

A Method for Applying TRIZ to Enhance Brainstorming

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VALUEiINNOVATION

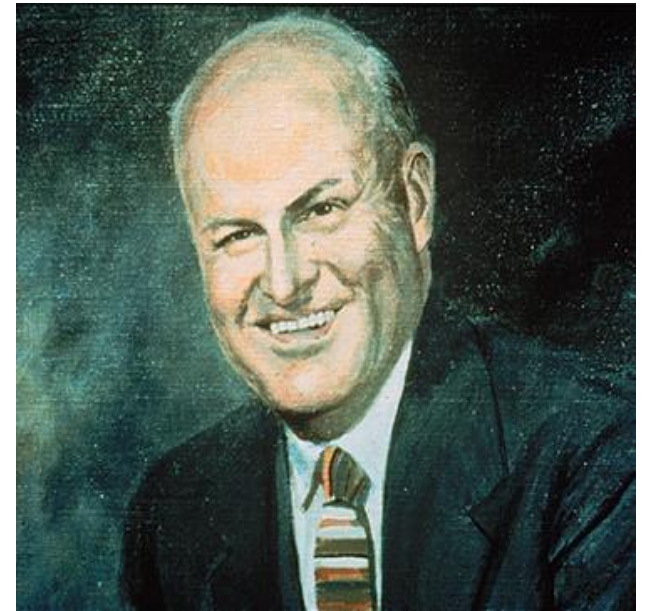
A DIFFERENT WAY OF THINKING

Outline

- **Background**
 - Value Management
 - TRIZ Guided Brainstorming
- **Synergies of Methodologies**
- **One Way to Integrate**
- **Conclusions**

What is the Value Methodology?

- The Value Methodology (VM) is known as “value engineering”, “value analysis”, and “value management”.
- The Value Methodology originated by Larry Miles in the 1940s.
- The Value Methodology uses function analysis to improve projects, products, and processes.



Definition of “Value”

$$\text{VALUE} = \text{FUNCTION} / \text{COST}$$

- The reliable performance of what a product, or process, must do to make it work, and sell at the least possible cost.



VA/VE Workshop Phases

VM Job Plan



Challenge – Identification of Value Improvement effort

1. **Information Phase** – Review all information regarding system under study
2. **Function Phase** – Define and organize the functions that must be delivered
3. **Creative Phase** – Brainstorm ideas for improvement
4. **Evaluation Phase** – Categorize ideas as to Impact (savings) and Ease (timing)
5. **Development Phase** – Analyze most promising ideas (investment and payback)
6. **Report Phase** – Report results/solutions to management

VA/VE Workshop Phases



Value Methodology – A systematic process for improving Value through the analysis of functions, developed by Larry Miles in the 1940's



Function Analysis System Technique (FAST) - Diagrammatic technique developed by Charles Bytheway in 1965.



Brainstorming - Idea generation technique set forth in the 1950s by Alex Osborn.



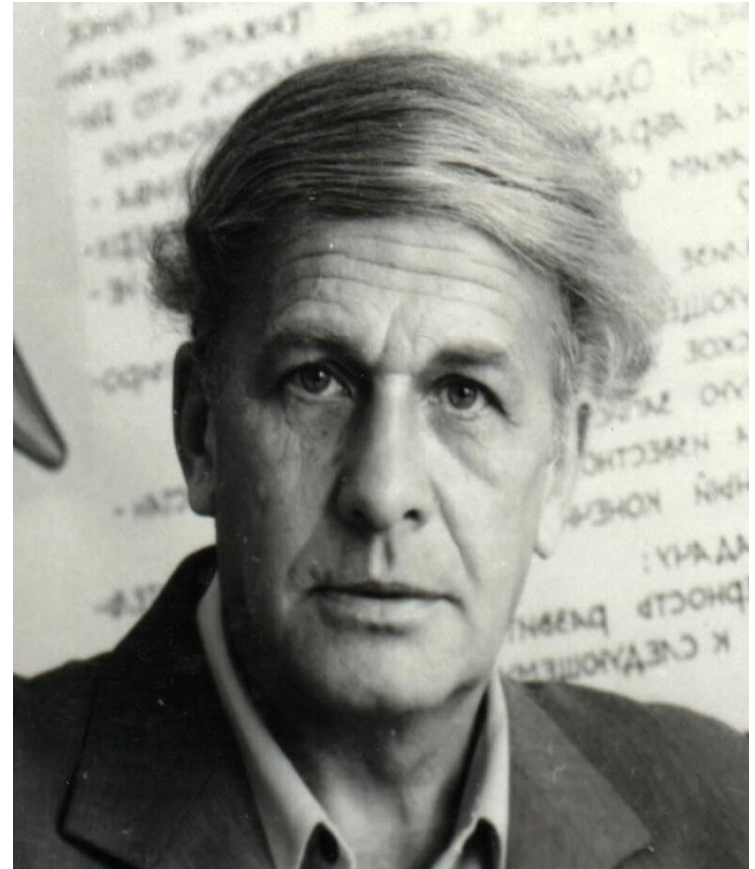
Theory of Inventive Problem Solving (TRIZ)

Teoriya Resheniya Izobreatatelskikh Zadatch

Originated in 1946 by Genrich Altshuller from the study of several hundred thousand patents (now in the millions).

