

Ideation-TRIZ Software

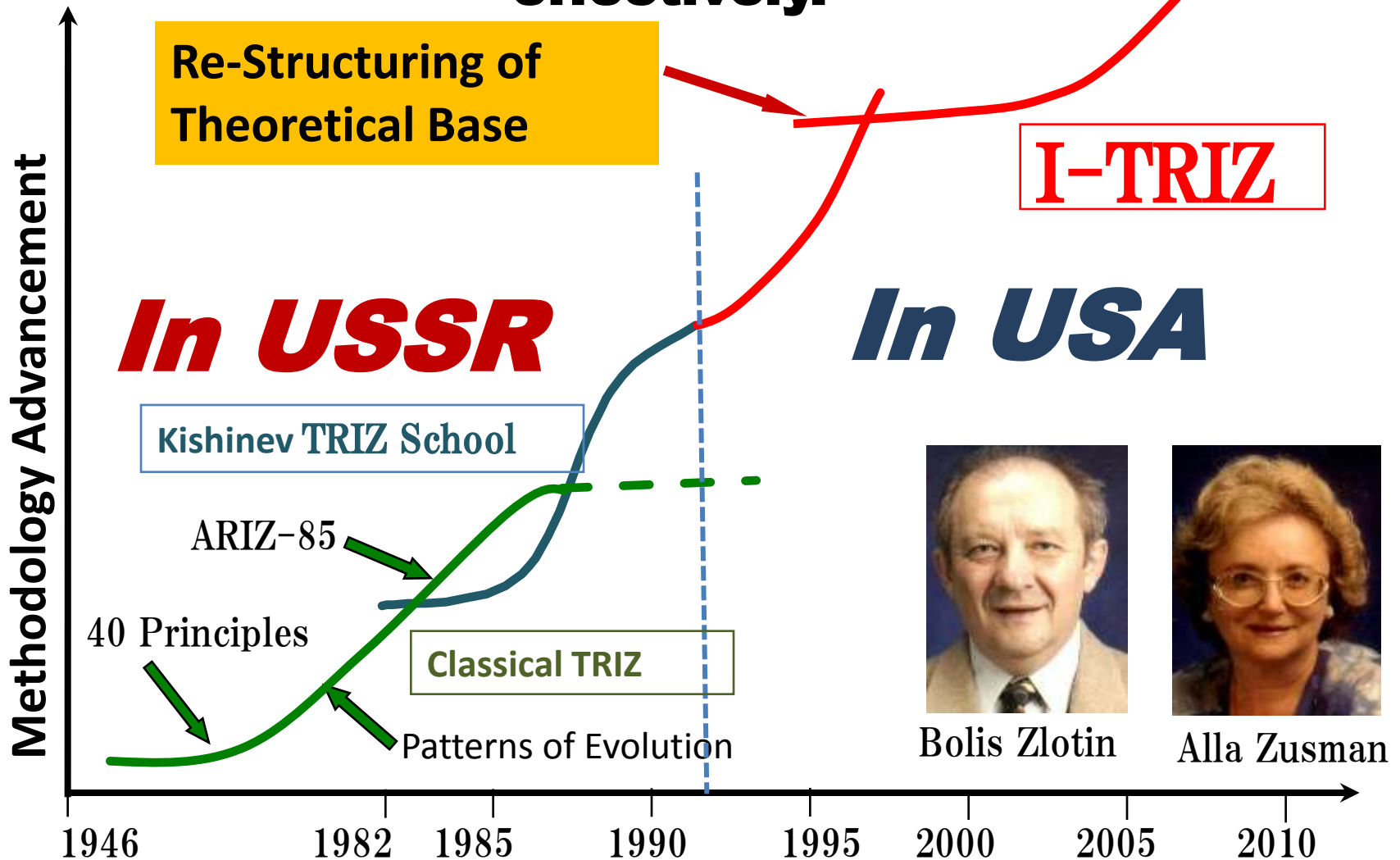


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Patent Attorney in Japan

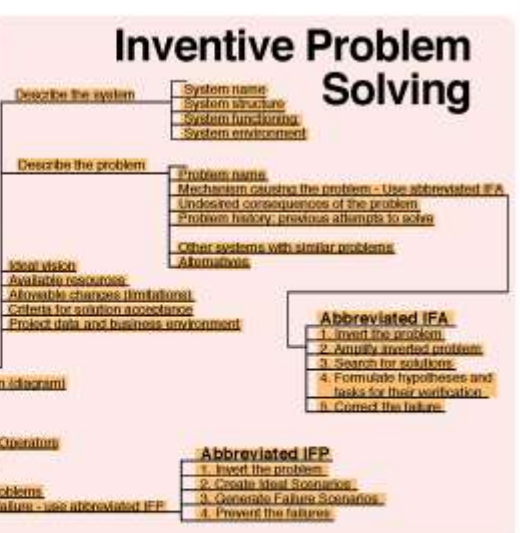
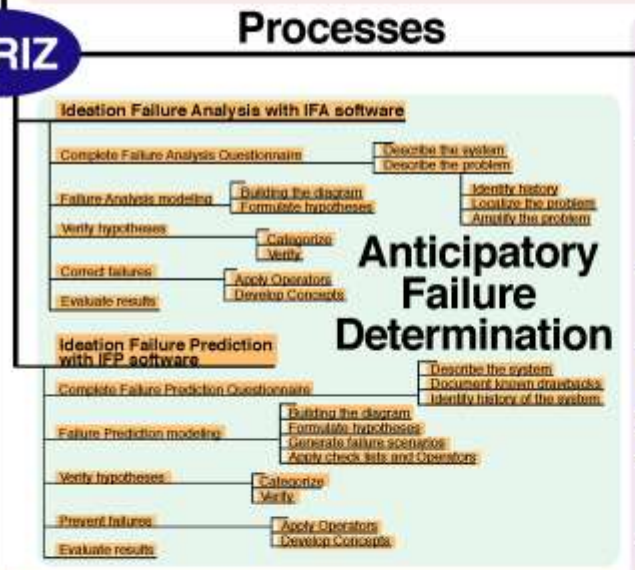
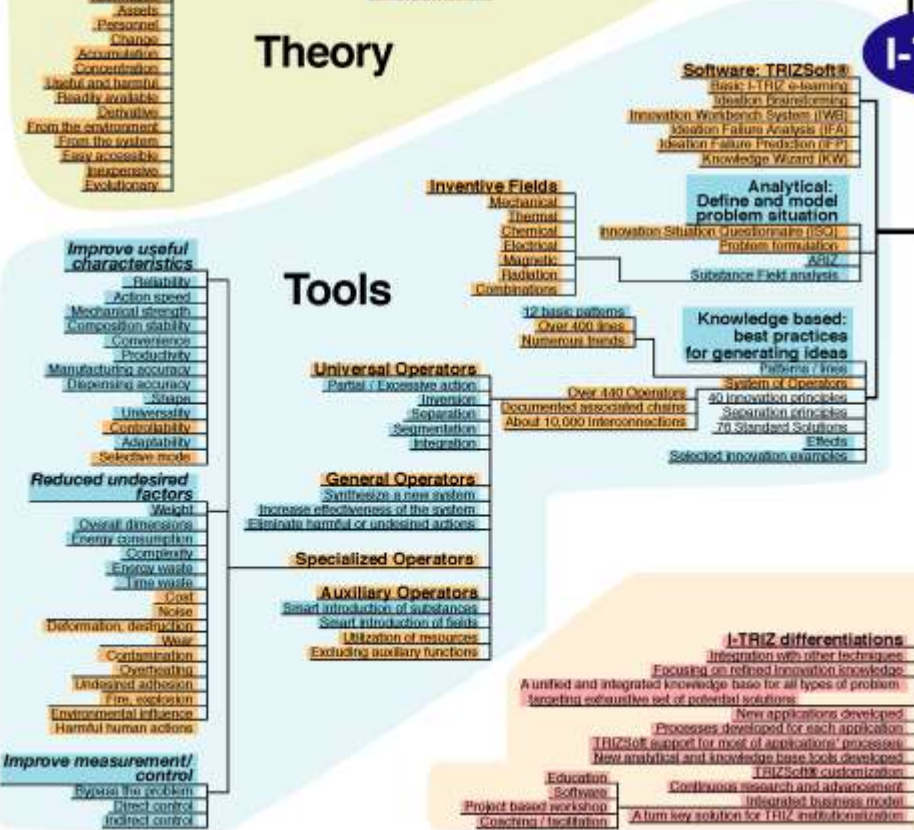
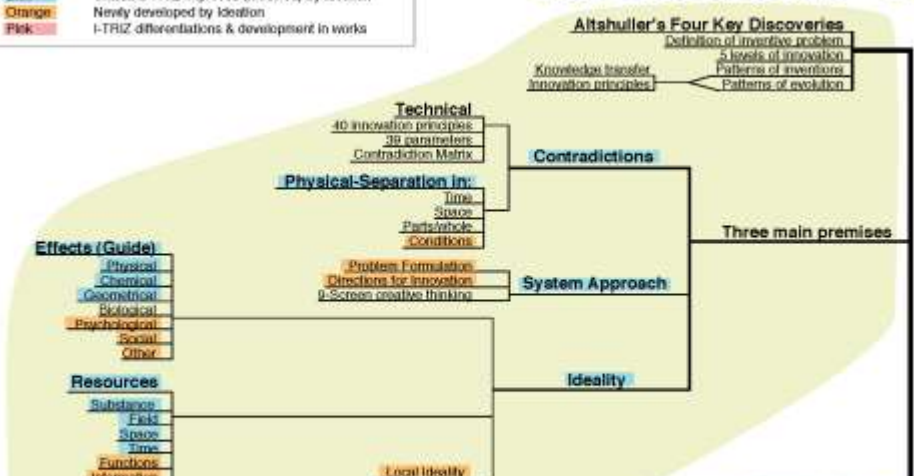
Ideation TRIZ has been developed by expanding and re-structuring Classical TRIZ so as for ordinary persons to practice it more easily and more effectively.



