

An idea-generation workshop using TRIZ Cards (Chie Cards)

TRIZのカード (智慧カード) を用いたアイデア創出ワークショップ



Rikie Ishii 石井 力重

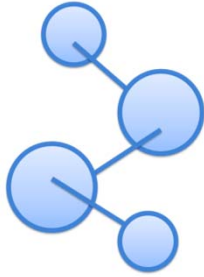
IDEAPLANT (Japan)

Jaeho Park 朴 在鎬

Yeungnam University (Korea)

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- 4.References



Overview

Team

Jaeho Park (朴在鎬)



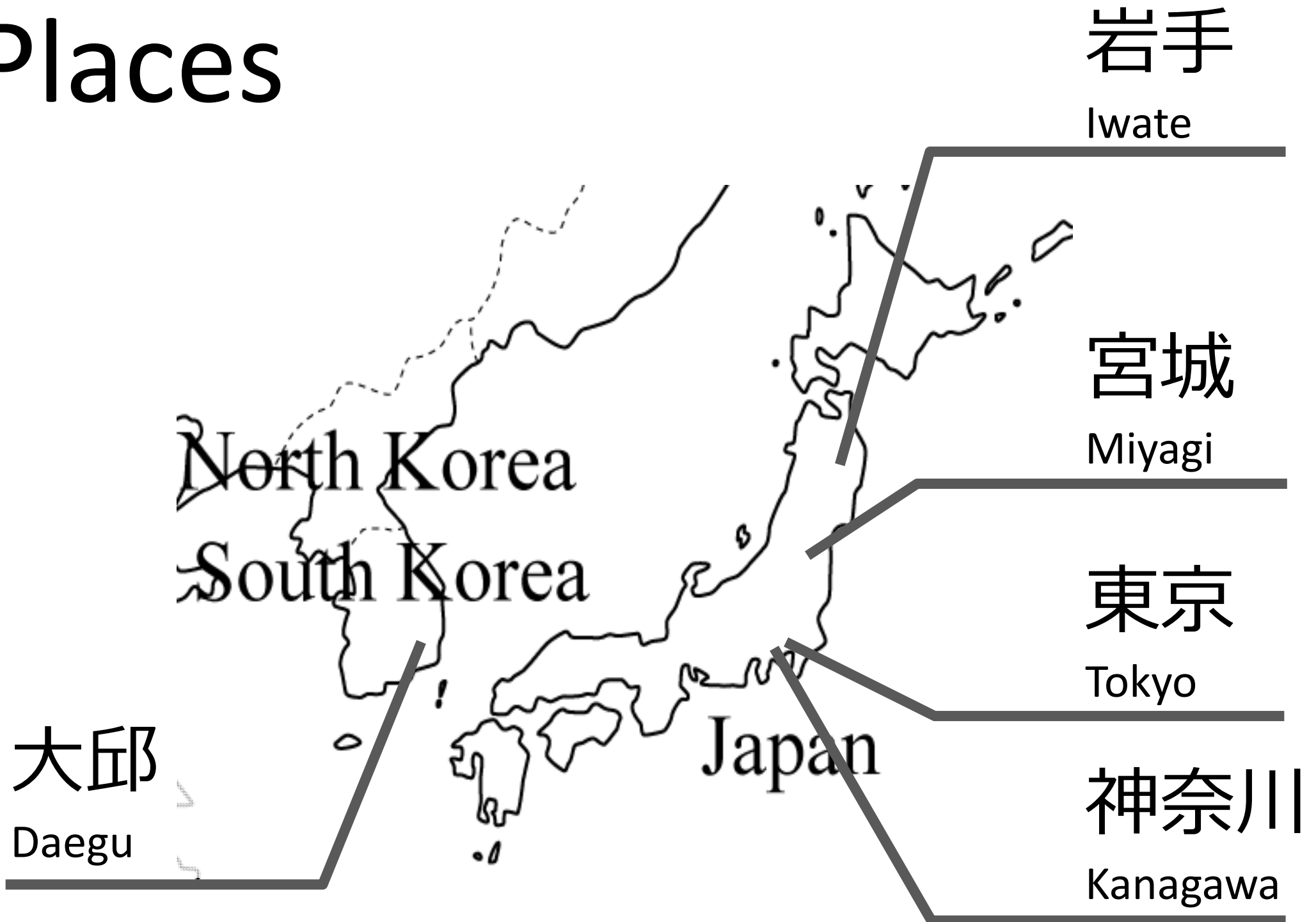
- Yeungnam University Industrial and organizational psychology Professor , Head of Department , Senior Professor, Graduate School / GRCIOP President
- Graduate School of Goettingen University; Ph.D. of Industrial and organizational psychology
- Majoring fields: Industrial and Organizational Psychology, Cross-Cultural Psychology, Group Dynamics