Key Insights:

- People can invent better with abstracted knowledge (principles) than with guesswork
- Studies of past inventions and evolution of technologies can identify a **comprehensive** set of principles to use in problem solving

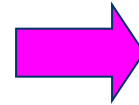
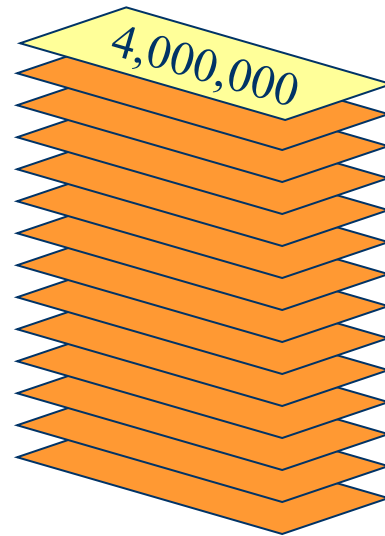


Genrich Saulovich Altshuller

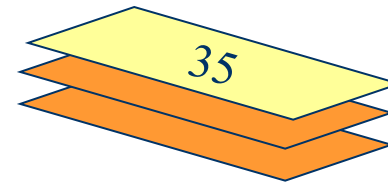
10/15/26 to 9/24/98

Inventive Principles

Patents
(worldwide)



Inventive
Principles

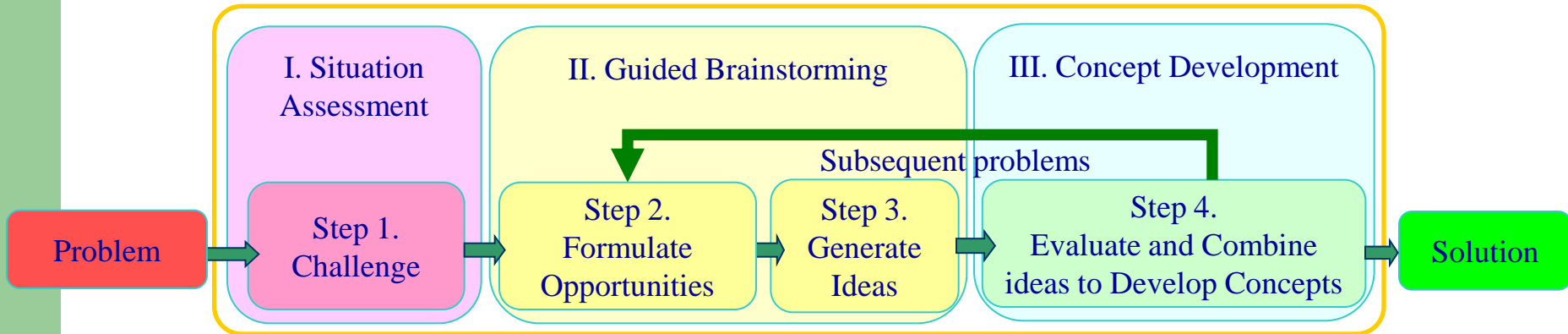


- The same **inventive principles** have been used over and over again in different areas of technology, often separated by many years.
- The screening of more than **four million patents** has yielded a system of **35 principles** (or Operators) to use as building blocks.
- Applicable to a wide range of problems – organizational, sales, business processes, intellectual property, etc.

4 Basic Concepts of TRIZ

- **Ideality**: Systems tend to evolve in the direction of increasing Ideality.
- **Resources**: Properties of the system that are available for our use
- **Inventive Principles**: A system of abstract principles derived from millions of patents.
- **Contradictions**: Conflicts that require us to make a compromise between useful results and harmful effects.

