ITRIZ Introduction

Ideation Theory of Inventive Problem Solving
Existing Intellectual Property Situation

Existing process of innovation creation is ineffective, in particular:

- It takes about 3,000 raw ideas to come up with one commercial success
- From four projects that enter development stage, only one becomes commercially successful
- According to US department of commerce, 90% of all new products fail in the first four years
- For 150 patent application, 112 patents issued; 9 of them will be supported by the owners; one could be really successful.
- Less that 10% of American companies tried to come up with a new product for the last 10 years
- 80% of all innovations originate from customers rather than producers


Conclusion: Less than 10% of R&D efforts are properly utilized and produce substantial results!
Classical Idea Generation

- Individual experience
- Personal talent

Tacit knowledge = Intuition

How Can I Invent

New Ideas, Invention, Innovation

Tomas Alva Edison
TRIZ-based Idea Generation

Explicit knowledge - How to create new ideas for system evolution

Genrich Altshuller

New Ideas, Concepts, Inventions, Innovations, etc.

Tacit knowledge = Intuition

Personal talent

Individual experience

Generalized experience of inventors (patent fond)

History of evolution in technology, science, society, art, etc.
Different Methods of Creativity

Explicit general knowledge + Intuition = Tacit evolutionary knowledge

Explicit general knowledge + Explicit and computerized evolutionary knowledge

Explicit general knowledge + Explicit and computerized evolutionary knowledge + New Evolutionary Intuition – result of DE training

Intuition is unconscious and non-verbalized (not expressed in words) knowledge of Evolutionary Patterns.
What is TRIZ?

- Russian acronym for the Theory of Inventive Problem Solving
- Systematic, structured way of thinking supported by numerous tools
- Science based on patterns of evolution

What is ITRIZ?

- Advanced and westernized version of TRIZ developed by Ideation International in USA.
Over 55 Years of Development
initiated and led by G. Altshuller and involving hundreds of scientists and inventors

More than 3,000,000 world-wide patents

History of evolution in different areas of technology and science, social systems, business, management, art, languages, etc.

Feedback from solving with TRIZ thousands of problems

Practical experience of thousands of scientists, inventors, engineers, managers, businessmen, etc.
Creative Problem Solving

Creative gap – “Mental distance” between known and new ideas. Jump over “creative gap” – non-logical mental operation, result of human natural creativity.

Creative Methods and Software help an individual but not substitute him or her

Ideation Problem Solving Process includes:
• Problem analysis – shortening creative gap
  • Problem understanding
  • Resources allocation
• Ideas synthesis - jumping over “creative gap”
  • Using Operators and Patterns recommendations
  • Using analogies
  • Integration of Ideas into Concepts
Building bridge over the problem = shortening creative gap
Analytical Work - Building Bridge Over the Problem
Creative Jump – Tools Enhancement
# Ideation Problem Solving Process

The Ideation Process is a comprehensive, software-based problem-solving process incorporating the Ideation TRIZ Methodology (I-TRIZ). The Ideation Process is designed to support you in analyzing a problem situation and developing innovative solution concepts.

<table>
<thead>
<tr>
<th>Analytical Process Stage</th>
<th>Analytical Process Stage Objectives</th>
</tr>
</thead>
</table>
| Innovation Situation Questionnaire (ISQ) | • Collecting information about system and problem  
                                            • Understanding and documenting system resources                                                   |
| Building Cause-Effect Diagram and Problem Formulation | • Understanding system functioning  
                                                        • Understanding problem root causes  
                                                        • Understanding interdependence between system functioning and problem root causes  
                                                        • Formulating possible problems for solving                                                                 |
| Prioritize Directions                     | • Selection of the most promising directions for problem solving  
                                            • Refining and strengthening directions for problem solving                                          |
Ideation Problem Solving Process

The Ideation Process is a comprehensive, software-based problem-solving process incorporating the Ideation TRIZ Methodology (I-TRIZ). The Ideation Process is designed to support you in analyzing a problem situation and developing innovative solution concepts.