Rikie Ishii (石井力重)

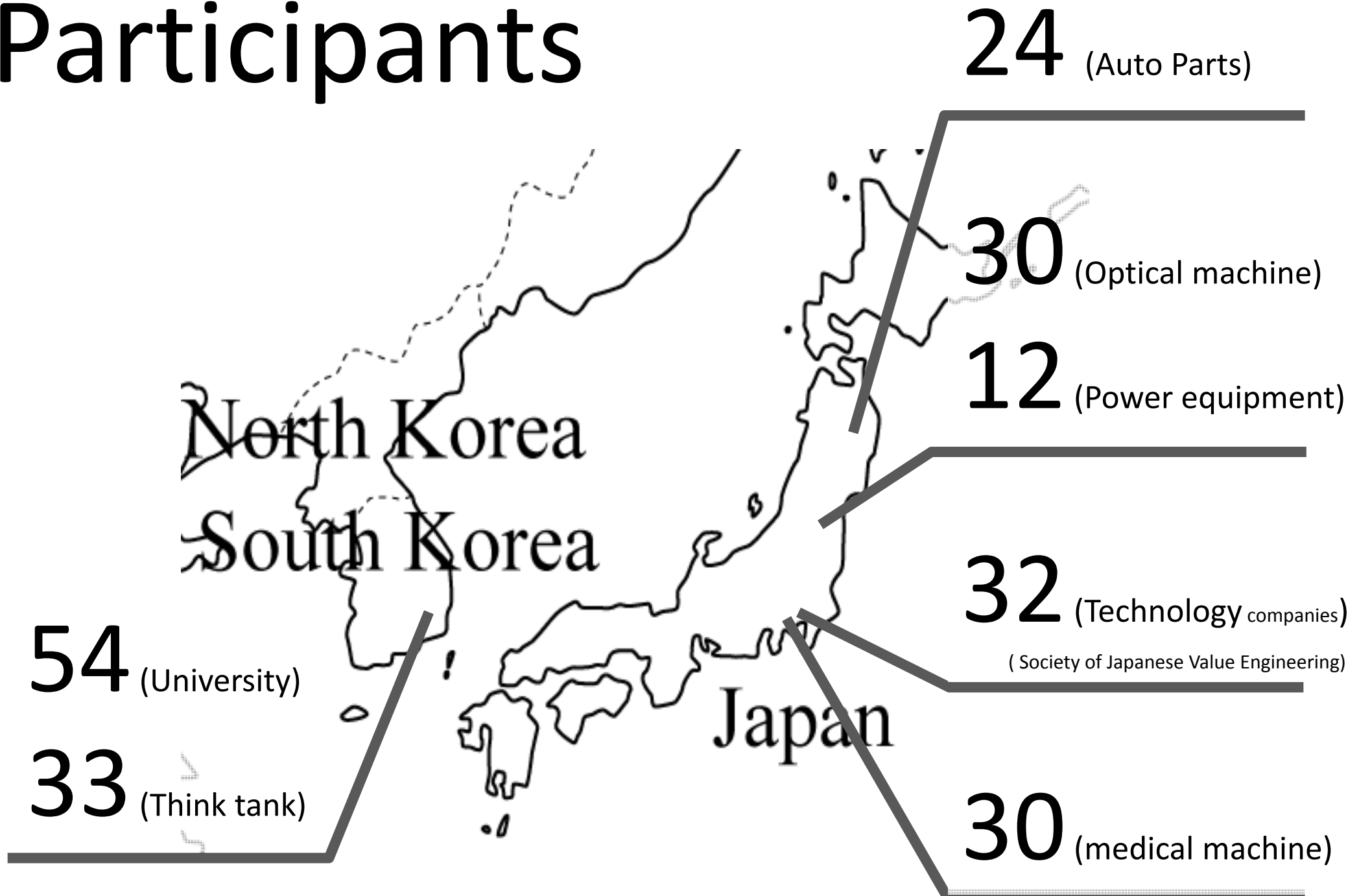
- IDEAPLANT President / Miyagi-TRIZ Chairman
- Tohoku university Graduate School of Science Master
- Majoring fields : Engineering for the creation, Development of tools to facilitate the creation of ideas