The TRIZ Guided Brainstorming Process

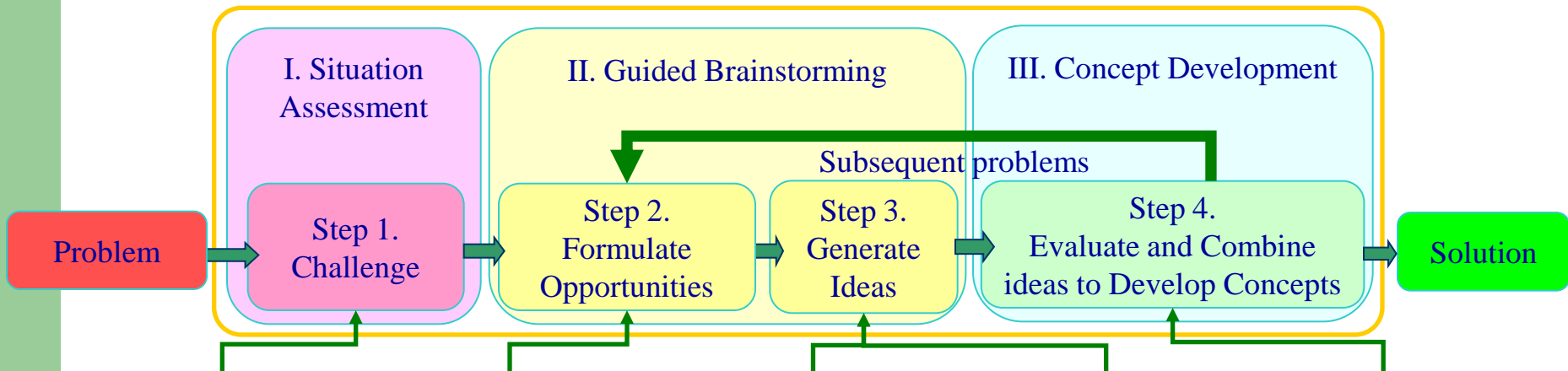


Problem – What problem are you trying to resolve?

1. **Challenge** – Define your statement of objectives -- Form an Ideal Vision; determine criteria for evaluation of your solution(s).
2. **Formulate Opportunities** – Define and select the functions to be changed.
3. **Generate Ideas** – use TRIZ Inventive Principles to focus and accelerate brainstorming.
4. **Develop Concepts** – Evaluate and combine ideas into workable Solution Concepts; identify & resolve subsequent problems.

Solution – Prepare an action plan to implement the solution concept


The TRIZ Guided Brainstorming Process



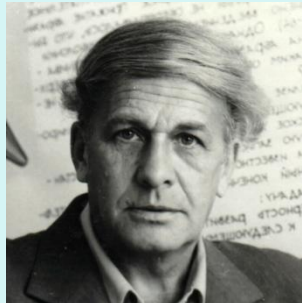
System Approach – Initiated by Ludwig von Bertalanffy in 1937



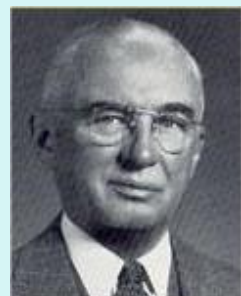
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Theory of Inventive Problem Solving (TRIZ)- Russian acronym for the method originated by Genrich Altshuller on 1946.



Brainstorming - Idea generation technique set forth in the 1950s by Alex Osborn.



Decision-matrix method – invented by Stuart Pugh in 1981



Process Comparison

Workshop Phase	Value Management	TRIZ Guided Brainstorming
Information Phase	Review Available Information	Describe Situation & Form an Ideal Vision
Function Phase	Define Functions That Must Be Delivered	Define Functions To Be Changed
Creativity Phase	Brainstorming	Use TRIZ Inventive Principles + Brainstorming
Evaluation Phase	Cost / Timing Assessment	Type/Impact/Ease Assessment
Development Phase	Analyze Investment and Payback	Combine Ideas; Address Subsequent Problems
Report Phase	Present Mini-Business Case to Management	N/A