<table>
<thead>
<tr>
<th>Synthesis Process Stage</th>
<th>Synthesis Process Stage Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ideas Generation</strong></td>
<td>• Thinking over refined directions for problem solving</td>
</tr>
<tr>
<td></td>
<td>• Considering software recommended Operators</td>
</tr>
<tr>
<td></td>
<td>• Considering software recommended Analogies</td>
</tr>
<tr>
<td></td>
<td>• Application of recommended Operators and Analogies to refined directions for problem solving and ideas generation</td>
</tr>
<tr>
<td><strong>Integration of ideas into Concepts</strong></td>
<td>• Adding new ideas into Cause-Effect Diagram</td>
</tr>
<tr>
<td></td>
<td>• Recognizing and solving secondary problems</td>
</tr>
<tr>
<td></td>
<td>• Summarizing concepts description and IP protection</td>
</tr>
</tbody>
</table>
How the Ideation Process Works

- A large number of typical problems are available for consideration.
- TRIZ helps narrow the search to a manageable range of typical problems.
- For each typical problem, there are one or more potential solutions.

<table>
<thead>
<tr>
<th>Many Typical Problems</th>
<th>Many Typical Solutions (Knowledge Base)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prism of TRIZ - Analytical Tools</td>
<td>To Corresponding Solutions</td>
</tr>
</tbody>
</table>

1 2 3 4 5 6 7 8 9 n

Many Typical Problems

<table>
<thead>
<tr>
<th>My Problem</th>
</tr>
</thead>
</table>

My Solution
What is TRIZ?

Different points of view

• Science on creativity
• Evolutionary science like biology, cosmology, geology, paleontology, etc. but oriented on evolution of artificial systems (technical, social, in area of art, culture, etc.)
• Language for creativity
• Culture of creativity
• Evolution of way of thinking
• Structured way of thinking (modeling)
• Methods for providing competitive advantage
• Collection of useful tools (including software)
• Set of applications, in particular:
  • Inventive Problem Solving
  • Research Problem Solving
  • Innovative Cost/Quality Engineering
  • Failure Analysis
  • Failure Prediction
Directed Evolution versus Traditional Way of New Product Generations

**Traditional Way**
- Psychological Inertia
- Traditionally, evolution goes through Trial & Error method. The majority of trials fail because they are influenced by psychological inertia.

**Directed Evolution Way**
- Psychological Inertia
- In Directed Evolution, the majority of trials are productive because they follow Patterns of evolution.

In Directed Evolution, the majority of trials are productive because they follow Patterns of evolution.
I-TRIZ APPLICATIONS

Directed Evolution
A systematic procedure for strategically evolving future generations of technological systems

Failure Analysis
A systematic procedure for identifying the root causes of a failure or other undesired phenomenon in a system, and for making corrections in a timely manner.

Failure Prediction
A systematic procedure for identifying beforehand, and then preventing, all dangerous or harmful events that might be associated with a system.

Control of Intellectual Property
A systematic procedure for increasing IP value and providing protection from infringement and circumvention.

Inventive Problem Solving
A systematic procedure for resolving tough technological problems, enhancing system parameters, improving quality, reducing cost, etc. for current generations of products and technologies.
What is an Inventive Problem?

• **Involves one or more contradictions**

• **Suggests no known ways or means of solution**
Level 1
Small changes of an existing system, usually well-known in other areas of technology, like using in car adjustable pedal, well-known in aviation

Level 2
Improvements of an existing system, usually with some compromise, like bifocal glasses, telephone with internet connection, etc.

Level 3
Invention inside the paradigm, essential improvement of an existing system like coffee-machine, car automatic transmission, radio telephone, etc.

Level 4
Invention outside the paradigm, system, based on the new principle of performing the primary function, like jet aircraft, integrated circuit, etc.