Places



Participants



Items

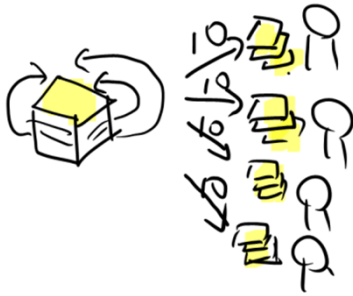


		Which TRIZ Card is effective?	
Improvement needs		Very effective	
1	Moving object's weight	35 28 18 26 27 29 31 34 2 3	10 1 8 19 36 5 15 24 37 38 40 6 11 12 22 32 39 4 14 17 20 21 30 7 9 13 16 23 25 33
2	Motionless object's weight	35 10 19 28 1 2 13 18 26 12	22 29 6 8 11 29 15 25 4 7 8 10 17 24 38 14 19 26
3	Moving object's length	35 28 14 1 26 3 10 15 2 7	29 40 8 17 2 15 13 26 30 4 10 14 17 29 32 1 18 19
4	Motionless object's length	18 2 35 10 16 30 40 4 36 13	1 7 15 17 10 1 14 15 32 34 35 2 4 25 40 13 22 26 5 17 28 3 6 7 16 18 36 8 9 19 25 33 36 37 39 11 12 20 21 23 24 27 31 38
5	Moving object's surface area	35 2 10 14 34 18 19 1 4 6	16 17 30 37 1 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
6	Motionless object's surface area	28 13 35 10 19 34 38 2 1 5	15 18 32 3 35 18 37 10 1 36 15 19 28 3 13 21 2 14 18 29 39 1 5 6 14 15 17 22 40 9 11 12 20 21 22 29 30 31 33 34 38 7 8 23 24 32 36 37
7	Moving object's volume	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
8	Motionless object's volume	35 19 2 3 22 17 18 21 32 35	10 15 16 27 30 36 24 28 40 4 6 9 14 26 31 1 13 23 25 29 33 34 5 7 8 11 12 20 37
9	Velocity	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
10	Force (strength)	35 18 37 10 1 36 15 19 28 3	13 21 2 14 18 29 39 1 5 6 14 15 17 22 40 9 11 12 20 21 22 29 30 31 33 34 38 7 8 23 24 32 36 37
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 32 38
12	Shape	35 2 10 14 34 18 19 1 4 6	16 17 30 37 1 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
13	Stability of the object's composition	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	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	18 35 3 10 27 2 28 4 13 10	18 29 39 1 5 6 14 15 17 22 40 9 11 12 20 21 22 29 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 35	10 15 16 27 30 36 24 28 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	35 12 1 35 15 26 2 6 13 10	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 30 37 1 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
20	Motionless object's energy consumption	18 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 36 38 39
21	Output	35 19 2 10 38 26 34 6 17 13	28 31 32 15 18 20 22 25 27 29 30 36 37 1 4 8 13 14 24 40 3 5 7 8 9 11 12 21 23 33 39
22	Energy loss	35 2 6 18 19 28 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 6 8 12 20 24 31 33 34 40
23	Object loss	15 18 28 31 2 24 27 3 29 39 40	6 15 34 1 13 14 39 36 38 5 16 22 23 32 33 12 21 27 4 7 8 9 11 17 19 20 28
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	16 29 17 30 37 1 2 3 6 19 22 36 38 39 14 15 21 7 8 9 11 13 23 25 27 31 33 40
26	Object quantity	35 3 29 18 10 14 27 40 2 13	28 31 32 15 18 20 22 25 27 29 30 36 37 1 4 7 8 20 30 32 36 38 5 9 11 12 19 21 22 23 37
27	Reliability	35 11 10 3 28 40 27 1 2 5	13 21 24 32 4 14 19 25 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 20	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 23 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 25 30 32 5 7 8 9 11 12 14 16 20 36 38
31	Harmful factors the object will release	22 35 2 1 39 18 40 15 17 10	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 20	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	16 17 3 4 10 18 24 27 39 6 26 40	9 11 17 24 31 33 37 39 5 6 7 8 12 14 15 16 20 21 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 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	35 17 27 6 16 22 30 36 37 3 4 9 12 120 30 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 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 13

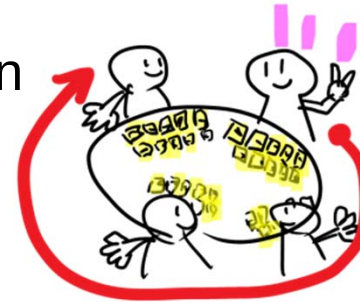
For work

Process 1 (For Game)

Hand it out to everyone.



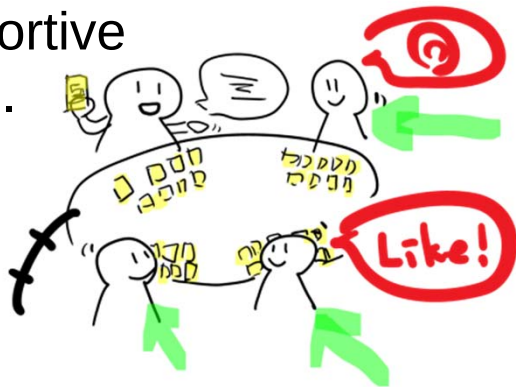
Start with the person who wins the most, then go clockwise.



