | 2 | 39 | 27 | 40 | 1 | 13 | 15 | 18 | 32 | 10 | 23 | 28 | 30 | 3 | 19 | 22 | 4 | 14 | 16 | 21 | 26 | 34 | 6 | 8 | 9 | 11 | 17 | 29 | 31 | 33 | 37 | 5 | 7 | 12 | 20 | 24 | 25 | 36 | 38 | | | | | | | | |
| 14 | Durability | 3 | 35 | 10 | 40 | 15 | 27 | 28 | 14 | 25 | 1 | 29 | 2 | 8 | 11 | 13 | 18 | 32 | 9 | 17 | 19 | 30 | 7 | 16 | 22 | 31 | 34 | 37 | 4 | 5 | 6 | 12 | 20 | 21 | 23 | 24 | 25 | 33 | 36 | 38 | 39 | | | | | | | | |
| 15 | Moving object's operating time | 19 | 35 | 3 | 10 | 27 | 2 | 28 | 4 | 13 | 16 | 18 | 29 | 39 | 1 | 5 | 6 | 14 | 15 | 17 | 22 | 40 | 9 | 11 | 12 | 20 | 21 | 25 | 26 | 30 | 31 | 33 | 34 | 38 | 7 | 8 | 23 | 24 | 32 | 36 | 37 | | | | | | | | |
| 16 | Motionless object's operating time | 35 | 1 | 10 | 16 | 40 | 6 | 27 | 34 | 38 | 3 | 18 | 19 | 20 | 2 | 17 | 22 | 23 | 24 | 25 | 26 | 28 | 31 | 33 | 36 | 39 | 4 | 5 | 7 | 8 | 9 | 11 | 12 | 13 | 14 | 15 | 21 | 29 | 30 | 32 | 37 | | | | | | | | |
| 17 | Temperature | 35 | 19 | 2 | 3 | 22 | 17 | 18 | 21 | 32 | 39 | 10 | 15 | 16 | 27 | 30 | 36 | 24 | 28 | 38 | 40 | 4 | 6 | 9 | 14 | 26 | 31 | 1 | 13 | 23 | 25 | 29 | 33 | 34 | 5 | 7 | 8 | 11 | 12 | 20 | 37 | | | | | | | | |
| 18 | Intensity of illumination | 19 | 32 | 1 | 35 | 15 | 25 | 2 | 6 | 13 | 16 | 10 | 3 | 7 | 28 | 39 | 11 | 25 | 27 | 30 | 4 | 6 | 7 | 8 | 9 | 12 | 14 | 18 | 20 | 21 | 22 | 23 | 24 | 29 | 31 | 33 | 34 | 36 | 37 | 38 | 40 | | | | | | | | |
| 19 | Moving object's energy consumption | 35 | 19 | 13 | 2 | 15 | 26 | 12 | 6 | 24 | 1 | 13 | 16 | 7 | 27 | 32 | 3 | 5 | 14 | 21 | 23 | 25 | 26 | 29 | 38 | 8 | 9 | 11 | 22 | 30 | 31 | 34 | 37 | 4 | 7 | 10 | 20 | 33 | 36 | 39 | | | | | | | | | |
| 20 | Motionless object's energy consumption | 19 | 35 | 1 | 27 | 1 | 2 | 4 | 6 | 10 | 22 | 31 | 36 | 37 | 3 | 9 | 16 | 23 | 25 | 28 | 29 | 32 | 5 | 7 | 8 | 11 | 12 | 13 | 14 | 15 | 17 | 20 | 21 | 24 | 26 | 30 | 33 | 34 | 38 | 39 | 40 | | | | | | | | |
| 21 | Output | 35 | 19 | 1 | 10 | 38 | 26 | 34 | 6 | 17 | 16 | 28 | 31 | 32 | 15 | 18 | 20 | 22 | 25 | 27 | 29 | 30 | 36 | 37 | 1 | 4 | 8 | 13 | 14 | 24 | 40 | 3 | 5 | 7 | 9 | 11 | 12 | 21 | 23 | 33 | 39 | | | | | | | | |