Ideation TRIZ Map

Color Code

- Plain: Classical TRIZ
- Blue: Classical TRIZ Improved (modified) by Ideation
- Orange: Newly developed by Ideation
- Pink: I-TRIZ differentiations & development in works



Ideation Operating System for Innovation

IPS

(Inventive Problem Solving)

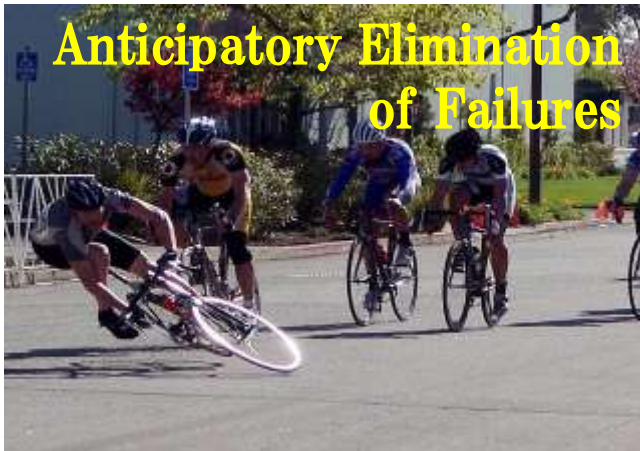
Fast Evolution of Existing Generations



AFD

(Anticipatory Failure Determination)

Anticipatory Elimination of Failures



DE

(Directed Evolution®)

Proactive Development of Future Generations



CIP

(Control of Intellectual Property)

Construction of Threatening IP Force



Software on sale in Japan

Innovation WorkBench (IWB)

*For Practitioners,
To Solve Technological Problems.*



IPS | AFD

Problem Formulator (PF)

*To Analyze a Situation
and Find out Directions
for Solutions.*



Failure Analysis (FA)

*To Identify the Route Cause
of a Failure and Develop
Solutions.*



IBS

(Ideation BrainStorming)

For Students,

To Solving Technological Problems.



Failure Prediction (FP)

*To Anticipate Potential Failures
and Develop Preventions.*



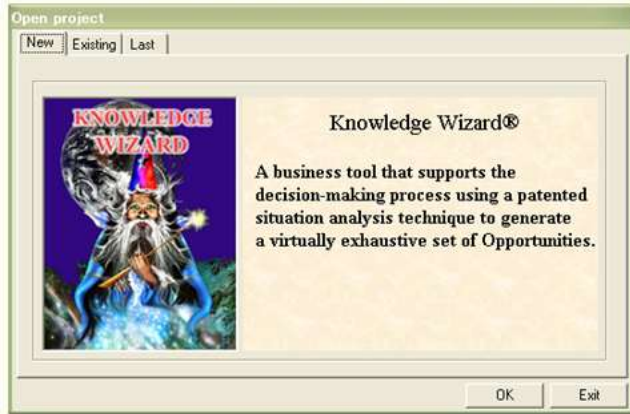
IPS

Software for our in-house use

CIP

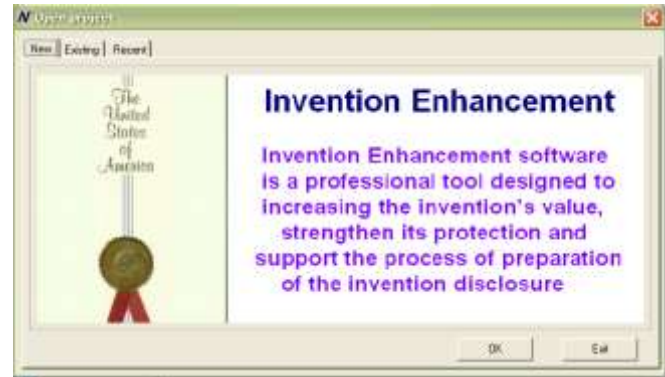
Knowledge Wizard

To Solving Business Problems.



Invention Enhancement

To Enhance and/or Circumvent Patents/Inventions.



DE

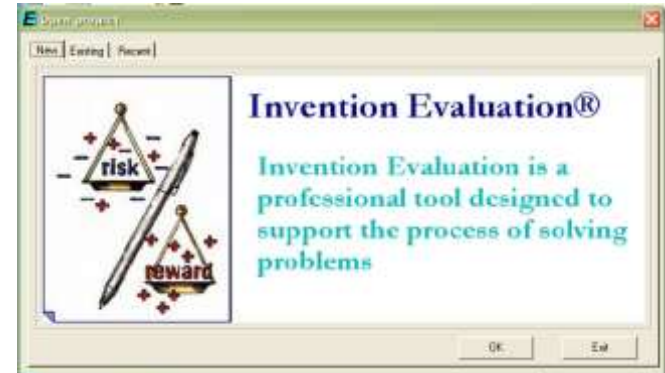
Directed Evolution

To Develop Scenarios for Future Evolution of a system.



Invention Evaluation

To Evaluate a Patent/Invention and Develop Directions for increasing the value of it.





Rene Kapik, Ph.D. Medical Industry Consultant

***I-TRIZ has brought
clarity to the long-
standing mystery of
classical TRIZ***

***and simplicity of the tools that
once required extended study
time to master.***

What you are given by I-TRIZ software:

- (1) Thinking Process, (2) Elegant Analysis Tools, (3) Exhaustive Set of Directions, and (4) Hundreds of Invention Patterns (Operators).