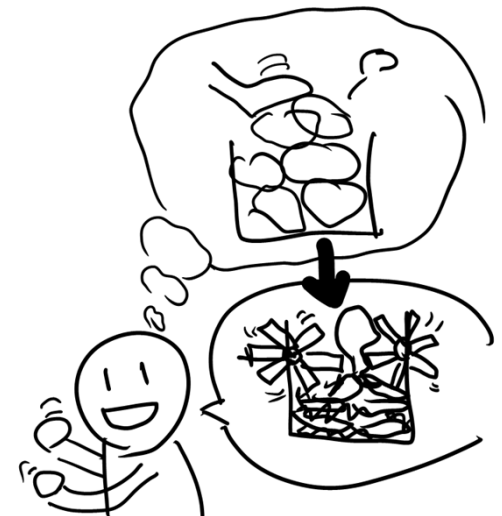
Choose one card.
Use that to begin stating your idea.



Give supportive comments.



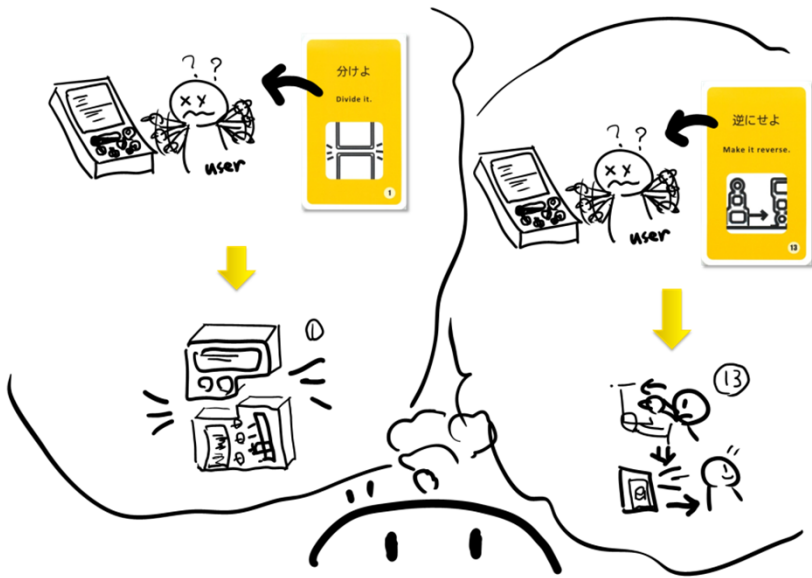
Give an idea that solves an issue of existing trash bins.



Process 2 (For Work)



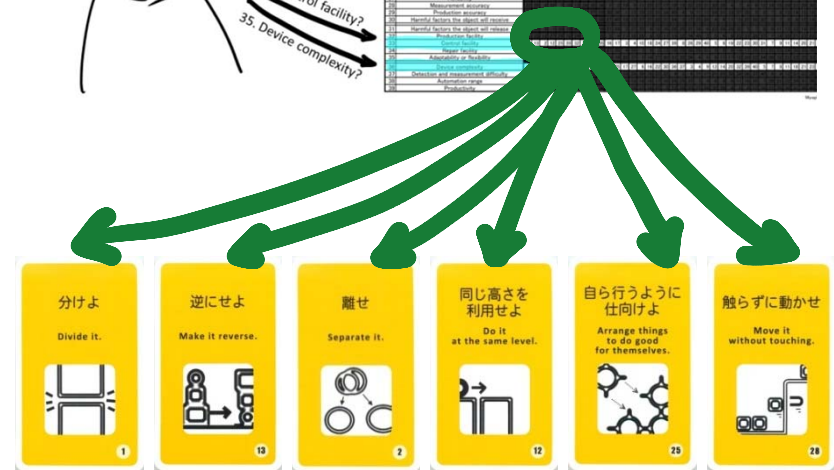
I want to make it easier to use!
(Decide improvement needs.)



Propose solutions using those that help you come up with an idea.