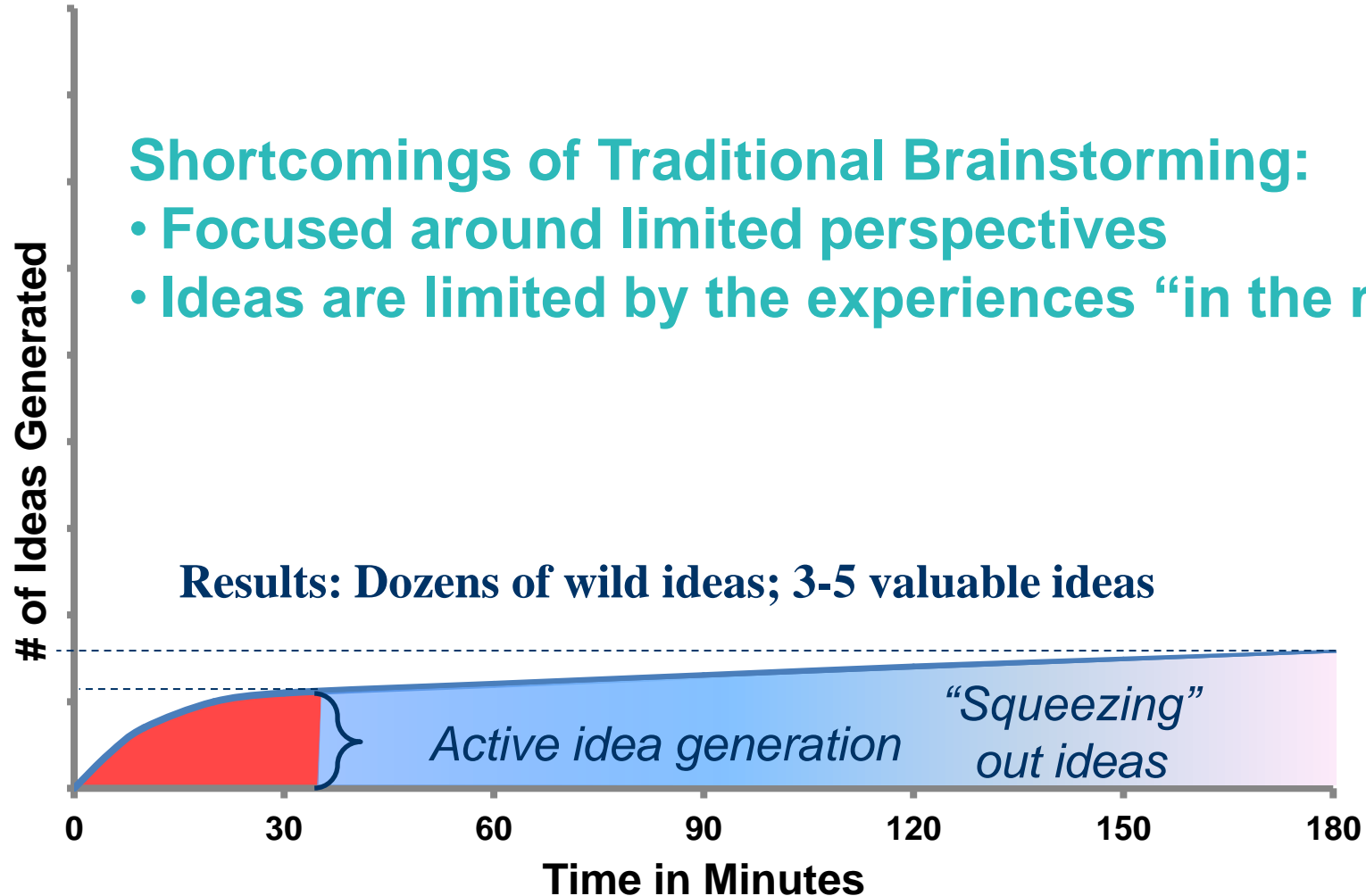
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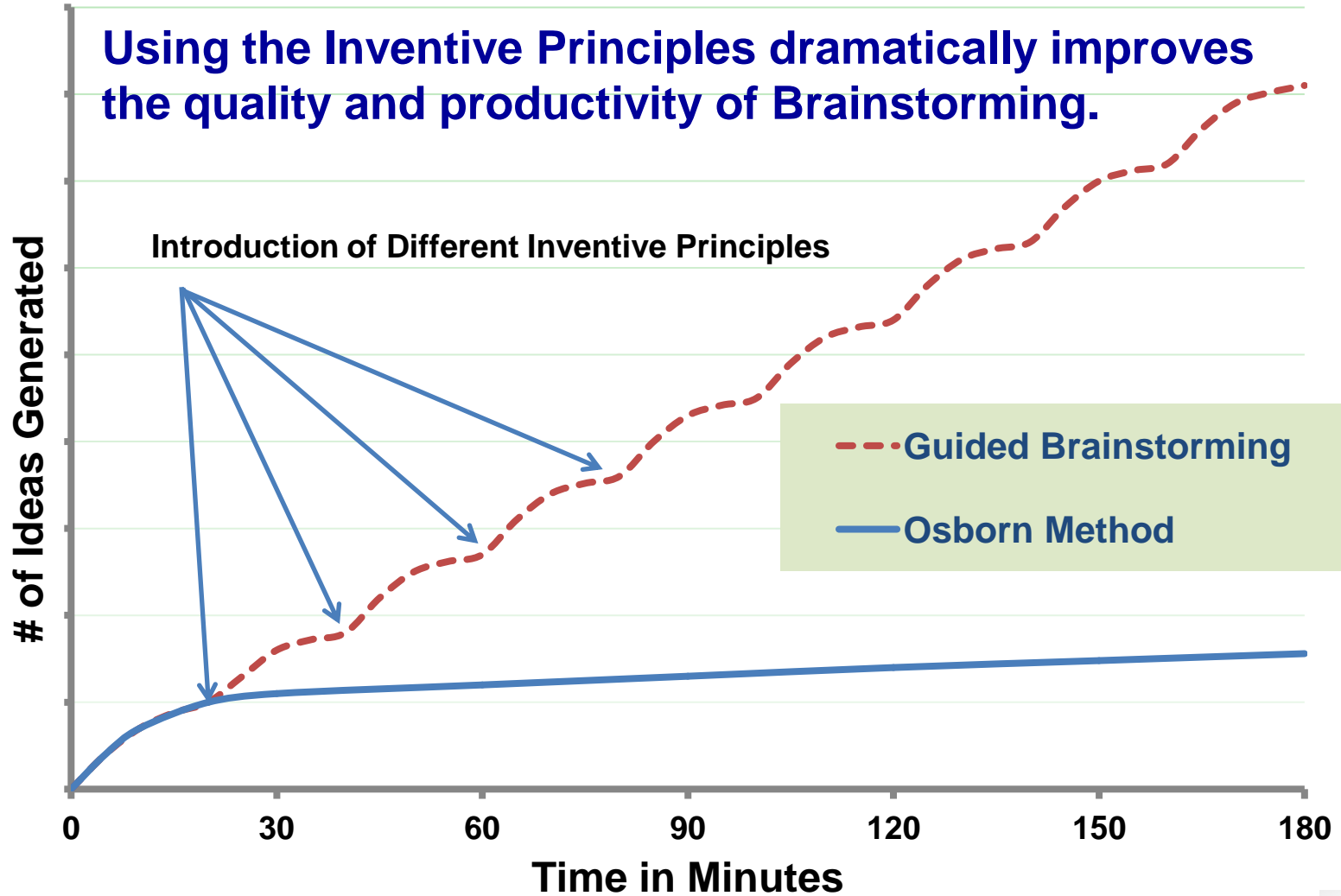
Traditional Brainstorming