Level 5
Pioneering of an essentially new system based on discovery, like laser, radio, airplane, etc.
Levels of Invention

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>68.3% inventions</td>
<td>27.1% inventions</td>
<td>4.3% inventions</td>
<td>0.24% inventions</td>
<td>0.06% inventions</td>
</tr>
</tbody>
</table>

Normal Distribution of Invention Levels

\[ F(x, \mu, \sigma) = \frac{1}{\sigma \sqrt{2\pi}} \int_{-\infty}^{+\infty} e^{-\frac{(x-\mu)^2}{2\sigma^2}} dx \]
Software Module for
Invention Creativity Level Definition

To identify the level of invention, consider the following criteria:

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>LEVEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem type</td>
<td>1</td>
</tr>
<tr>
<td>Direction type</td>
<td>1</td>
</tr>
<tr>
<td>Utilized information</td>
<td>1</td>
</tr>
<tr>
<td>Solution types</td>
<td>1</td>
</tr>
<tr>
<td>Changes in the system</td>
<td>1</td>
</tr>
<tr>
<td>Changes in system functions</td>
<td>1</td>
</tr>
<tr>
<td>Transforming an idea into design</td>
<td>1</td>
</tr>
<tr>
<td>Application / market</td>
<td>1</td>
</tr>
<tr>
<td>The Level of Idea</td>
<td>1</td>
</tr>
</tbody>
</table>

Level of invention is determined via evaluation of the amount of creative efforts applied for the invention creation, its degree of novelty and the impact it can exert on the overall level of technology and/or society.

Problem type:

<table>
<thead>
<tr>
<th>Levels</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ready formulated problem is addressed. Example</td>
</tr>
<tr>
<td>2</td>
<td>One from several problems is selected. Example</td>
</tr>
<tr>
<td>3</td>
<td>Initial problem is critically changed. Example</td>
</tr>
<tr>
<td>4</td>
<td>New problem is identified. Example</td>
</tr>
<tr>
<td>5</td>
<td>New very important problem is discovered. Example</td>
</tr>
</tbody>
</table>

This software module supports realistic identification of inventions’ level and provides recommendations on situation improvement in the following directions:

- Increasing Return on Investment
- Risk Minimization
- Implementation Acceleration
Connection between Levels of Invention and different characteristics of commercialization

Attention! That diagram show only typical tendency, in reality can be big difference depends of area of industry or science, volume of production, legal regulation, market share, etc. For example, in area of electronic, computerization, Internet, etc. time for ROI can be a shorter.
Invention Creativity Levels and Probability of Success

Probability of success

Patent protect you IP only 20 years! Non enough time to have real success!
Invention Creativity Levels and Return on Investment

Patent protect you IP only 20 years! Non enough time to have real profit!
Typical Invention Levels Hierarchy

Main reason for slowly ROI for high level invention – non solved problems in intermediate levels (3 or even 2), causes from non-systematic methods of invention.

Systematic Innovation can improve this!
## Applications for I-TRIZ and DE Tools

<table>
<thead>
<tr>
<th>Typical level of invention</th>
<th>Applications</th>
<th>Target audience</th>
<th>Ideation Software Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1 – 2) - over 95% of all inventions</td>
<td>Inventive Problem Solving, Cost/Quality Engineering, Failure analysis</td>
<td>All engineers, 3 days of education per each application</td>
<td>IWB, TRIZY, Failure Analysis™</td>
</tr>
<tr>
<td>(2 – 3) - about 30% of all inventions</td>
<td>Inventive Problem Solving, Failure analysis, Failure Prediction, Research Problem Solving</td>
<td>Research and Development engineers and scientists</td>
<td>Innovation WorkBench®, Failure Analysis™, Failure Prediction™, Research WorkBench</td>
</tr>
<tr>
<td>Non technical problems (any level)</td>
<td>Inventive Problem Solving, Failure analysis, Failure Prediction</td>
<td>Managers, business and marketing people</td>
<td>Knowledge Wizard™, Failure Analysis™, Failure Prediction™, Directed Evolution™</td>
</tr>
<tr>
<td>(3 – 4) - about 4% of all inventions</td>
<td>Directed Evolution</td>
<td>The best engineers and people working with Strategic Planning</td>
<td>Directed Evolution™, Research WorkBench</td>
</tr>
<tr>
<td>Control of Intellectual property</td>
<td>Patent attorneys and agents</td>
<td>Patent Deconstruction</td>
<td></td>
</tr>
<tr>
<td>(4 – 5) – less than 0,5% of all inventions</td>
<td>Long-term future vision</td>
<td>People working with Strategic Planning, Top level scientists</td>
<td>Directed Evolution™, Research WorkBench</td>
</tr>
</tbody>
</table>
Knowledge for Different Levels

