A Method for Applying TRIZ to Enhance Brainstorming

CSVA 2011 Conference
Toronto, Ontario
Nov 14 -16, 2011

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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”

VALUE = FUNCTION / COST

- The reliable performance of what a product, or process, must do to make it work, and sell at the least possible cost.
<table>
<thead>
<tr>
<th>Phase</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Challenge</strong></td>
<td>Identification of Value Improvement effort</td>
</tr>
<tr>
<td>1. <strong>Information Phase</strong></td>
<td>Review all information regarding system under study</td>
</tr>
<tr>
<td>2. <strong>Function Phase</strong></td>
<td>Define and organize the functions that must be delivered</td>
</tr>
<tr>
<td>3. <strong>Creative Phase</strong></td>
<td>Brainstorm ideas for improvement</td>
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<tr>
<td>4. <strong>Evaluation Phase</strong></td>
<td>Categorize ideas as to Impact (savings) and Ease (timing)</td>
</tr>
<tr>
<td>5. <strong>Development Phase</strong></td>
<td>Analyze most promising ideas (investment and payback)</td>
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VA/VE Workshop Phases

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

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

**Function Phase**

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

**Evaluation Phase**

**Development Phase**

**Report Phase**
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

• 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.

Solution – Prepare an action plan to implement the solution concept
The TRIZ Guided Brainstorming Process

I. Situation Assessment
   - Step 1. Challenge

II. Guided Brainstorming
   - Step 2. Formulate Opportunities
   - Step 3. Generate Ideas
   - Subsequent problems

III. Concept Development
   - Step 4. Evaluate and Combine ideas to Develop Concepts

Problem

Solution

System Approach – Initiated by Ludwig von Bertalanffy in 1937

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

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

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<th>TRIZ Guided Brainstorming</th>
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<td>Review Available Information</td>
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<td>Define Functions That Must Be Delivered</td>
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<td>Cost / Timing Assessment</td>
<td>Type/Impact/Ease Assessment</td>
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<td>Development Phase</td>
<td>Analyze Investment and Payback</td>
<td>Combine Ideas; Address Subsequent Problems</td>
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<td>Present Mini-Business Case to Management</td>
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Traditional Brainstorming

Shortcomings of Traditional Brainstorming:
• Focused around limited perspectives
• Ideas are limited by the experiences “in the room”

Results: Dozens of wild ideas; 3-5 valuable ideas
Brainstorming Using Inventive Principles

Using the Inventive Principles dramatically improves the quality and productivity of Brainstorming.

Introduction of Different Inventive Principles

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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
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

Apply Inventive Principles:

- Improve Results (of Workshop)
- Increase Creativity
- Apply TRIZ
- Train Participants
- Increase Complexity
- Lengthen Workshop

How → Why

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System of Inventive Principles

<table>
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<tr>
<th>Use Resources</th>
<th>Use Time</th>
<th>Use Space</th>
<th>Change Structure</th>
<th>Change Conditions or Parameters</th>
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<tbody>
<tr>
<td>Power / Energy</td>
<td>Preliminary action</td>
<td>Another dimension</td>
<td>Exclude</td>
<td>Partial action</td>
</tr>
<tr>
<td>Elements</td>
<td>Post process time</td>
<td>Asymmetry</td>
<td>Integrate</td>
<td>Excessive action</td>
</tr>
<tr>
<td>Information</td>
<td>Use pauses</td>
<td>Nesting</td>
<td>Partitioning</td>
<td>Matching</td>
</tr>
<tr>
<td>Derived</td>
<td>Accelerate</td>
<td>Take out the part</td>
<td>Mediator</td>
<td>Dynamism</td>
</tr>
<tr>
<td>Intensify</td>
<td>Stretch out</td>
<td>Localize</td>
<td>Copy</td>
<td>Controllability</td>
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Apply Inventive Principles:

- *Exclude* a critical part or function

Apply TRIZ without training the participants.

*The Stealth Approach!*
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!
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