| 22 | Energy loss | 7 | 35 | 1 | 6 | 18 | 19 | 38 | 10 | 15 | 32 | 23 | 1 | 3 | 13 | 17 | 21 | 22 | 26 | 28 | 30 | 9 | 11 | 14 | 16 | 25 | 27 | 29 | 36 | 37 | 39 | 4 | 5 | 8 | 12 | 20 | 24 | 31 | 33 | 34 | 40 | | | | | | | | |
| 23 | Object loss | 10 | 35 | 1 | 8 | 31 | 2 | 24 | 27 | 3 | 29 | 39 | 40 | 6 | 15 | 24 | 1 | 13 | 14 | 30 | 36 | 38 | 5 | 16 | 22 | 23 | 32 | 33 | 12 | 21 | 37 | 4 | 7 | 8 | 9 | 11 | 17 | 19 | 20 | 25 | 28 | | | | | | | | |
| 24 | Information loss | 10 | 26 | 1 | 2 | 19 | 24 | 28 | 32 | 1 | 23 | 30 | 2 | 5 | 13 | 15 | 16 | 21 | 27 | 33 | 3 | 4 | 6 | 7 | 8 | 9 | 11 | 12 | 14 | 17 | 18 | 20 | 25 | 29 | 31 | 34 | 36 | 37 | 38 | 39 | 40 | | | | | | | | |
| 25 | Time loss | 10 | 35 | 1 | 8 | 4 | 5 | 32 | 34 | 20 | 24 | 26 | 16 | 28 | 17 | 30 | 37 | 1 | 2 | 3 | 6 | 19 | 22 | 36 | 38 | 39 | 14 | 15 | 21 | 7 | 8 | 9 | 11 | 12 | 13 | 23 | 25 | 27 | 31 | 33 | 40 | | | | | | | | |
| 26 | Object quantity | 35 | 3 | 1 | 8 | 10 | 14 | 27 | 40 | 1 | 15 | 28 | 31 | 25 | 34 | 6 | 13 | 16 | 17 | 24 | 33 | 39 | 1 | 4 | 7 | 8 | 20 | 28 | 30 | 32 | 36 | 38 | 5 | 9 | 11 | 12 | 19 | 21 | 22 | 23 | 7 | | | | | | | | |
| 27 | Reliability | 35 | 11 | 1 | 1 | 28 | 40 | 27 | 1 | 1 | 13 | 21 | 24 | 32 | 4 | 14 | 29 | 15 | 16 | 17 | 19 | 23 | 26 | 6 | 9 | 25 | 30 | 31 | 34 | 36 | 38 | 39 | 5 | 7 | 12 | 18 | 20 | 22 | 33 | 37 | | | | | | | | | |
| 28 | Measurement accuracy | 32 | 28 | 1 | 3 | 10 | 13 | 24 | 1 | 1 | 1 | 2 | 16 | 5 | 11 | 25 | 27 | 17 | 18 | 19 | 22 | 23 | 31 | 33 | 39 | 4 | 7 | 8 | 9 | 12 | 14 | 15 | 20 | 21 | 29 | 30 | 36 | 37 | 38 | 40 | | | | | | | | | |
| 29 | Production accuracy | 32 | 25 | 1 | 13 | 26 | 35 | 3 | 1 | 1 | 1 | 30 | 36 | 1 | 13 | 1 | 25 | 34 | 40 | 4 | 9 | 11 | 17 | 24 | 31 | 33 | 37 | 39 | 5 | 6 | 7 | 8 | 12 | 14 | 15 | 16 | 20 | 21 | 22 | 38 | | | | | | | | | |
| 30 | Harmful factors the object will receive | 22 | 35 | 1 | 1 | 33 | 18 | 19 | 24 | 1 | 9 | 27 | 40 | 10 | 13 | 1 | 29 | 31 | 34 | 3 | 17 | 23 | 26 | 4 | 6 | 11 | 15 | 25 | 30 | 32 | 5 | 7 | 8 | 9 | 12 | 14 | 16 | 20 | 26 | 36 | | | | | | | | | |