Thinking Process of Expert Problem-Solvers

Fully Understanding

Available Resources

Operation Plan

Directions to solutions

Ideas for solutions

System Approach

Resource Analysis

Problem Formulator

Operator System

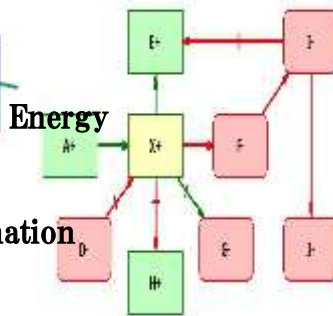
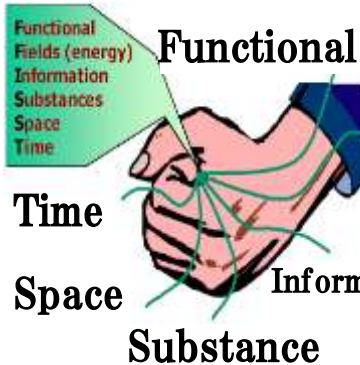
Observe along 4-dimensional perspective axes.

What can we utilize?

Clarify cause-effect network.

Select what and how you change.

Develop ideas with hundreds of operators.



Harmful elements

Useful elements

Contradictions

Similar problem

Operators

New Problem

New solutions

Ordinary persons can solve difficult situations like experts.

Thinking Process

Tools, Know-how, Knowledge, Operators.

Main Window

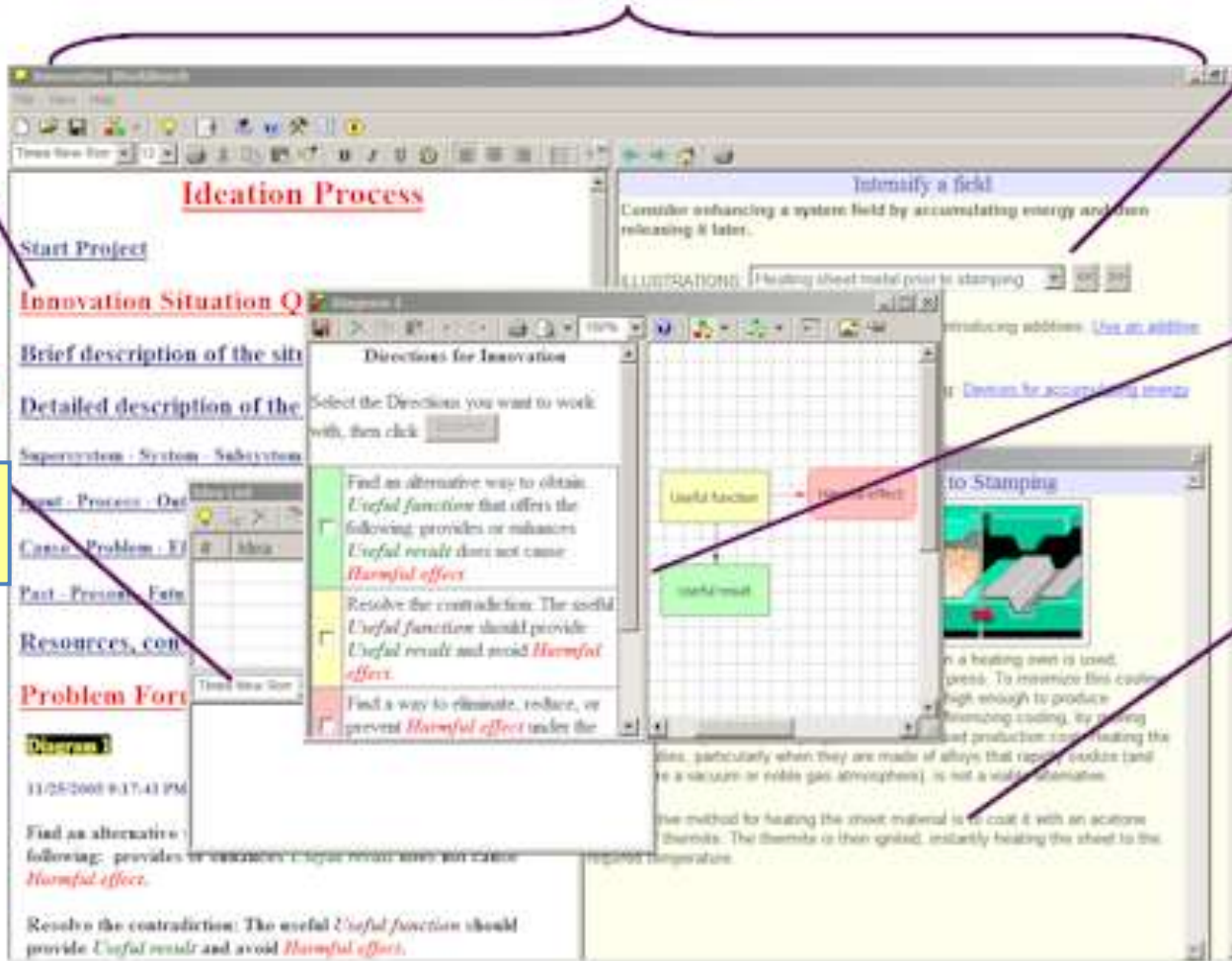
Suggestion Pane

Process Pane

Ideation Process

Idea Window

Developed Ideas



Problem Formulator Window

C-F modeling, Directions.