All That Is Knowable

1 2 3 4 5

PERSONAL

COMPANY

INDUSTRY

SOCIETY
Tapping Our Knowledge

Ideal Vision
Social, Market and Technology Evolution

Science and technology, discoveries and inventions - fuel for evolution

Society requirements – motor for evolution

Business - driver for evolution

Market - cassis for evolution
Where is “Huge Ideas”? 

“Huge Ideas” here!

ROI

Social invention

Business invention

Market invention

Technological invention

“Huge Ideas” not here!
Resources = Source for both:

Good Evolution

and

Bad Evolution
Moving toward Ideality with A “FFI SSSS TTTT” Full of Resources

Functional
Field (energy)
Information
Ideas
Substance
Space
Time
Trends

Accumulation
Concentration
Leveraging the Combination of Ideas, Concepts, Systems

Readily Available
• Visible
• Hidden

Harmful to use
• Harmful Energy
• Harmful Objects
• Space Resources of Harmful Functions
• Informational Resources of Harmful Functions
• Time Resources of Harmful Functions
• Others resources of Harmful Functions

Natural Use via Physical, Chemical and Geometric Effects
Nonlinear effects

Resources of Change

Combination of different resources

Ideality
Problems in Evolution from A “FFI ISSTT” Full of Resources

- Functional Field (energy)
- Information
- Ideas
- Substance
- Space
- Time
- Trends

Accumulation

Concentration

Harmful combination of Ideas, Concepts, Systems

Physical, Chemical, Geometric, Biological, etc. effects

Resources of Change

Nonlinear effects

Readily Available
- Visible
- Hidden

Mistakes, sabotage etc.

Useful to harm
- Useful Energy
- Useful Objects
- Space Resources of Useful Functions
- Informational Resources of Useful Functions
- Time Resources of Useful Functions
- Others resources of Useful Functions

Combination of different resources

Scaling
Contradiction

Wing area must be < 15m² for good cruising speed

Wing area must be > 25m² for good take-off

\[
\begin{align*}
    a > X > b \\
    a < b
\end{align*}
\]

Impossible!
Contradiction Resolution

\[
\begin{align*}
& a > X > b \\
& a < b
\end{align*}
\]

\[
\begin{align*}
& X \rightarrow X(f) \\
& X(f_1) > b \\
& X(f_2) < a
\end{align*}
\]

Wing area < 15m² in time of cruising speed

Variable-geometry wing

Wing area > 25m² in time of take-off
Patterns of Invention:
Processing Sweet Peppers
If it is necessary to destroy or split a product which has open cavities, pores or cracks, consider the possibility to place the product into a hermetic chamber; use slow increase of the pressure inside the chamber followed by abrupt pressure drop.

**Pattern of Invention**

- **Pressure increase/drop**
  - Removing stems from bell peppers
  - Removing shells from sunflower seeds
  - Cleaning filters
  - Unpacking parts wrapped in protective paper
  - Splitting diamonds along micro-cracks
  - Producing sugar powder from sugar crystals, etc.
  - **hundreds of inventions**
Patterns of Invention

- The same fundamental problem (contradiction) had been addressed by a number of inventions in different areas of technology.
- The same fundamental solutions were used over and over again, often separated by many years.
- If the latter inventor had had knowledge of the earlier solution, their task would have been straightforward.
- TRIZ development is extraction, compiling, and organization such information.
- There is about 1000 different Patterns of Invention named Operators in different Ideation software tools for Innovative Problem Solving.
Patterns of Invention

• Pressure increase/drop
  – Removing stems from bell peppers
  – Removing shells from sunflower seeds
  – Cleaning filters
  – Unpacking parts wrapped in protective paper
  – Splitting diamonds along micro-cracks
  – Producing sugar powder from sugar crystals