| 31 | Harmful factors the object will release | 22 | 35 | 1 | 1 | 18 | 40 | 1 | 1 | 1 | 24 | 5 | 1 | 1 | 10 | 16 | 26 | 28 | 1 | 4 | 6 | 23 | 29 | 30 | 32 | 5 | 7 | 8 | 9 | 11 | 12 | 13 | 14 | 20 | 21 | 36 | 37 | 38 | | | | | | | | | | | |
| 32 | Production facility | 11 | 1 | 1 | 28 | 15 | 24 | 1 | 1 | 1 | 12 | 4 | 11 | 1 | 1 | 16 | 17 | 19 | 1 | 1 | 1 | 1 | 5 | 6 | 9 | 23 | 33 | 36 | 37 | 7 | 14 | 20 | 21 | 22 | 25 | 30 | 31 | 38 | 39 | | | | | | | | | | |
| 33 | Control facility | 1 | 1 | 1 | 25 | 25 | 32 | 34 | 1 | 1 | 15 | 17 | 3 | 1 | 1 | 27 | 39 | 1 | 1 | 1 | 1 | 1 | 1 | 5 | 6 | 19 | 22 | 23 | 30 | 31 | 7 | 9 | 11 | 14 | 20 | 21 | 33 | 36 | 37 | 38 | | | | | | | | | |
| 34 | Repair facility | 1 | 10 | 1 | 1 | 35 | 13 | 15 | 25 | 16 | 32 | 27 | 28 | 4 | 34 | 1 | 3 | 12 | 18 | 1 | 1 | 1 | 1 | 1 | 5 | 6 | 8 | 14 | 17 | 20 | 21 | 22 | 23 | 24 | 30 | 33 | 36 | 37 | 38 | 39 | 40 | | | | | | | | |
| 35 | Adaptability or flexibility | 35 | 1 | 15 | 29 | 16 | 13 | 2 | 6 | 3 | 8 | 10 | 19 | 28 | 37 | 7 | 14 | 27 | 30 | 31 | 32 | 1 | 4 | 5 | 9 | 11 | 17 | 18 | 20 | 22 | 24 | 26 | 12 | 21 | 23 | 25 | 33 | 36 | 38 | 39 | 40 | | | | | | | | |
| 36 | Device complexity | 13 | 26 | 1 | 28 | 2 | 10 | 19 | 29 | 15 | 24 | 34 | 35 | 17 | 27 | 6 | 16 | 22 | 30 | 36 | 37 | 3 | 4 | 9 | 12 | 14 | 20 | 32 | 39 | 40 | 5 | 7 | 8 | 11 | 18 | 21 | 23 | 25 | 31 | 33 | 38 | | | | | | | | |
| 37 | Detection and measurement difficulty | 28 | 35 | 18 | 26 | 27 | 1 | 2 | 18 | 19 | 3 | 29 | 13 | 15 | 24 | 39 | 10 | 22 | 32 | 4 | 5 | 6 | 11 | 17 | 21 | 25 | 30 | 34 | 36 | 37 | 40 | 8 | 9 | 12 | 21 | 33 | 38 | 7 | 14 | 20 | 23 | | | | | | | | |
| 38 | Automation range | 35 | 13 | 28 | 26 | 1 | 2 | 10 | 18 | 27 | 22 | 23 | 34 | 5 | 12 | 14 | 15 | 17 | 19 | 24 | 25 | 35 | 3 | 4 | 6 | 8 | 9 | 11 | 16 | 30 | 7 | 20 | 21 | 22 | 29 | 31 | 36 | 37 | 39 | 39 | 40 | | | | | | | | |
| 39 | Productivity | 10 | 15 | 23 | 1 | 1 | 1 | 2 | 26 | 36 | 24 | 14 | 6 | 17 | 7 | 17 | 15 | 17 | 19 | 22 | 2 | 13 | 20 | 21 | 32 | 20 | 32 | 39 | 4 | 5 | 6 | 12 | 16 | 21 | 25 | 30 | 31 | 36 | 40 | 8 | 9 | 11 | 23 | | | | | | |