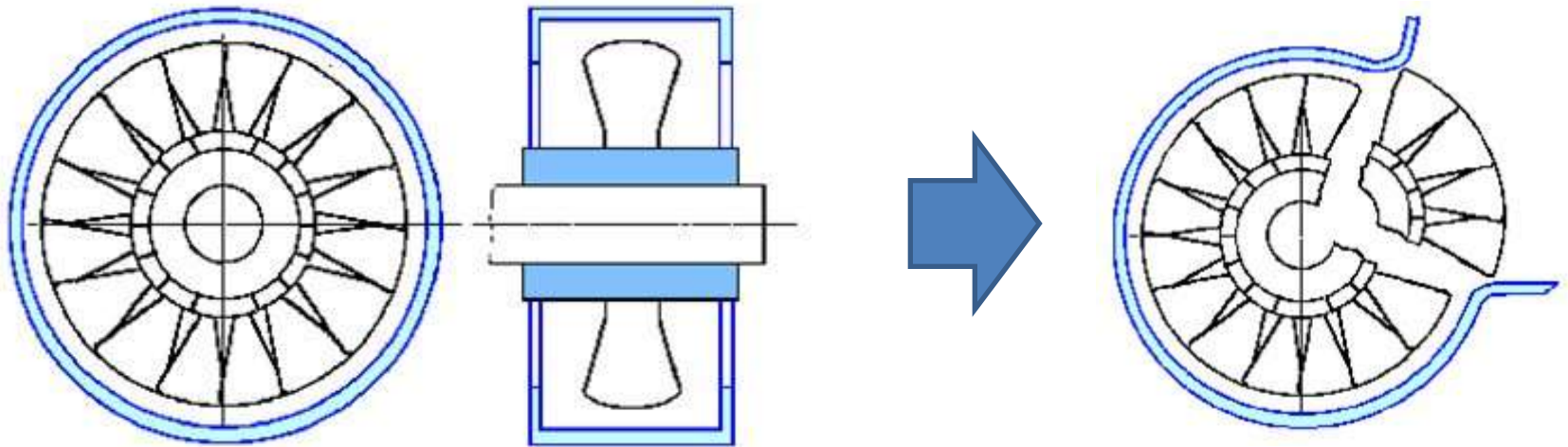
Illustration Window

Illustrative Examples of Operators

IPS Case Study using IWB

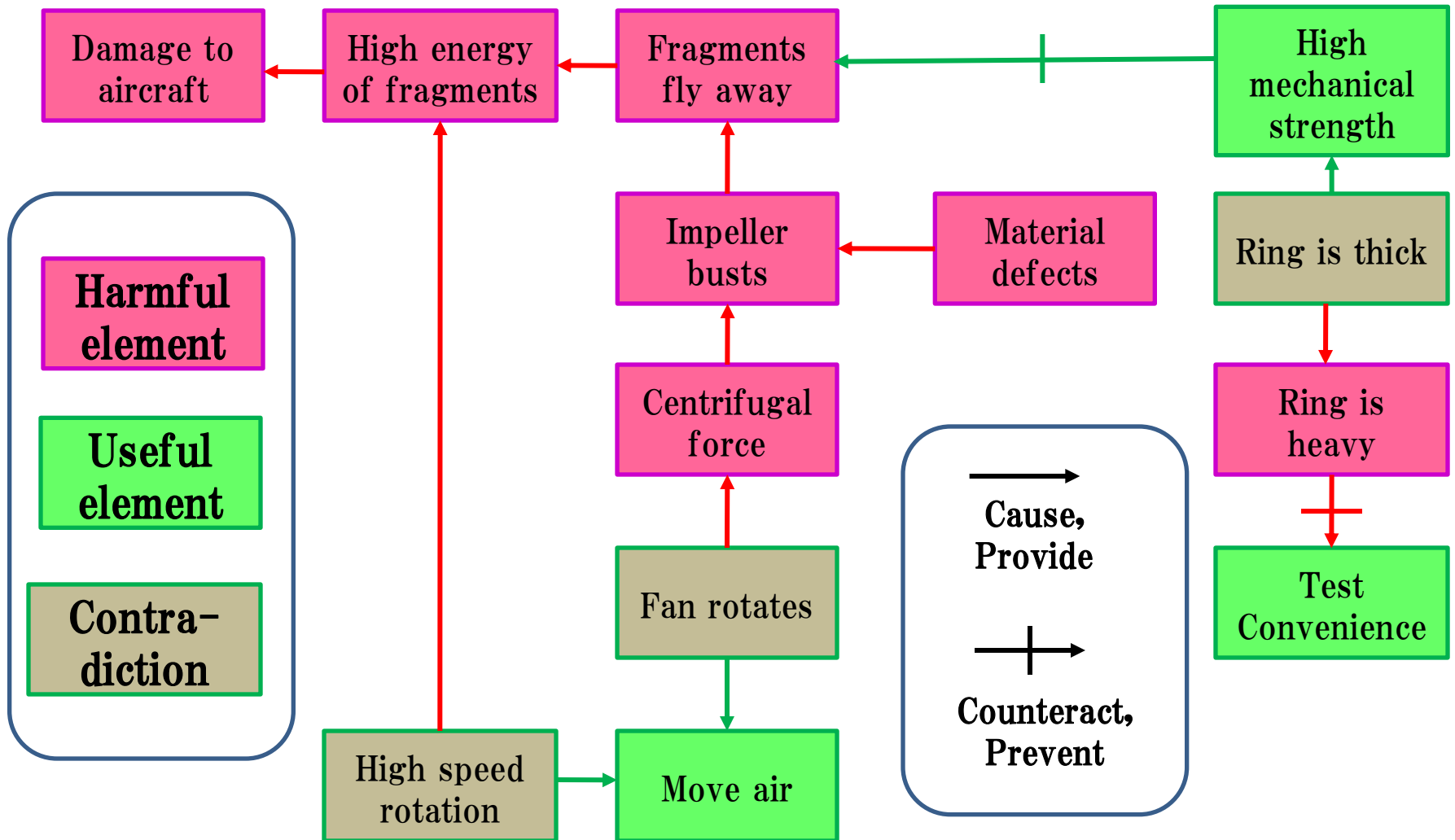
“Containment Ring of Fan of Air Controller for Aircraft”

Objective: *To reduce the weight of the ring without decreasing its mechanical strength.*