Shortcomings of Traditional Brainstorming:

- Focused around limited perspectives
- Ideas are limited by the experiences “in the room”



Brainstorming Using Inventive Principles

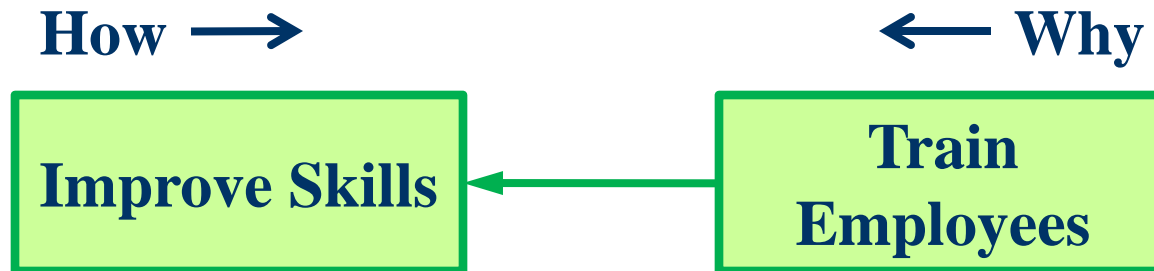


Other Benefits

- Formation of an Ideal Vision helps focus the workshop effort.
- Expands usefulness of FAST Diagram by including “Harmful” and “Contradictory” functions.
- Addressing Subsequent Problems reduces probability that solutions will be rejected.

Example – How Harmful Functions Increase FAST Diagram Usefulness

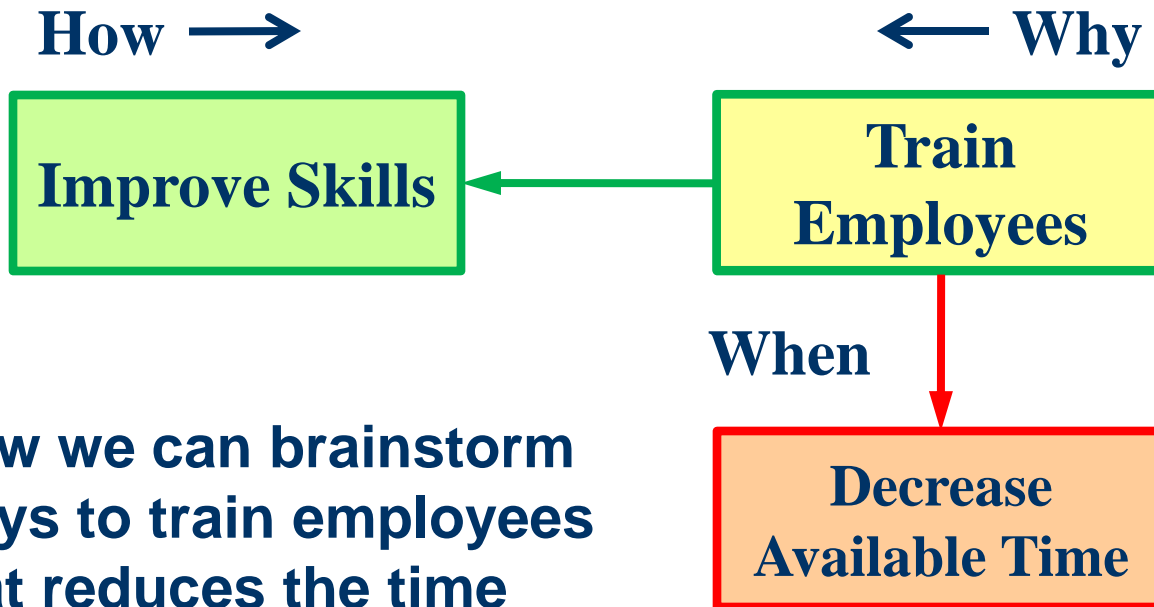
Continuing Education Training of Employees



Brainstorming is focused on ways to train employees

Example – How Harmful Functions Increase FAST Diagram Usefulness

Continuing Education Training of Employees



Now we can brainstorm ways to train employees that reduces the time away from their jobs.