• Lottery principle
  – Automotive plant
  – Income control
  – Littering problem
Patterns of Invention

• Altshuller recognized that the same fundamental problem (contradiction) had been addressed by a number of inventions in different areas of technology
• He also observed that the same fundamental solutions were used over and over again, often separated by many years
• He reasoned that if the latter inventor had had knowledge of the earlier solution, their task would have been straightforward
• He sought to extract, compile, and organize such information
Patterns of Evolution -- The Primary TRIZ Postulate

• Engineering (technological) systems evolve not randomly, but according to objective patterns

• These patterns can be revealed from the patent fund and purposefully used for systems development without numerous blind trials
Main Patterns of Evolution

• Increasing of system Ideality
  • Evolution of useful functions
  • Elimination of harmful functions
  • Evolution of applications

• Integration/ structuring

• Increasing of dynamism and controllability

• Evolution with matching/mismatching

• Evolution of resources application

• Evolution of contradictions

• Increasing complexity followed by simplification

• Evolution of fields

• Evolution towards multy-levels

• Changes in human involvement
Classical TRIZ and Ideation TRIZ Comparison

Tools for Supporting the Innovation Process

<table>
<thead>
<tr>
<th>Innovation Stages</th>
<th>Classical TRIZ</th>
<th>Ideation TRIZ (I-TRIZ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revealing the problem</td>
<td></td>
<td>ISQ, AFD, Lines of Evolution</td>
</tr>
<tr>
<td>Formulating the problem</td>
<td></td>
<td>Problem Formulation (software-based and manual)</td>
</tr>
<tr>
<td>Developing the solution</td>
<td>Principles, ARIZ, SF-Analysis, Standard Solutions</td>
<td>Ideation’s knowledge-base tools – System of Operators, Lines of Evolution, etc.</td>
</tr>
<tr>
<td>Evaluating the solution</td>
<td></td>
<td>Criteria and Lines of Evolution</td>
</tr>
<tr>
<td>Implementing the solution (solving secondary problems)</td>
<td></td>
<td>IPS for secondary problems, include non-technological</td>
</tr>
</tbody>
</table>

Stages necessary for successful professional problem solving

Good tools for an amateur

Tools for a professional
Directed Evolution for Resolution of Cost/Quality Contradiction

Quality enhancement causes cost growing

Cost reduction causes quality deterioration
Directed Evolution for Resolution of Cost/Quality Contradiction

TRIZ based Cost/Quality Engineering

System simplification and parts exclusion – a way of Cost/Quality Engineering

Resolution of contradiction between Cost and Quality
Classical TRIZ Education

Classical TRIZ seminars

120 – 200 hour course
+ 30 – 60 hour home work,
+ the best teacher – G. Altshuller

Objectives:
• Creation of Problem Solving skills
• Creation of Creative Imagination
• Creation of TRIZ development skills

Results ~ 10% successful users
Knowledge Degradation

“One shot” education

Education with coaching
Professional mode of TRIZ work:
- 50 – 100 hours of education
- 2 – 3 day TRIZ work per each week
- Continuous participating in real problem solving
- Continuous reading of TRIZ information
- Discussing TRIZ issues with others TRIZ professionals, etc.
- Close connection with “TRIZ Mentor”

Practically impossible for an average industrial or design engineer
Knowledge Degradation

Education supported by education materials

Permanent knowledge, accumulated in books and education materials

Acquired Knowledge

Education supported by software

Permanent knowledge, accumulated in software

The only practical way for an average engineer
Manual Versus Computerized Work?

Some TRIZ teachers exclaim: “To hell with computers!”

In general, there are two sources of this idea:
• Russia, where most people have neither computers or Internet access
• Elderly people, who are not very adept at using computers

As professionals, we use the “manual” mode to conduct a preliminary estimation of a targeted project

But for the REAL work we use a computer, because:
• It is faster and more productive
• It prevents mental exhaustion and reduces stress
• It ensures high process reliability. This is especially important for AFD prediction, to exclude any probability of accidents or failures.

“To hell with computers!” means

Back to infantile cradle!