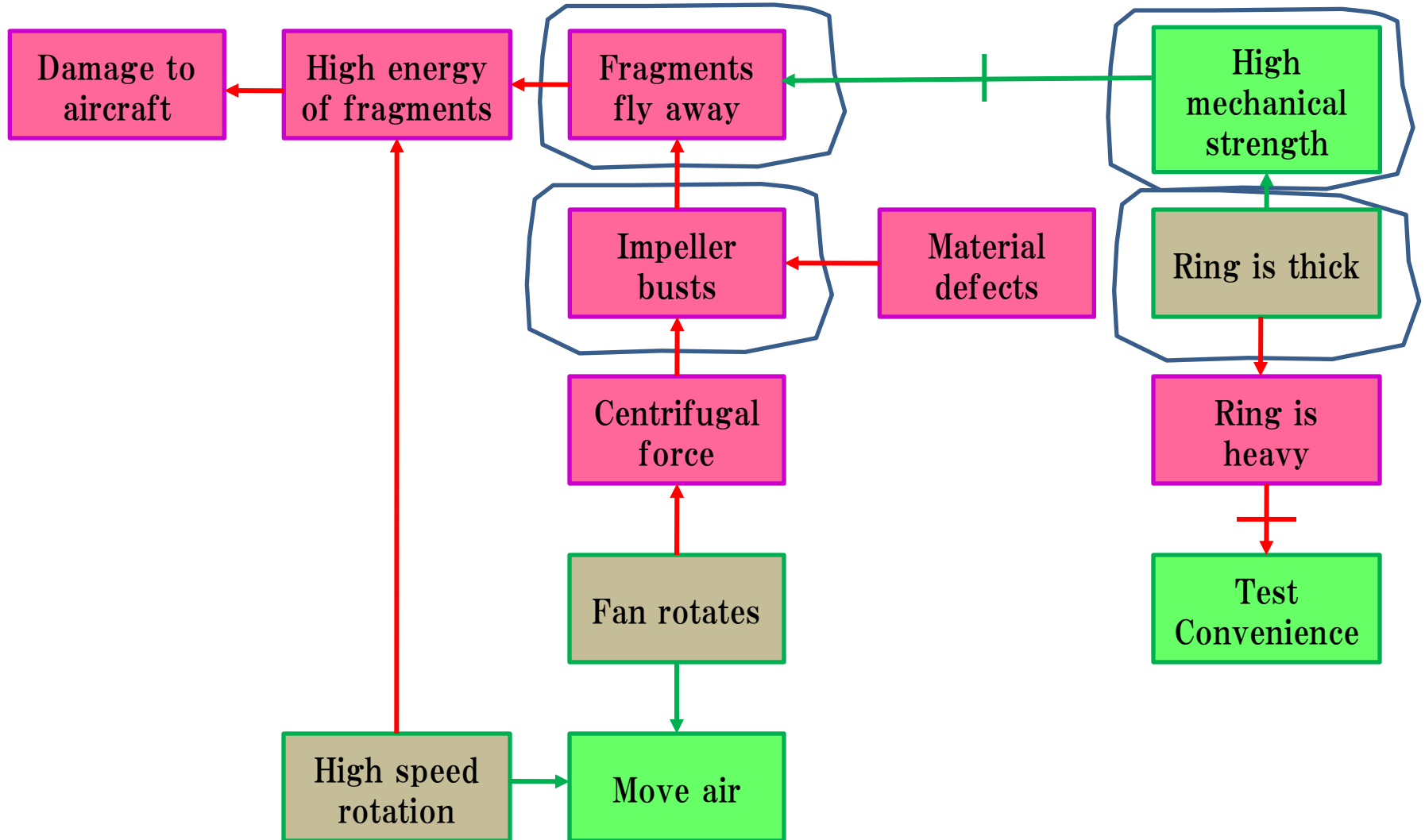
Cause – Effect Modeling

Clarify Complicated Cause – Effect Relationship among Elements



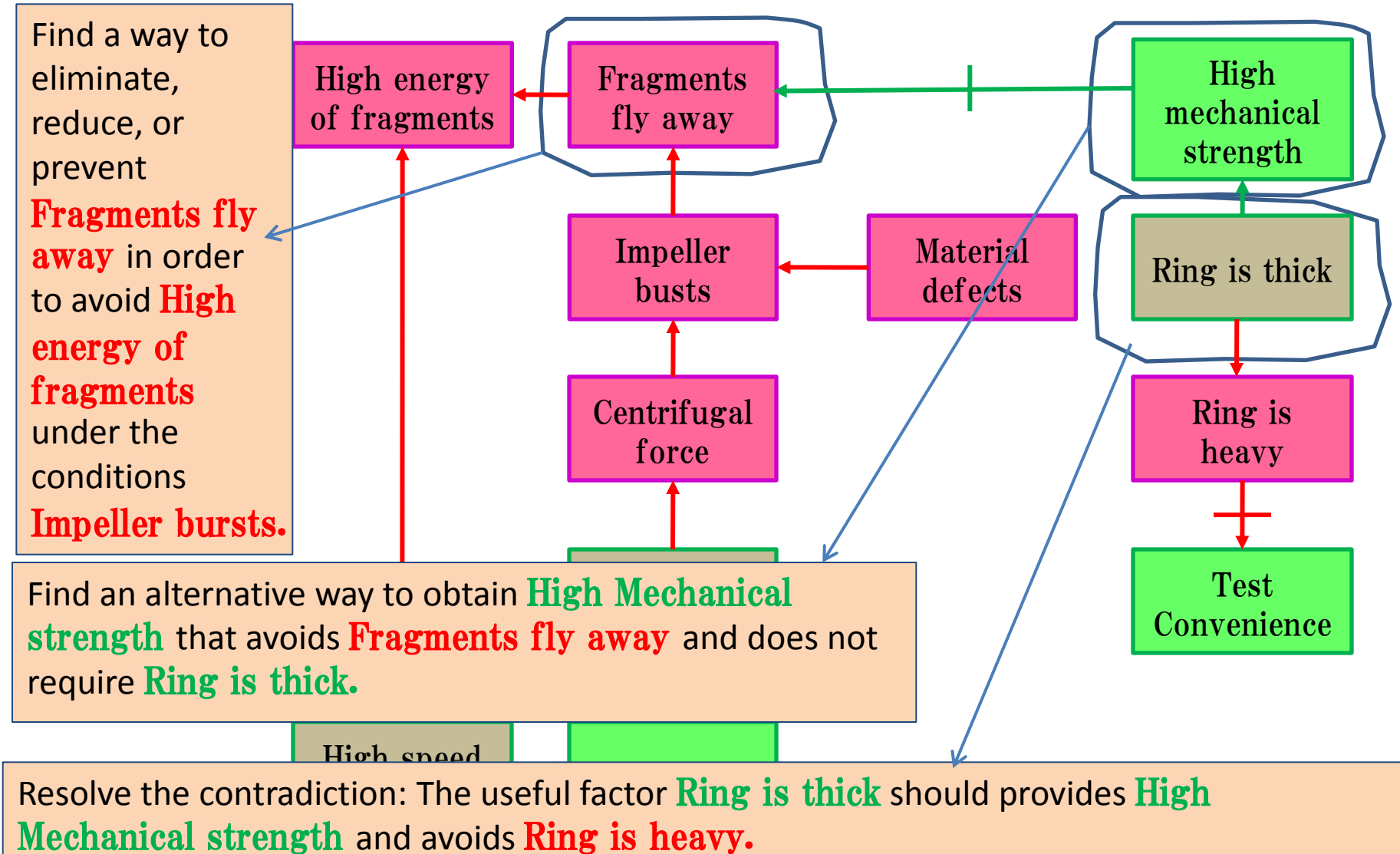
Plan a Strategy to Improve the Situation

Select particular elements to be changed to lead to promising solutions.



Obtain Directions to Solutions

Identify how you change each selected element.



Obtain Directions to Solutions

Identify how you change each selected element.

3 Basic Types of Directions

- Eliminate, Reduce, or Prevent **Harmful Element**
- Find Alternative Way to Obtain **Useful Element**
- Resolve **Contradiction**
Providing Useful Element;
Avoiding Harmful Element.

I-TRIZ Operator System allows You to Create a Larger Number of Ideas in Shorter Time.

- (1) About 500 user-friendly and easily-selectable operators
- (2) Ideation brainstorming

When using a principle “Dynamization,” for example, you can use many different specific tactics as shown below.

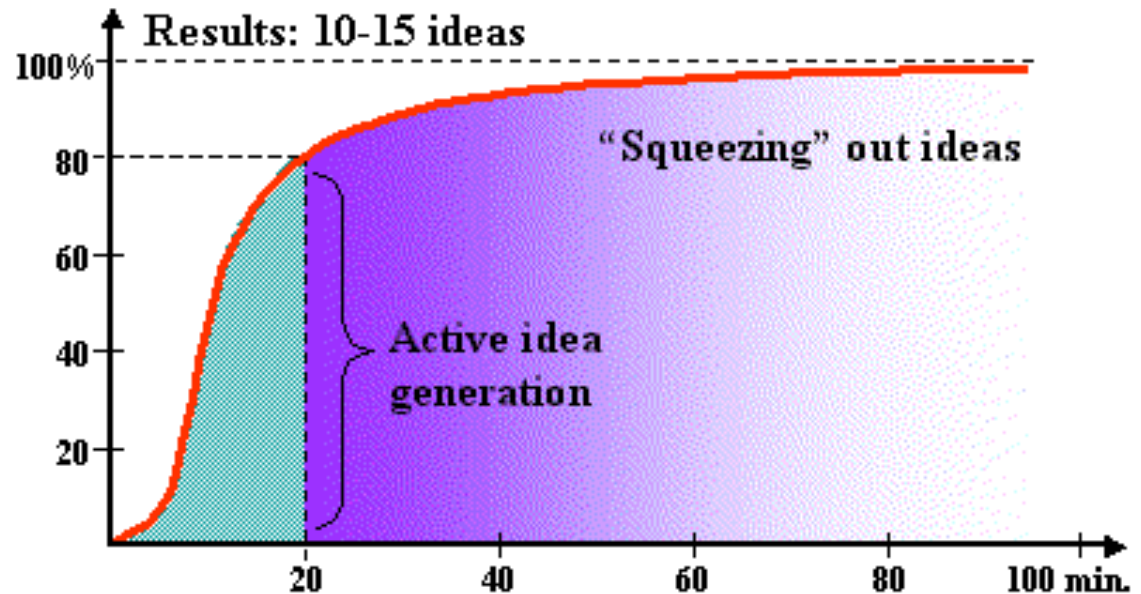
Dynamization

To find a way to make your system or process more dynamic, work with these operators:

- [Decrease stability](#)
- [Transition from stationary to mobile](#)
- [Divide into mobile parts](#)
- [Apply physical effects](#)
- [Add a mobile object](#)
- [Use interchangeable elements](#)
- [Use elements that are automatically interchanged](#)
- [Use elements with dynamic features](#)
- [Use adjustable elements and links](#)