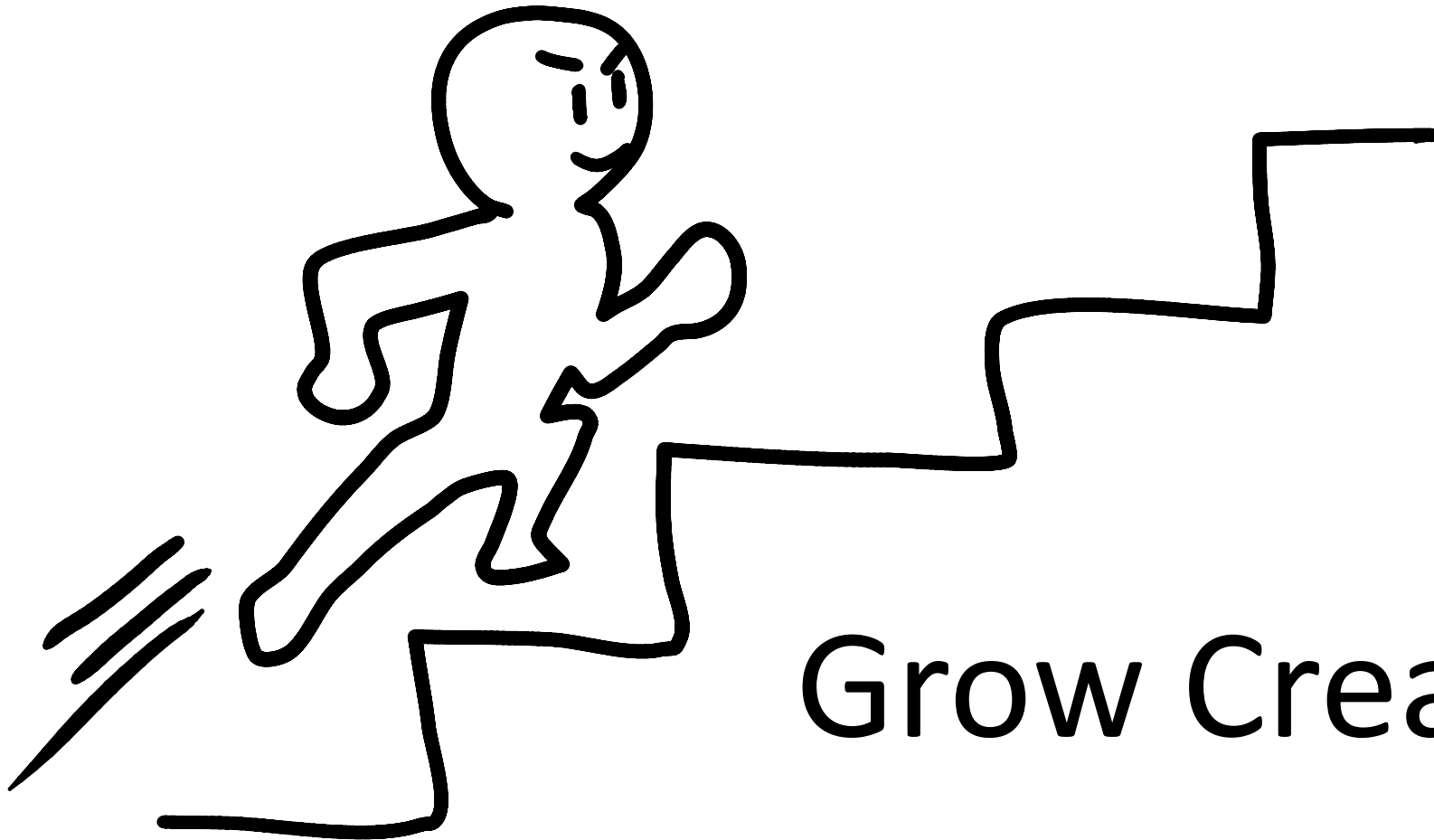


“Make it easier to use”. Which one is this issue out of the 39 ?
Choose one that applies to the “39 improvement needs”.

[illegible]

Lay about 5~10 of the TRIZ Cards in the order of the first numbers on the line. 8

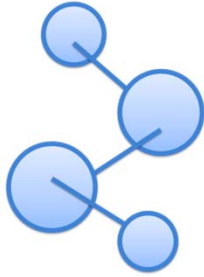
Purpose



Grow Creativity

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Details

Profile of Participants

Korea

- Undergraduate students 50
- Graduate students 4
University(phycology)
- Social issue researchers 33
Think tank

88

The number of
people who know
the TRIZ : 1

Japan

- Manufacturing engineers 24
Auto Parts
- Engineers & planners 30
Optical machine
- Maintenance technicians 12
Power equipment maintenance
- Engineers & planners 32
Various Companies that belong to the Japan Society of VE
- Product developers 30
Medical machine

128

The number of
people who know
the TRIZ : 8

Facilitators

Korea



Ishii

Co-Facilitator



Park

Japan



Ishii

1st process
(For Game)

Tool Principle → 40 Cards (Illustration & Phrase)

Japanese
English



TRIZ Card
(智慧カード)

Tool 40 Cards of Special Korean version

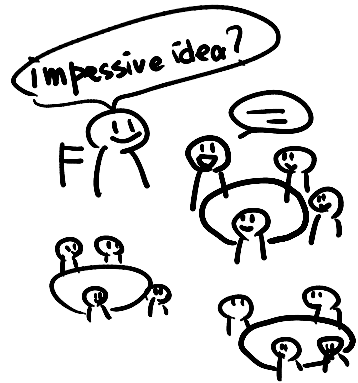
Korean
English
Japanese



Theme of Ideation

- New Trash Bin
(New product idea)
- Frozen Key
(Problem solving, include new product idea)
- Traffic Jam
(Problem solving, include mechanical innovation
~ social system innovation)

Process 1 (55 minutes)



Idea Review



Play

What is TRIZ?