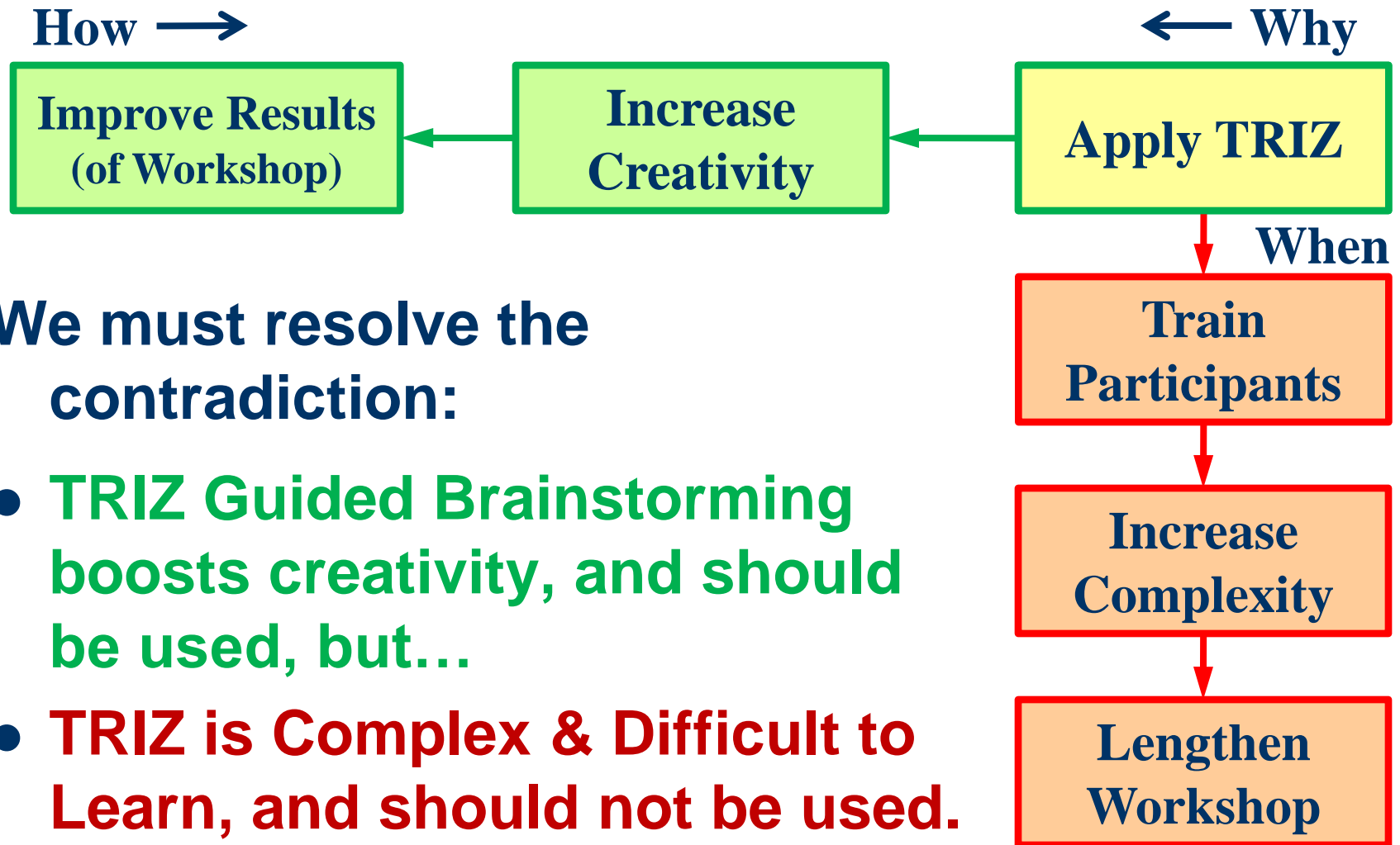
So Why Don't We Use It?

