TRIZ Methods and Applications

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Systematic Technology and Business Innovation

TRIZ Activities

- Engineering Program Manager - Intel
  - TRIZ Projects
    - Technical and Business
  - TRIZ Program Development
    - Organization Integration
    - Program Integration (ex. TRIZ and Lean)
  - TRIZ Training
  - Competitive Analysis
- Executive Committee Member - Altshuller Institute for TRIZ Studies
- Consultant - Innomation, LLC

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Overview

- TRIZ encompasses a large selection of tools, concepts and methodologies
- The array of innovation options can be confusing in so far as what concepts to use in what situation
- This presentation summaries TRIZ tools available to the practitioner and makes suggestions as to how best, and when, to use them.

Tools, Concepts and Methodologies

- Classical TRIZ – refine and sharpen a single problem – public domain

  Trends of Engineering System Evolution, Inventive Principals, Standard Inventive Solutions with Substance-Field Analysis, ARIZ

- TRIZ plus – exposes the fundamental key problems of a system – Gen3

  TRIZ++ Benchmarking, Cause and Effect Chain Analysis, Flow Analysis, Function Analysis, Trimming, Feature Transfer

- Other Tools

  Nine Screens (Classical TRIZ)

Inventive Methods

- The following combine to create 5 inventive methods:
  - 4 problem model types
  - 4 solution tools
  - 3 solution model types

Inventive Methods

Model of Problem	Tool	Model of Solution	Source
Engineering Contradiction	Altshuller's Matrix	Inventive Principles	Classical TRIZ
Su-Field	76 Standard Solutions	Specific Standard Inventive Solution	Classical TRIZ
Physical Contradiction	Separation, Satisfaction, Bypass Algorithms	Inventive Principles	Classical TRIZ
Physical Contradiction	Library of Effects	Specific Effect	Classical TRIZ
Functional Model	Library of Effects	Specific Effect	TRIZ Plus

Problem Models

Define the Problem Using:	When you want to:
Functional Analysis	Change or maintain one parameter
Physical Contradictions	Have one parameter exist in 2 states
Engineering Contradictions	Solve conflicts between 2 or more parameters
Su-Fields	Address material/field interactions

Solution Models

	Level of Problem Abstraction		
Solution Specificity	**Low** (i.e., want to inc. temperature)	**Medium**	**High** (i.e., area vs. weight)
very specific	Specific Effect		
no specific effect but specific recommendation		Specific Standard Inventive Solution	
non-specific			Inventive Principles

When to Use Which Solution Model?

1.) **How to?** - How to type problems – use Specific Effects

Starting place but any problem can be modeled in all three ways

2.) **Interactions** – Interaction with Su-field – use Standard Inventive Solutions

3.) **Contradictions** – No clue how to solve – use Inventive Principals

ARIZ – when all else fails

- The series execution of the 4 problem model types (slide 5) are a process referred to as ARIZ

Algorithm for Inventive Problem Solving (ARIZ) Summary	
Pre-Work	Functional model of engineering system & component analysis
Part 1	Convert the engineering system into a well defined model of the problem (2 inverse engineering contradictions subsequently represented as 2 su-field models)
Part 2	Inventory of resources (space, time and substance-field resources)
Part 3	Identification of the ideal final result and the associated limiting physical contradiction(s)
Part 4	Resolve the physical contradiction (Small Smart People – helps decrease psychological inertia)
Part 5	Apply the knowledge base, effects, standards and principles
Part 6	If no solution found, redefine the mini-problem (change problem statement if the problem has not been resolved)

Tech Tools also Applicable to "Softer" Issues

- Cause and Effect Chain – can be used to id business, political, social and technical key problems
- Nine Screens - applicable to a wide variety of issues where future/past and super/sub system relations comprehension is helpful
- Inventive Principles - Can be used outside of engineering (i.e., social, economic)
  - Most general and can therefore be applied to anything (however, provides fuzzy model of solution)
  - Darrell Mann - business version of 40 principals
- Trends of Engineering System Evolution – focused brainstorming for product or process ideation

Systematic Innovation Competitive Intelligence Tools

- Used by companies world wide to improve their competitive position
  - Airbus, GE, Samsung, Siemens, etc.
- Wide variety of Analytical Tools to:
  - Model Problems
  - Model Solutions
- Gives specific solution paths towards improving your competitive position

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