Ex:33

| | | | | | | | | | | | | | | | | | | | | | | |
|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|
| 31 | Harmful factors the object will release | 22 | 35 | | 9 | 18 | 40 | 15 | 17 | | 24 | 3 | 27 | 33 | 4 | | 16 | 26 | 28 | 3 | | |
| 32 | Production facility | 1 | 35 | 13 | 27 | 28 | 16 | 24 | 12 | 15 | 26 | | 4 | 11 | 18 | 29 | 8 | 10 | 17 | 19 | 32 | 3 |
| 33 | Control facility | 1 | 13 | 2 | 12 | 25 | 28 | 32 | 34 | 15 | 35 | 16 | 17 | 3 | 4 | 10 | 18 | 24 | 27 | 39 | 8 | 2 |
| 34 | Repair facility | 1 | 10 | 2 | 11 | 35 | 13 | 15 | 25 | 16 | 32 | 27 | 28 | 4 | 34 | 7 | 9 | 3 | 12 | 18 | 19 | 2 |
| 35 | Adaptability or flexibility | 35 | 1 | 15 | 29 | 16 | 13 | 2 | 6 | 3 | 8 | 10 | 19 | 28 | 37 | 7 | 14 | 27 | 30 | 31 | 32 | 1 |

| | | | | | | | | | | | | | | | | | | | | | | |
|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|
| 31 | Harmful factors the object will release | 22 | 35 | 9 | 18 | 40 | 15 | 17 | 24 | 3 | 27 | 33 | 4 | 16 | 26 | 28 | 3 | | | | | |
| 32 | Production facility | 1 | 35 | 13 | 27 | 28 | 16 | 24 | 12 | 15 | 26 | 4 | 11 | 18 | 29 | 8 | 10 | 17 | 19 | 32 | 3 | |
| 33 | Control facility | 1 | 13 | 2 | 12 | 25 | 28 | 32 | 34 | 15 | 35 | 16 | 17 | 3 | 4 | 10 | 18 | 24 | 27 | 39 | 8 | 2 |
| 34 | Repair facility | 1 | 10 | 2 | 1 | 35 | 13 | 15 | 25 | 16 | 32 | 27 | 28 | 4 | 34 | 7 | 9 | 3 | 12 | 18 | 19 | 2 |
| 35 | Adaptability or flexibility | 35 | 1 | 15 | 29 | 16 | 13 | 2 | 6 | 3 | 8 | 10 | 19 | 28 | 37 | 7 | 14 | 27 | 30 | 31 | 32 | 3 |

分けよ

Divide it.



1

逆にせよ

Make it reverse.



13

離せ

Separate it.



2

同じ高さを
利用せよ

Do it
at the same level.



12

自ら行うように
仕向けよ

Arrange things
to do good
for themselves.



25

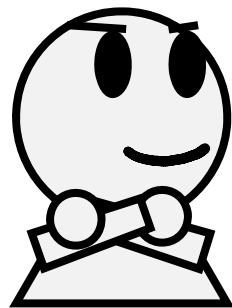
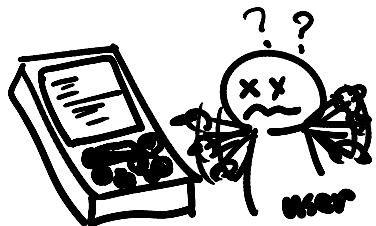
触らずに動かせ

Move it
without touching.

