



The Invention Machine

Computational adaptation of TRIZ, Value Engineering and the Semantic Web

Thanks to Invention Machine and
Dr. Mikhail Verbitsky for materials and
consultation and

SDM04 students who participated

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Our goal is to convert conventional qualitative methods of conceptual design into a formal approach:

predictable,

well defined,

reproducible,

quantitative

process 

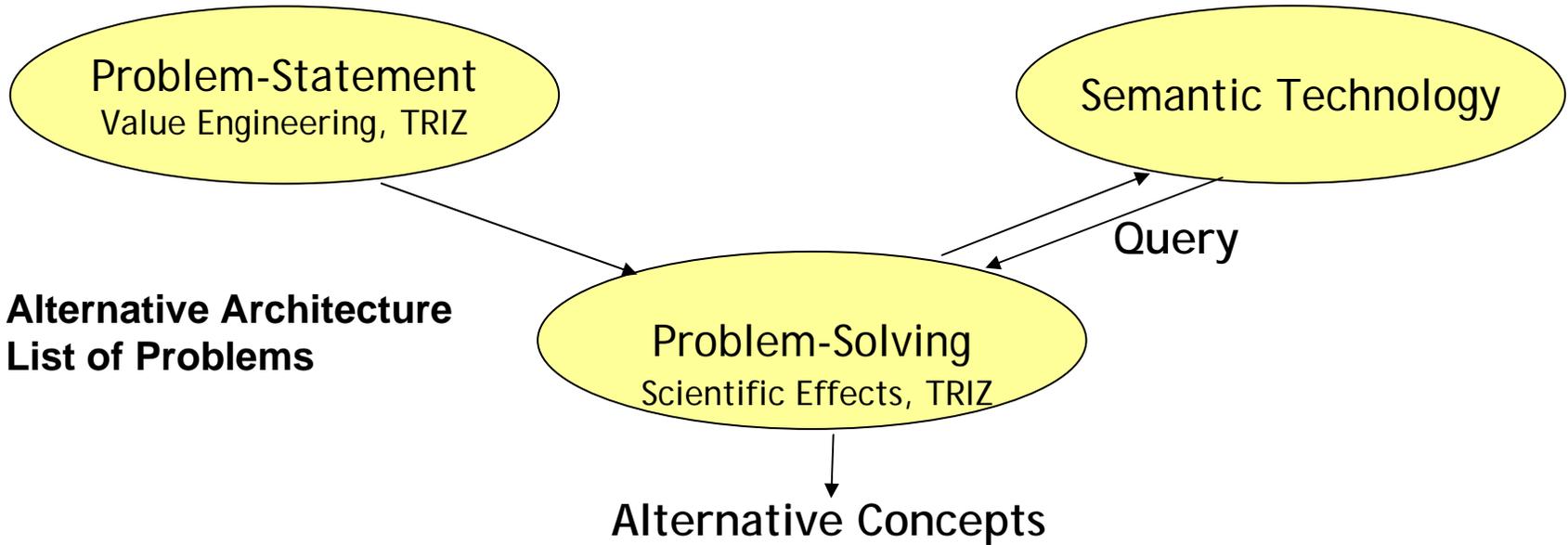


Agenda

- **Overview of Innovation Tools: Problem Statement and Problem Solving tools, their logic and interaction**
- **Problem Statement Tools: Design Diagnostics, Ideal Design, Alternative Architecture Research**
- **Problem-solving tools: Traditional TRIZ**
- **Problem-solving tools: Semantic TRIZ**



Innovative Conceptual Design Applications



$$(1) \text{ Value} = \text{Function Rank} / (\text{Problem rank} + \text{Cost})$$

$$(2) \text{ Ideal system} = \text{Lim} (\text{Value})$$

$$\text{Function Rank} = \text{const}$$

$$\text{Problem Rank} = 0$$

$$\text{Cost} = 0$$



Roadmap of Innovative Conceptual Design

Process Milestones	Goal
1. Value Equation Development	To develop major criteria of design diagnostics, identify object of diagnostics
2. Function Modeling	To translate existing knowledge about current design into comprehensive product design functional model
3. Functional model verification and diagnostics	To verify model calculations (function rank, problem rank) against empirical knowledge, to identify relative component value
4. Strategy Synthesis	To explore and identify new configuration-architecture, which can increase overall design value. To identify what new physics is necessary to achieve this goal
5. Concept Generation	To research new Physics and existing technical solutions capable to solve problems which have been identified during Strategy Synthesis stage
6. Concept Selection	To select most feasible concepts