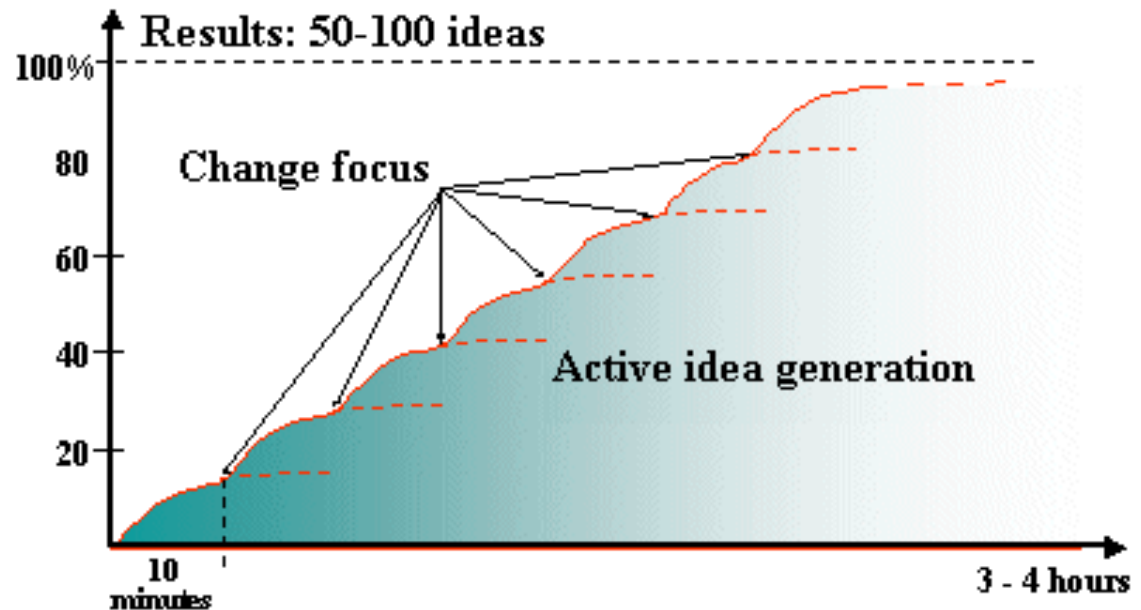
Classical Brainstorming

Participants have fun and actively generate ideas for the first 20% of the session. The rest of the session is spent "squeezing" ideas out of the participants, who become bored and even irritated at having to withhold their opinions.



Ideation Brainstorming

Frequently changing focus (**Operators** and **Directions**) allows participants to keep having fun and high creativity all through the session.



For each direction, select operators and develop ideas.

Direction Type #1:

Eliminate, Reduce or prevent Harmful Element

Find a way to eliminate, reduce, or prevent **Fragments fly away** in order to avoid **High energy of fragments** under the conditions **Impeller bursts**.

← → 🐞

Find a way to

H

Select Refine Directions and

- [Lower harmful parameters](#)
- [Enhance useful parameters](#)
- [Isolate the system from the](#)
- [Counteract the harmful effects](#)
- [Impact on the harmful action](#)
- [Eliminate the cause of the](#)
- [Reduce the harmful results](#)
- [Benefit from the undesirable](#)

Submit

← → 🐞

Impact on an undesired action

If an undesired action cannot be eliminated, reduced or prevented, consider the possibility of redirecting or changing it.

For this purpose, consider the following recommendations (Operators):

- ["Draw off" an undesired action](#)
- [Change the direction of an action](#)
- [Switch off an action](#)
- [Enforce an action](#)
- [Local slackening of an action](#)
- [Weaken an action](#)

Draw off an **undesired action**

To protect a system or process from a harmful effect, introduce a mediating component or subsystem that transforms or absorbs (partially or completely) the harmful effect.

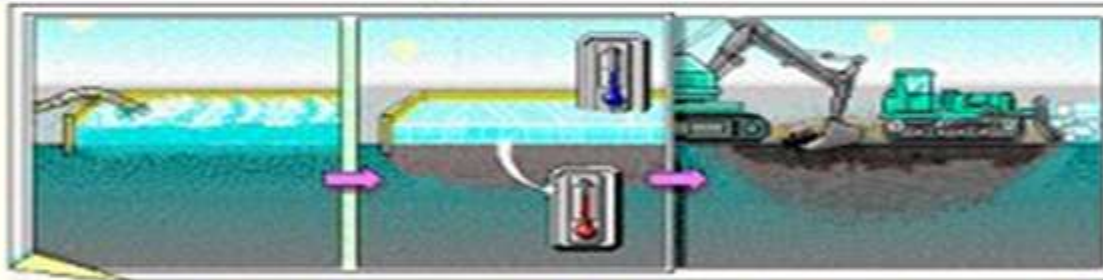
ILLUSTRATIONS:

If you introduce a mediating component or subsystem it should be done as economically as possible. In addition, the mediator should be removed as soon as it has fulfilled its function.

For this purpose, consider: ["Smart" ways to add a substance](#)

Defrosting frozen ground

Defrosting Frozen Ground

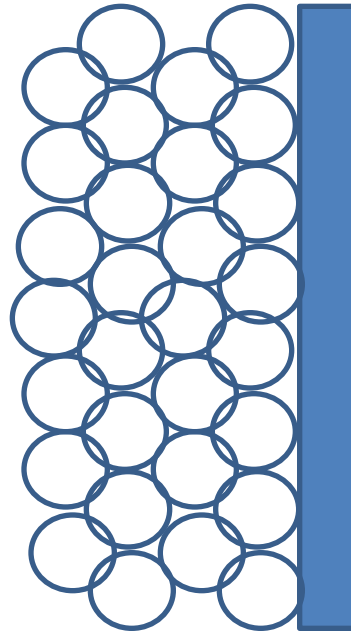
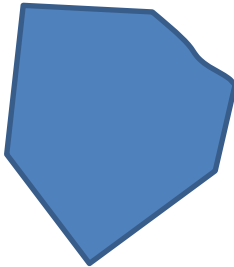


When hot water is poured on frozen ground, the ground is defrosted but it also becomes muddy.

The mud can be prevented. If the frozen ground is surrounded by a low, waterproof fence and cold water is poured in, the water freezes. As the water changes to ice, heat is given off and the ground is warmed. A day or two later, the ice layer can be removed with an excavating machine and the unfrozen ground can be easily worked. Inclined, as well as level sites can be defrosted by this technique.

2007/06/28 16:33:56 Idea #9

Use foam or foam-like material to absorb energy. Apparently, we need a special type of foam such as metal foam. We can also consider other fillings that can absorb energy.



Counteract with a similar action

Try to oppose an action that causes a harmful effect using another, similar action.