Theme

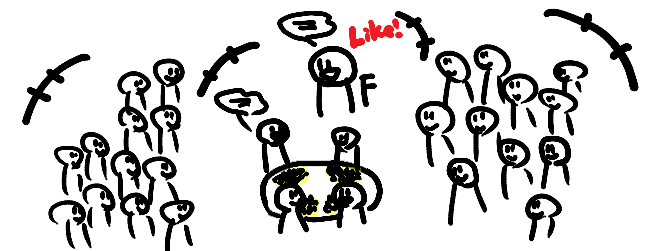
Imaginary setting

- New Trash Bin
- Frozen Key
- Traffic Jam

How to play



Sample Play



2nd process

(For Work)

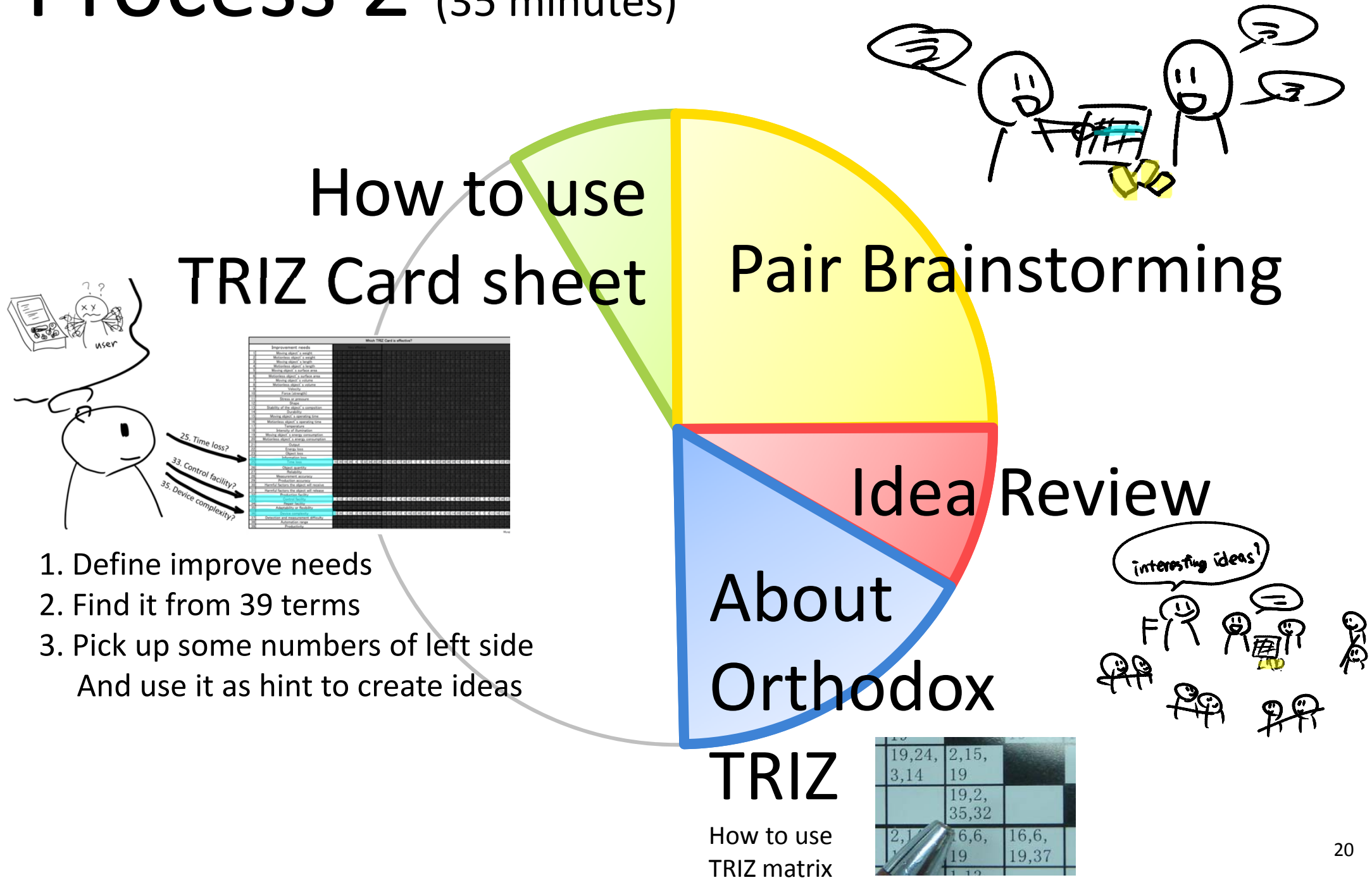
Tool

“Which TRIZ Card is effective?”