- **“Functional Fixedness”**
- **Resistance to Change**
- **Reluctance to adopt TRIZ**
 - Too complex
 - Takes too long to teach
 - Will lengthen workshop

Q. How can we resolve this?

A. Let's apply TRIZ to the problem!

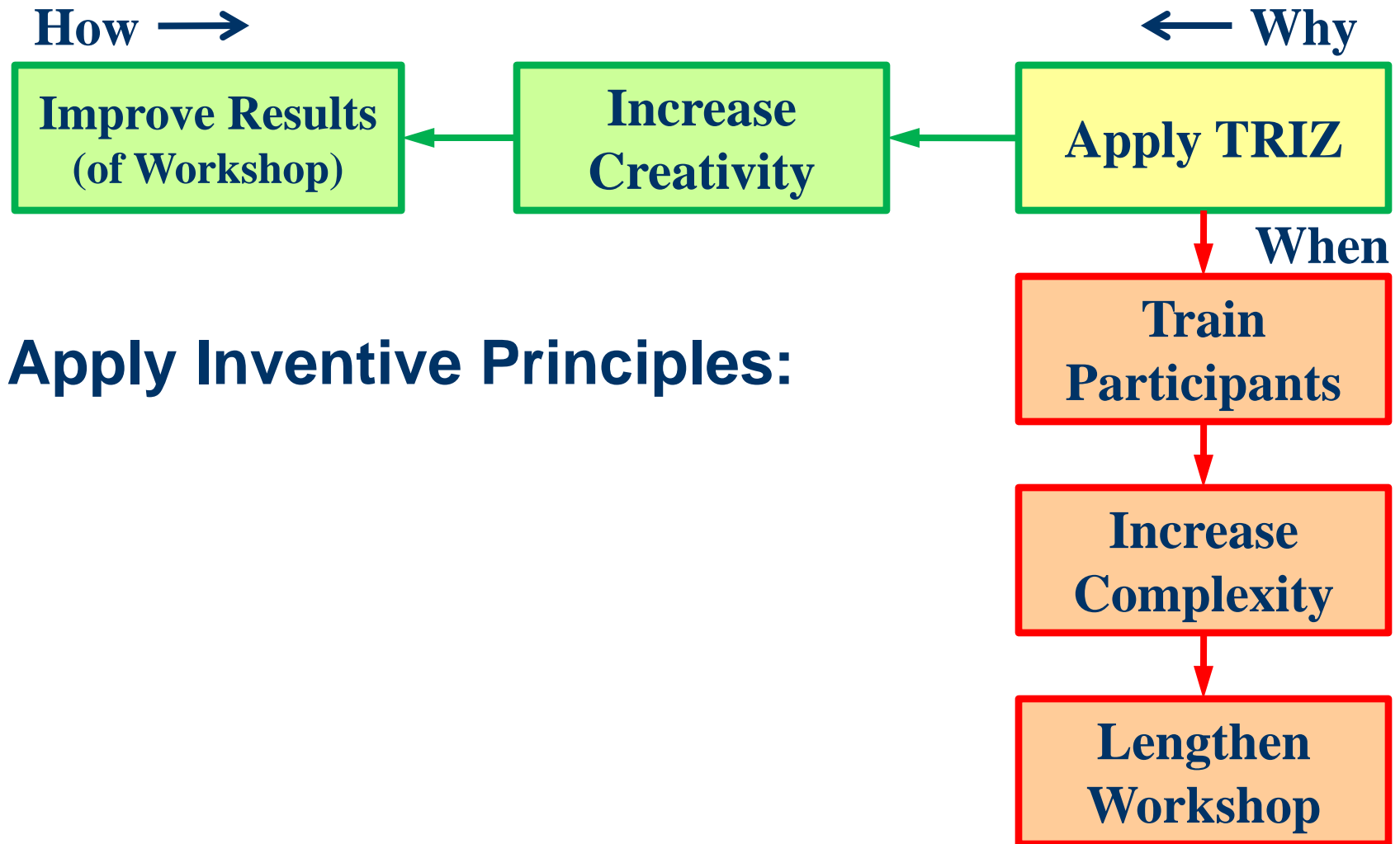
The Challenge



We must resolve the contradiction:

- **TRIZ Guided Brainstorming** boosts creativity, and should be used, but...
- **TRIZ is Complex & Difficult to Learn**, and should not be used.