ILLUSTRATIONS: << >>

Protecting Against Armor-Piercing Shells

Protecting Against Armor-Piercing Shells

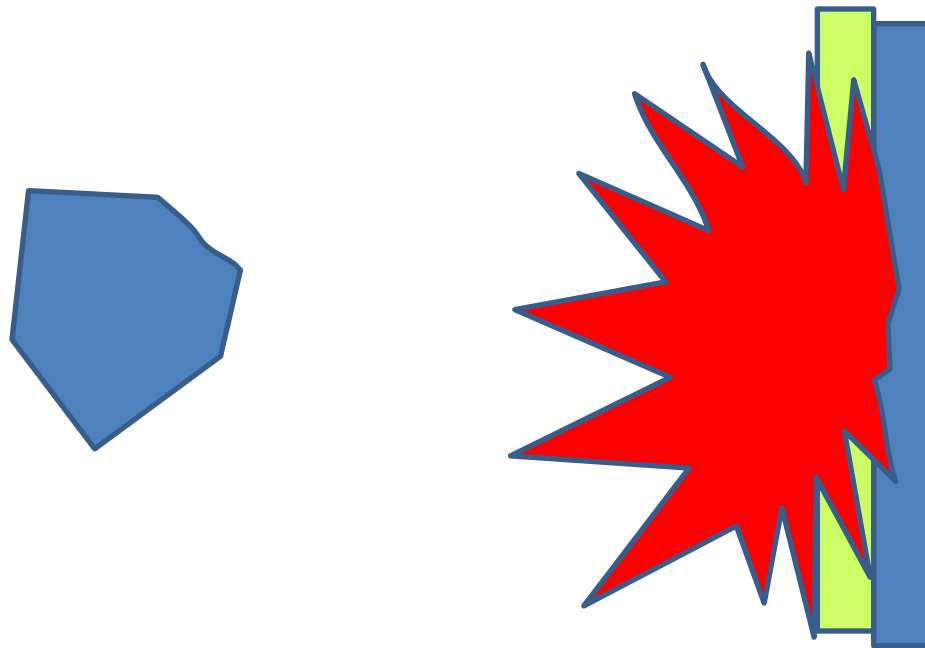


Active armor can be used as a countermeasure against armor-piercing shells.

The active armor has an outer skin in which small explosive charges are embedded. When an armor-piercing shell impacts the skin, an embedded charge explodes, repelling the shell and preventing it from penetrating the main armor.

2007/06/28 16:45:12 Idea #13

Explode the ring the moment the impeller bursts. Use the explosion wave to create a counteracting force.



Direction Type #2: Find Alternative Way for Useful Element

Find an alternative way to obtain **High Mechanical strength** that avoids **Fragments fly away** and does not require **Ring is thick**.

The image shows a screenshot of a TRIZ software interface. It consists of three overlapping panels:

- Find Panel:** A list of characteristics with checkboxes. The checked items are: Enhance, Lower hard, Idealizatio, Increase s, Partial/exe, Inversion, Integration, Segmenta, and Synthesiz.
- Insu Panel:** A list of characteristics with checkboxes. The checked items are: Mechanical ste, Convenience, and Shape.
- Improve mechanical strength Panel:** A detailed view of the 'Improve mechanical strength' operator. It lists several operators with checkboxes, all of which are checked:
 - Transform an object's shape
 - Transform an object's micro-structure
 - Transform the aggregate state
 - Integrate into a poly-system
 - Add a strengthening element
 - Anti-loading (highlighted with a pink arrow)
 - Introduce a strengthening additive

Below the operators, there is a section titled 'Also see:' with one operator checked: Eliminate a stressful operation.

Using pre-stressed constructions

Inner stress that is distributed optimally in an object or system can be created in advance (during manufacturing, construction, etc.)

ILLUSTRATIONS:

To create the required amount of inner stress, impart stress in one direction to some parts of the object/system and in the opposite direction to others. This can be accomplished by:

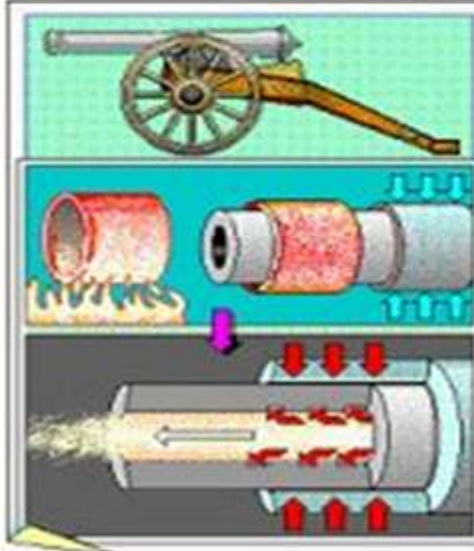
[Integrating objects](#)

[Partitioning objects](#)

Also see: [Building bi-systems](#)

Strengthening Gun Barrels

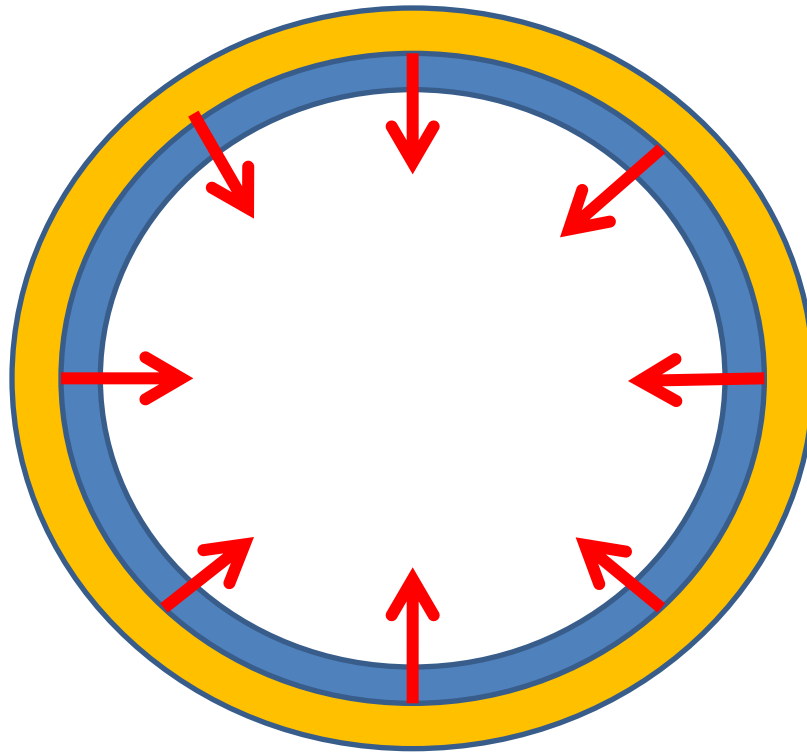
Strengthening Gun Barrels



To prevent gun barrels from rupturing when fired, preheated steel rings or pipes are placed around the barrels so that when cooled, they tighten and reinforce the gun barrel. Stretched wires or bands wound around the barrel provide the same reinforcing effect against pressure inside the barrel.

2007/06/28 17:59:41 Idea #41

Create inner stresses inside the ring: This can be done using wiring, banding, double ring structure, etc.



Direction Type #3: Resolve Contradiction

Find an alternative way to obtain **High Mechanical strength** that avoids **Fragments fly away** and does not require **Ring is thick**.

Resolve the contradiction

Document known ideas related to resolving this contradiction in the Idea list.

Resolve contradiction by separating the **Useful Function** into two states so that, in one state it will provide **Useful Result** and in another will counteract **Harmful Function**.

Select Refined Directions and press Submit button

- [Separate in space](#)
- [Separate in time](#)
- [Separate in structure](#)
- [Separate on conditions](#)

Submit

Separate contradictory requirements in space

If a system is required to perform contradictory functions or operate under contradictory conditions, try to partition the system. Then assign each contradictory function or condition to a different location.