Back to the 20th century!
"Natural" creative thinking

"Manual" TRIZ

TRIZSoft
Classical TRIZ

Rejection of Others Methods
Ideation TRIZ
Collaboration with Others Methods

- Concurrent Engineering
- TQM
- FMA, HAZOP
- QFD
- Brainstorming
- Technological Forecasting
- Morphological Method
- Robust Design
- Value Engineering
- Lateral Thinking
- Theory of Constraints
- DFMA

And more…
Traditional Innovation Process

**STRONG**

- Identify Problem
- Formulate Problem
- Develop Concepts

**Weak**

- Evaluate
- Implement

**Widely Used Techniques**

- Reliability Study
- Cad/Cam
- Trial & Error
- Brainstorming
- Reliability Analysis
- Market Research
- Robust Design
The Added Value of TRIZ
ITRIZ Differentiation: Integration

“Osborn’s Direction”
Decreasing of psychological inertia, activation of human motivation, organization of effective teamwork

“Altshuller’s Direction”
Utilization of evolution patterns and methods of idea generation based on evolution patterns

“Miles’ Direction”
Re-structuring of existing knowledge for effective application of the creative process

Ideation TRIZ
Combination of all effective approaches to creative problem solving and control of technological evolution
From Classical TRIZ to Ideation TRIZ

Evolution of the TRIZ Methodology

Directed Evolution and IP Control Era

Re-Structuring of Theoretical Base

Advanced TRIZ Tools

Non-Technological Applications

ARIZ-85

AFD

40 Principles

Patterns of Evolution

Classical TRIZ Era

Kishinev Era

Directed Evolution (as a tool)

Advanced Software Tools

Ideation/TRIZ Era

Methodology Advancement

From Classical TRIZ to Ideation TRIZ
Evolution of the TRIZ Methodology

- Step-by-step analysis of the problem situation
- Typical solutions for typical problems
- Algorithm for Inventive Problem Solving
- Application of physical and other effects
- Overcoming psychological inertia
- S-F Modeling and Standard Solutions
- Patterns of Evolution of Technical Systems
- Classical TRIZ

- Computerized tools
- Subversion Analysis (AFD)
- Numerous Patterns and Lines of Evolution
- Directed Evolution and IP Control

- “Third wave” theory
- Theory of nonlinear system evolution and self-organization
- TRIZ-based theory of social evolution
- Theory of technical system hybridization
- Existing evolution trends

<table>
<thead>
<tr>
<th>Problem solving</th>
<th>Innovation</th>
<th>Control of destiny</th>
</tr>
</thead>
<tbody>
<tr>
<td>For exceptionally committed people</td>
<td>For an average individual</td>
<td></td>
</tr>
<tr>
<td>Developed by Altshuller</td>
<td>Developed by Kishinev School / Ideation</td>
<td></td>
</tr>
</tbody>
</table>
What is new in ITRIZ

New services:
Patent Deconstruction
Control of Intellectual Property
Failure Analysis
Failure Prediction
Directed Evolution
Scientific Problem Solving
Cost/Quality Engineering

New methods of work:
Ideation Brainstorming
Concepts Integration
What is new in ITRIZ

Software under development:
• Innovation WorkBench IWB 3.0 – new friendlier software shell, new formulator, operators, and examples
• e-Learning (Basic TRIZ, IWB master, AFD master
• TRIZy - simple and friendly software for beginners
• Research WorkBench RWB 1.0 – software for solving different scientific problems (discovering new effects, creation of new and improvement of existing theories, development of experiments and measurement systems, etc).
• Directed Evolution DE 1.0 – software for supporting DE service
• Control of Intellectual Property CIP 1.0 – for Patent Deconstruction service
• Building specialized knowledge bases (chemical, health care, business/management, etc.)
• New idea integrator module
• Integration with other businesses, quality and knowledge management systems like Six Sigma, Stage Gate, etc.
• Applying TRIZ to organizational development
**Ideation TRIZ Summary**

**Four Key Findings**
- Definition of the Inventive Problem
- Levels of Inventions
- Patterns of Inventions
- Patterns of Evolution