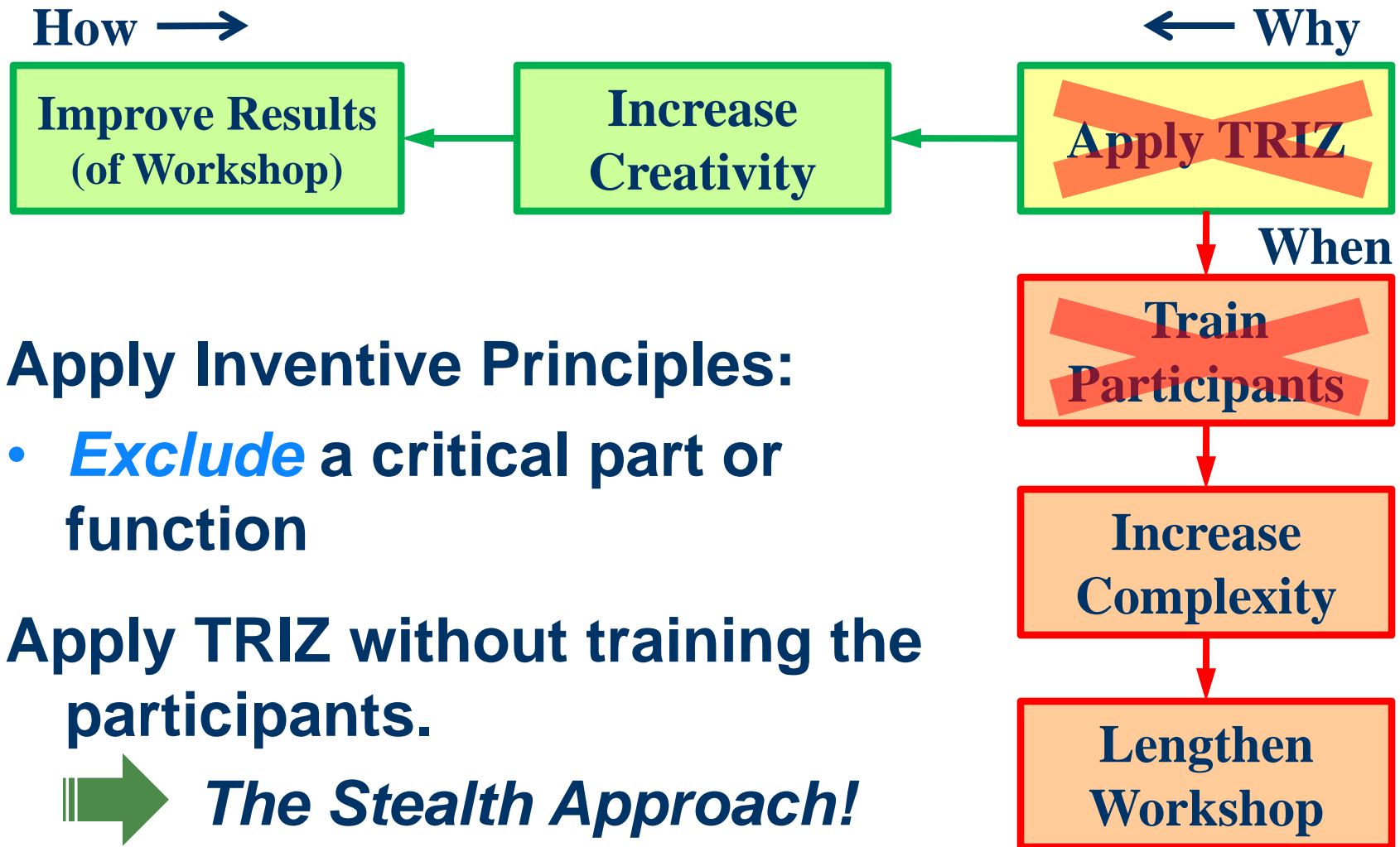
Resolving the Contradiction



System of Inventive Principles

Use Resources	Use Time	Use Space	Change Structure	Change Conditions or Parameters	
Power / Energy	Preliminary action	Another dimension	Exclude	Partial action	Vaccination
Elements	Post process time	Asymmetry	Integrate	Excessive action	Isolate
Information	Use pauses	Nesting	Partitioning	Matching	Counteract
Derived	Accelerate	Take out the part	Mediator	Dynamism	Disposable
Intensify	Stretch out	Localize	Copy	Controllability	Inversion

The Challenge



The Stealth Approach

Apply Inventive Principles without teaching TRIZ.

- **Skilled VM/TRIZ Facilitator guides session**
- **No mention of TRIZ or Inventive Principles**
- **Facilitator is the only one trained in TRIZ Guided Brainstorming methodology.**
- **Facilitator must be well versed in the use of Inventive Principles and examples of each.**

Drawbacks to Stealth Approach

Puts tremendous burdens on the facilitator:

- **In-depth knowledge of the TRIZ methodology**
- **Lead Group to identify Ideal Final Result**
- **Construct a parallel function model**
- **Tactful introduction of Inventive Principles**
- **Ability to remember all of the Inventive Principles**

Will It Work?

Yes! And it has!

- **Successfully practiced for several years at several companies.**
- **Demonstrated improvement in quality of ideas generated.**
- **Increasing number of facilitators using TRIZ Guided Brainstorming technique to boost output.**
- **Compatibility of methods is key.**

Conclusions

- TRIZ and Value Management represent *complementary* methodologies.
- The **Focus on Functions** is the nexus.
- Inventive Principles bring structure to standard brainstorming sessions.
- Participants need not have TRIZ training
- Facilitator must be skilled in both methodologies
- Emphasis is on *practical* solutions!

Integrating Value & Innovation.

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