- [Separate opposite requirements in space](#)
- [Separate an impeding part from an object](#)
- [Separate \(remove\) a required part from an object](#)
- [Use another dimension](#)
- [Use the reverse side](#)
- [Nesting \(matreshka\)](#)
- [Travel through](#)

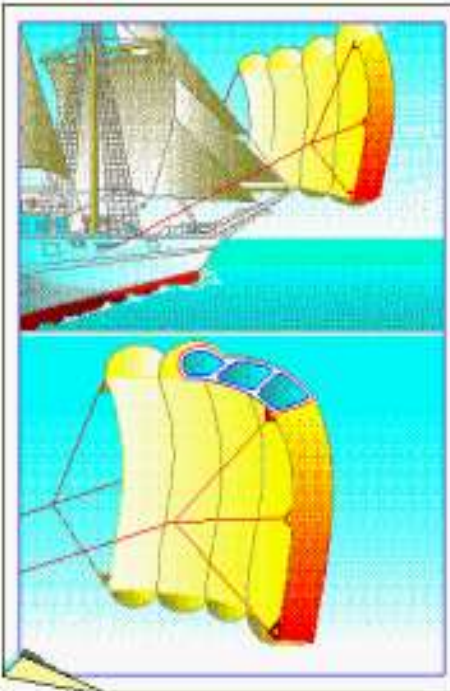
Remove an impeding part from an object

If a system or process has properties, functions or characteristics that are both desirable and undesirable, try to separate the part(s) with the undesirable qualities from the rest of the system.

ILLUSTRATIONS: Using a parachute as a sail

Parachute Used as a Sail

Parachute Used as a Sail

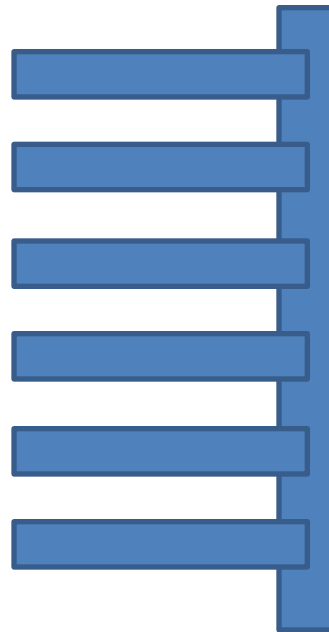
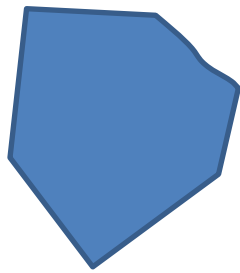


The equipping of a ship with a large sail is restricted by the stability and the dimensions of the ship.

To increase the sail area beyond that of a maximum-sized sail, it has been proposed that the ship be equipped with a parachute in addition to its normal sails. The parachute is released in front of the ship's bow on long cords. The canopy material is not like that generally used for a parachute, but instead is double-layered and filled with a gas which is lighter than air.

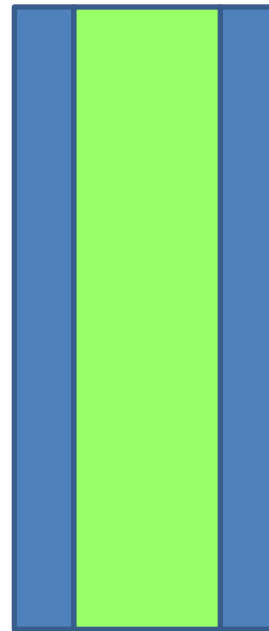
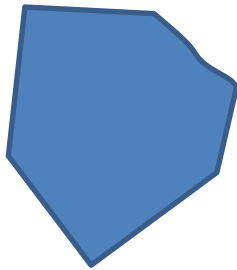
2007/06/28 17:05:42 Idea #15

Make a thin ring that has reinforcing ribs. If the ribs are placed on the internal surface of the ring, flying fragments will lose much of their energy smashing into the ribs.



2007/06/28 17:08:57 Idea #16

Use a multi-layer ring: additional strengthening rings, rings having different hardness and elasticity, rings which have a gap in between them, filling the gap with an energy-absorbing material.



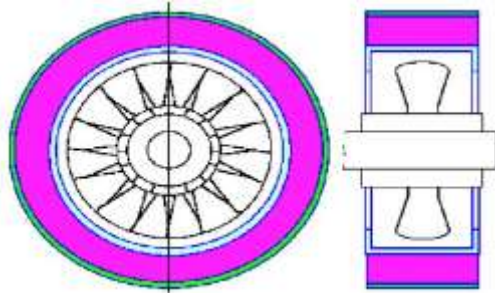
48 ideas in various directions developed
only in a couple of hours



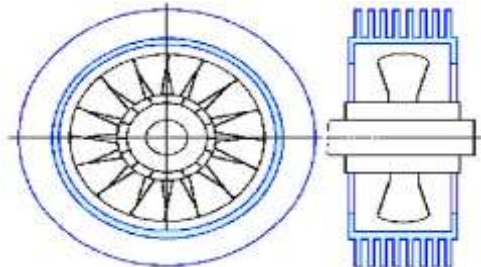
Develop Concepts

For Short -Term

1. Multi-layer Ring



2. Ring with Ribs

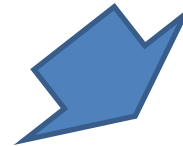


For Mid-Term

Explosive Ring

For Long-Term

Blades with Fibers (Wire)
inside to Keep Pieces in
Place.



Refine the Concepts

Thinking Process for CIP (Invention Enhancement)

CIP Problem Formulator

Clarify cause-effect network among elements of an invention (a patent claim).

Express Failure Prediction

Find out potential problems.

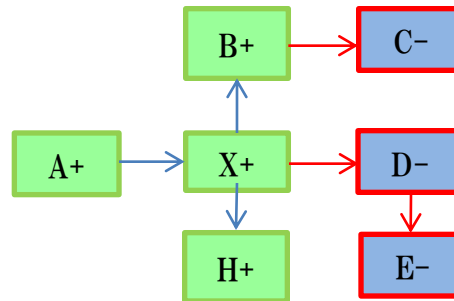
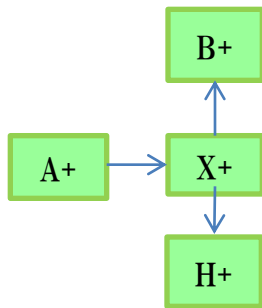
CIP Problem Formulator

Add the problems into the model.

Select what and how you change.

IPS Operator System

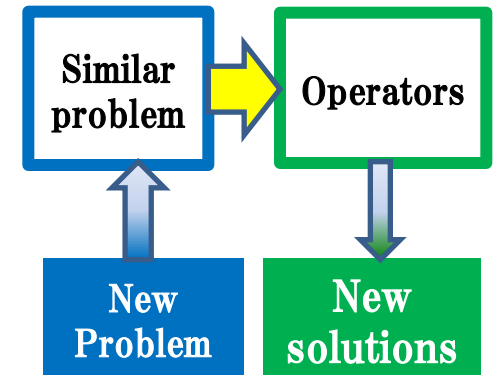
Develop ideas of improvements and alternatives of the invention.



Harmful elements

Useful elements

Contradictions



Operation Plan

Directions

Ideas

Thinking Process for DE

DE Problem Formulator

System Approach

General Trends of life,
Culture, market, etc.

S-Curve Analysis

Function Approach

Patterns and
Lines of
Technological
Evolution

IPS
Operator
System

Express
Failure
Prediction

Resource Analysis

Data
Gathering

Find out general
evolutional
directions

Develop Ideas for
Future Generations

Develop
Concepts

Predict and
Solve
potential
problems

Road
-map

Impression of First Experience of I-TRIZ

Sound Device Company

As a trial of I-TRIZ, consultants of Ideation Japan gave us a 3-hour demonstration showing us how to use IWB, dealing with a specific problem which we had recently found in our certain new product.

They started the demonstration with questioning about the situation, and then analyzed it using IWB and developed about 30 different ideas by themselves.

As a matter of fact, we have already worked on that problem for 3 – 4 months at that time and already had several solutions. But, all of those solutions we had were developed in that 3 hours, and other various ideas we had not yet come up with were also developed.