TRIZ Card Sheet

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	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	8	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	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	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	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 compisition	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	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	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	33	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	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	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	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	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	39	27	40	10	13	37	21	29	31	34	3	17	23	26	4	6	11	15	25	30	32	5	7	8	9	12	14	16	20	26	38										
31	Harmful factors the object will release	22	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	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																								

Process 2 (35 minutes)



Examples of generated ideas

(創出されたアイデアの例)

- A color change trash bin depending on weight.
中の重さによって色が変わるゴミ箱
- Mist comes out the trash bin. (Reduce the volume of scrap paper, cram a lot)
ミストの出るゴミ箱 (紙クズをしなっと小さくさせ、たくさん詰め込める)
- Lock with a handle to cause a frictional heat inside
内部で摩擦熱を起こせるハンドルが付いた錠

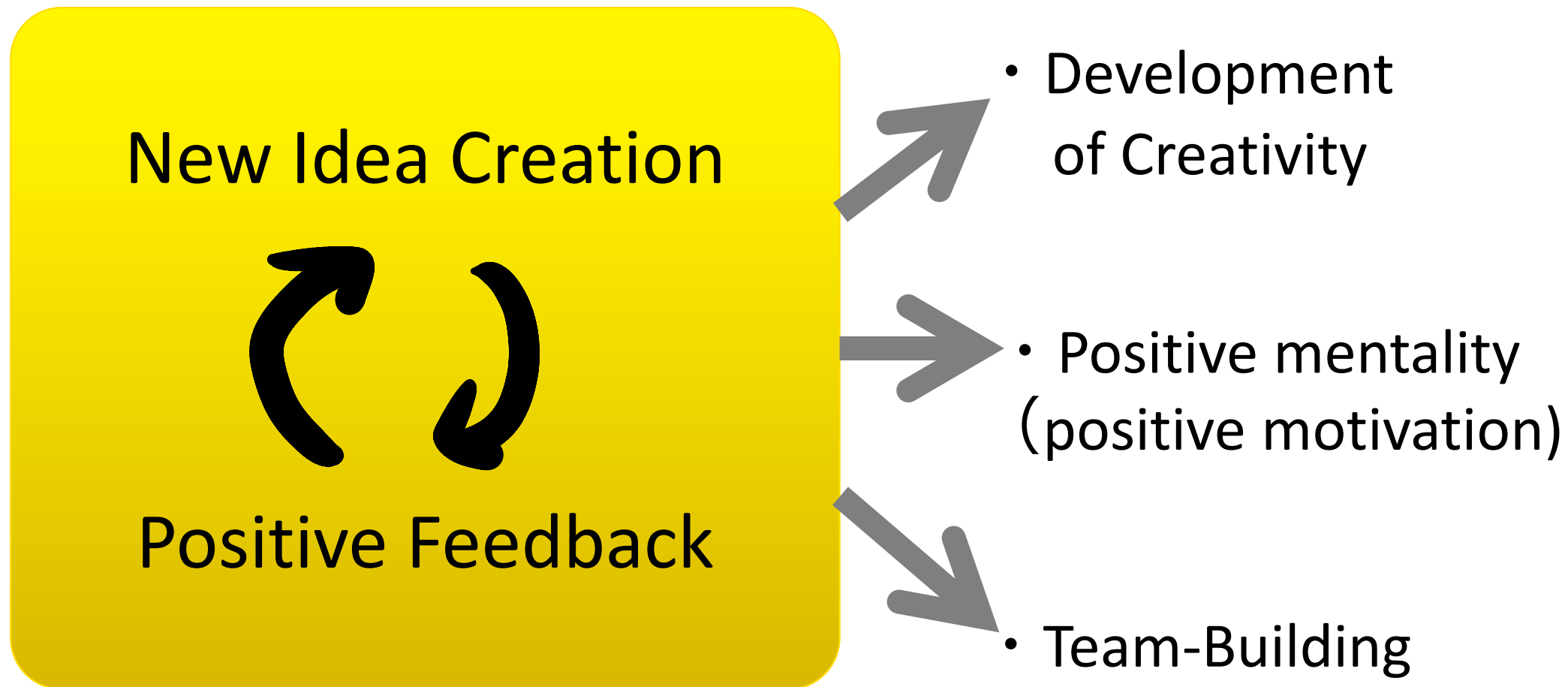
Impressions of the participants

(参加者の感想)