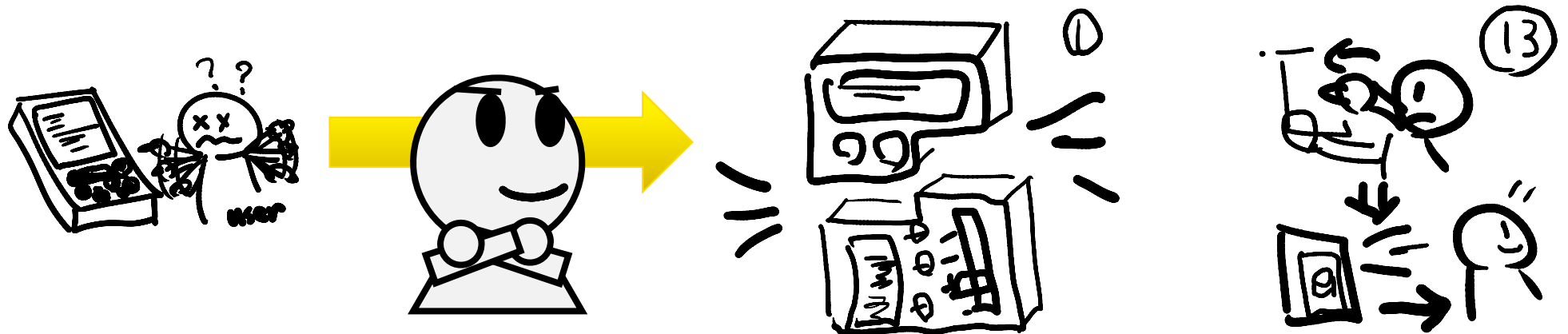


28

| | | | | | | | | | | | | | | | | | |
|----|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 30 | 物体が及ぼす有害要因 | 22 | 35 | 2 | 1 | 18 | 40 | 15 | 17 | 19 | 3 | 27 | 33 | 4 | 16 | 26 | 28 |
| 31 | 物体が発する有害要因 | 1 | 35 | 13 | 27 | 28 | 16 | 24 | 12 | 15 | 26 | 2 | 4 | 11 | 18 | 29 | 8 |
| 32 | 製造の容易性 | 1 | 13 | 2 | 12 | 25 | 28 | 32 | 34 | 15 | 35 | 16 | 17 | 3 | 4 | 10 | 18 |
| 33 | 操作の容易性 | 1 | 10 | 2 | 11 | 35 | 13 | 15 | 25 | 16 | 32 | 27 | 28 | 4 | 34 | 7 | 9 |
| 34 | 修理の容易性 | 35 | 1 | 15 | 29 | 16 | 13 | 2 | 6 | 3 | 8 | 10 | 19 | 28 | 37 | 7 | 14 |
| 35 | 適応性または融通性 | | | | | | | | | | | | | | | | |
| 36 | 状態の維持度 | | | | | | | | | | | | | | | | |



| | | | | | | | | | | | | | | | | | |
|----|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 30 | 物体が及ぼす有害要因 | 22 | 35 | 2 | 1 | 18 | 40 | 15 | 17 | 19 | 3 | 27 | 33 | 4 | 16 | 26 | 28 |
| 31 | 物体が発する有害要因 | 1 | 35 | 13 | 27 | 28 | 16 | 24 | 12 | 15 | 26 | 2 | 4 | 11 | 18 | 29 | 8 |
| 32 | 製造の容易性 | 1 | 13 | 2 | 12 | 25 | 28 | 32 | 34 | 15 | 35 | 16 | 17 | 3 | 4 | 10 | 18 |
| 33 | 操作の容易性 | 1 | 10 | 2 | 11 | 35 | 13 | 15 | 25 | 16 | 32 | 27 | 28 | 4 | 34 | 7 | 9 |
| 34 | 修理の容易性 | 35 | 1 | 15 | 29 | 16 | 13 | 2 | 6 | 3 | 8 | 10 | 19 | 28 | 37 | 7 | 14 |
| 35 | 適応性または融通性 | | | | | | | | | | | | | | | | |
| 36 | 状態の複雑度 | | | | | | | | | | | | | | | | |



Group work (30 minutes)

Write one issue that needs improvement on paper.

(If there is nothing particularly)

Improve the trash bin

An existing trash bin. What is wrong with it ?

1. Come up with problems of existing trash bins
2. Examine which one out of the “39 improvement needs” this issue is, and choose one or two from the 39.
3. Lay about seven of the wisdom cards in the order of the first numbers on the line. Propose solutions using those that help you come up with an idea
4. Draw a picture of the main idea (If there is time, review the ideas of other teams)

[Review]

- TRIZ Card supports coming up with creative ideas.
- TRIZ Card allows you to learn the basics of TRIZ.

In **Korea**, TRIZ is often used by Samsung electronics.

It would be great if today's studies assist you when your creativity is needed at work in your companies.

TRIZ Card can also be downloaded
as an Android application "ideaPod" (Paid application)