**Four Main Premises**
- Ideality
- Contradictions
- Systems Approach
- Resources

**Four Analytical Tools**
- Innovation Situation Questionnaire (ISQ)
- Problem Formulator
- Algorithm for Inventive Problem-Solving (ARIZ)
- Substance-Field Analysis (Su-Field)

**Seven Knowledge-Based Tools**
- Pattern/Lines of Evolution
- 40 Innovation Principles & Contradiction Table
- Separation Principles
- 76 Standard Solutions
- Effects (physical, chemical, etc.)
- System of Operators
- Selected Innovation Examples

**Five Main Applications**
- Inventive Problem Solving (IPS)
- Scientific Problem Solving
- Anticipatory Failure Determination (AFD), include Failure Analysis and Failure Prediction
- Directed Evolution (DE)
- Patent Deconstruction
Typical Scientific Works

• Each Ideation specialist has his/her continuous scientific work.
• “Scientific day” every week
• Scientific discussions on each Ideation project
• Testing all new TRIZ ideas and tools in real projects
• Continuous information search in areas of:
  • TRIZ
  • Other creativity methods
  • Technical, scientific and social system evolution
  • New inventions and discoveries
• New software testing
  • Ideation software
• Other software in various areas
The Commissioner of Patents and Trademarks

Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore this

United States Patent

Grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America for the term set forth below, subject to the payment of maintenance fees as provided by law.

If this application was filed prior to June 8, 1995, the term of this patent is the longer of seventeen years from the date of grant of this patent or twenty years from the earliest effective U.S. filing date of the application, subject to any statutory extension.

If this application was filed on or after June 8, 1995, the term of this patent is twenty years from the earliest effective U.S. filing date of the application, subject to any statutory extension.

Patent:

US Patent 5,581,663

Zlata et al.

US Patent


ABSTRACT

A computer implemented method to identify potential product development opportunities and trends by identifying opportunities for products to be used as inputs in such problems. The invention has an input device for receiving a description of the existing world system and a processor for processing of the description of the existing world system. The processor provides the outputs to the display device for displaying the outputs to the user. The processor includes a method for selecting a specific object to be used as an input to the method of identifying potential product development opportunities and trends by identifying opportunities for products to be used as inputs in such problems. The processor includes a method for selecting a specific object to be used as an input to the method of identifying potential product development opportunities and trends by identifying opportunities for products to be used as inputs in such problems.

30 Claims, 5 Drawing Sheets

© 2002 Ideation International Inc.
Ideation International Inc. Patent

Base for Software, Supporting Creativity

Innovation WorkBench® (IWB®)
IWB Masters Program
TRIZy (TRIZ easy)
Improver™
Innovation Situation Questionnaire®
Basic TRIZ e-Learning

Directed Evolution™
Knowledge Wizard
Ideation Failure Prediction (IFP)
Ideation Failure Analysis (IFA)
Research WorkBench (RWB)
Set of Ideation Software

TRIZSoft®

An integrated system of software and educational materials in an electronic format created by Ideation International Inc based on the newest developments in TRIZ.
New Ideation Software
(in Process of Development)

Directed Evolution

The Directed Evolution software is designed to support you in the
development of concepts for new
generations of the given system
(product, process or service)
TRIZ and Math Analogy

Both TRIZ and Math have the following features:

• Based on statistical approach to practical results
• Intended for solving problems in various areas
• Can be used for self-development
• Serve as a special language

TRIZ follows Math in:

• Building axiomatic foundation
• Developing formal apparatus

Add slide about math applications
TRIZ is not a Magic Wand

Innovation Success = \( P_c \times P_{kn} \times P_m \times M_s \times (1+C_{ITRIZ}) \)

- \( P_c \) = Personal Capabilities;
- \( P_{kn} \) = Personal Knowledge;
- \( P_m \) = Personal Motivation;
- \( M_s \) = Management support;
- \( C_{ITRIZ} \) = coefficient depends on ITRIZ training, ITRIZ tools and personal experience in ITRIZ utilization. \( C_{ITRIZ} \) can be between 0 and hundreds.