- Productive. (実際にたくさんアイデアが出せた)
- Pleasant. (ゲーム感覚でアイデアが出せて楽しかった)
- Interesting. (発想の手段として興味深い)

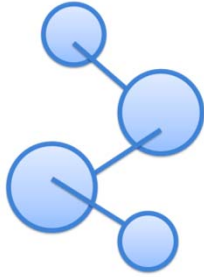
(観察からの仮説としての)

Effect of the workshop



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Future



We will research on “The effect of Group Dynamics on the Idea Generation
- focusing on SYMLOG(SPGR) and TRIZ Games -

SYMLOG

A **SY**stem for the **M**ultiple **L**evel **O**bservation of **G**roups

Research Hypothesis (研究仮説)

- Group Dynamics would play an important role in building teams.
 - Team dynamics impact the productivity of team ideas.
 - SYMLOG or SPGR(Systematizing Person-Group Relations)
enables to find out group dynamics on creative products.
 - Unified teams would produce more ideas than polarized teams.
 - Cross-cultural Research in four cultures.
 - They are Japan, Korea, Germany and Norway.
 - Research design: SYMLOG or SPGR as independent variable and the number of generated ideas by TRIZ cards is dependent variable
-
- グループダイナミクスはチームビルディングに重要な役割を果たすだろう。
 - チームダイナミクスはチームのアイデアの生産性に強く影響する。
 - SYMLOGとSPGR（個人とグループの関係の体系化モデル）は創造的産物についてのグループダイナミクスを明らかにできる。統一チームは偏ったチームより、多くのアイデアを生産するだろう
 - 4つの文化「日本、韓国、ドイツ、ノルウェー」におけるクロスカルチャー的研究をする。
 - 研究構想：SYMLOGあるいは（それとは独立変数である）SPGRと、TRIZ Cardを使って創出されるアイデアの数は従属変数である。

4 countries

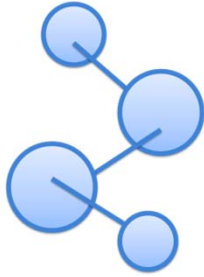


Prospect (見通し)

- Team idea generation is different from Individual idea generation because the former is influenced by team dynamics(group dynamics)
 - However, the cultural differences between countries(Japan, Korea, Germany and Norway), would show difference for the preference of Individual Idea Generation vs Team Idea Generation
 - This research result would offer ideas about how to build teams(team building) in different cultures, culture-based leadership development and training programs in order to raise the creativity of the team innovation capability.
-
- チームの発想は個々の発想とは異なる。なぜなら、前者はチームダイナミクス（集団力学）によって影響されるからだ。
 - けれどさらに、4か国（日本、韓国、ドイツ、ノルウェー）間の文化の違いは、個々の発想 vs チーム発想の嗜好の差を示すだろう。
 - この研究結果は、異なる文化や文化にもとづくリーダーシップ開発や研修プログラムにおいて、チームのイノベーション能力の創造性を高めるための、チームの構築（チームビルディング）の仕方についてアイデアを提供するでしょう。

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- 1. Overview
- 2. Details
- 3. Future
- 4. References



references

References (参考文献)

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 - http://www.ideaplant.jp/pdf/070901_JapanTRIZSociety.pdf
- 石井力重(2008)「TRIZ（技術開発理論）の発想カード化事例にみるカード化の効能～発想ツールの形状に関する一考察～」『日本感性工学会 第4回春季大会』
 - http://www.ideaplant.jp/pdf/080307_jske.pdf
- 石井力重(2012)「IDEAPLANT 海外レポート1」
 - http://www.ideaplant.jp/pdf/120530_korea.pdf
- Robert F. Bales(1970), Personality and Interpersonal Behavior, Holt, Rinehart Winston, NY,
- Robert F. Bales(1979), SYMLOG(A **S**ystem for the **M**ultiple **L**evel **O**bservation of **G**roups) Holt, Rinehart Winston NY,

Material (参考資料)

智慧カード (TRIZ Card)

Web site

<http://triz.sblo.jp/archives/20070814-1.html>

<http://www.ideaplant.jp/products/chiecard2/>

Smart phone App "ideaPod"

For iPhone <http://itunes.apple.com/us/app/ideapod/id325360569?mt=8>

For Android <https://play.google.com/store/apps/details?id=jp.co.etos.android.ideapod&hl=ja>



“Which TRIZ Card is effective?” (TRIZ Card Sheet)

Web site

<http://triz.sblo.jp/article/57164815.html>

[illegible]

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