5710533 : Electrical transformer with reduced fan noise

INVENTORS: **Pla; Frederic Ghislain**, Clifton Park, NY
Imam; Imdad, Schenectady, NY
Hedeen; Robert Arvin, Clifton Park, NY
Pitman, Jr.; Frank Albert, Rome, GA
Smith; Stephen Linwood, Garza Garcia, MN

ASSIGNEES: **General Electric Company**, Schenectady, NY

ISSUED: **Jan. 20, 1998** FILED: **July 31, 1995**

SERIAL NUMBER: **507130** MAINT. STATUS:

INTL. CLASS (Ed. 6): **H01F 015/00**;

U.S. CLASS: **336/100; 181/202**;

FIELD OF SEARCH: **336-100,59,92 ; 181-202,204,208 ;**

- *Transformer*
- *Variable Speed Cooling Fan*
- *Temperature Sensor*
- *Controller*

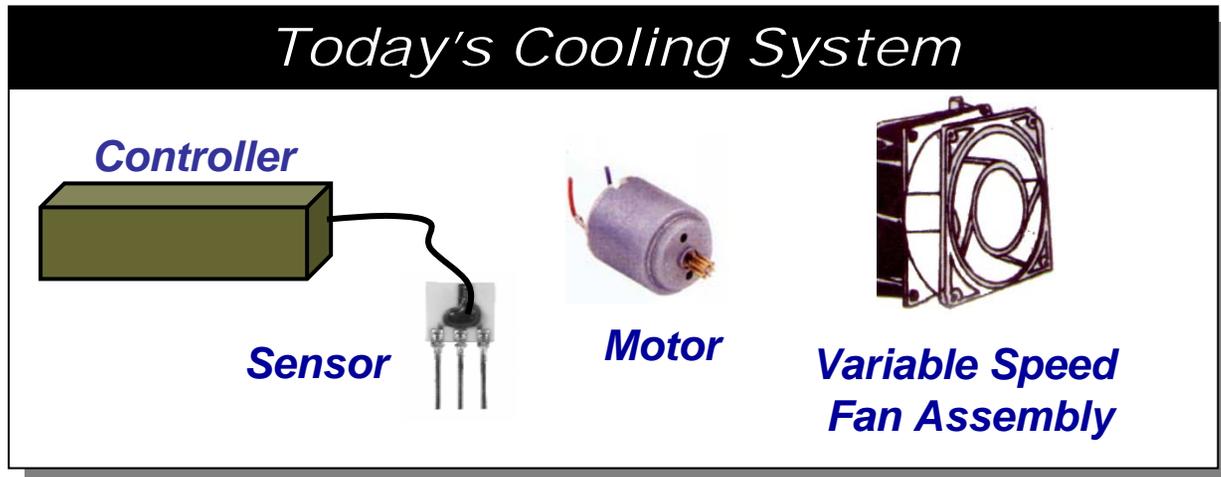
ABSTRACT: An electrical transformer includes a housing, a transformer core and winding subassembly located in the housing, and a cooling fan subassembly. The cooling fan subassembly includes a variable speed fan located outside the housing, a temperature sensor located near the housing, and a controller having an output port connected to the variable speed fan and an input port connected to the temperature sensor. The controller reduces the fan speed (and hence the fan noise) when a lower fan speed can maintain the desired temperature as sensed by the temperature sensor. Preferably, the electrical transformer further includes an active mount subassembly and/or (when the housing includes a tank containing transformer fluid) a mechanism for varying the dynamic pressure of such transformer fluid.

U.S. REFERENCES: (No patents reference this one)



Engineering Situation:

- **High warranty problems due to overheating**
- **Cooling system has a sensor & controller to activate & control fan for noise reduction & cooling.**

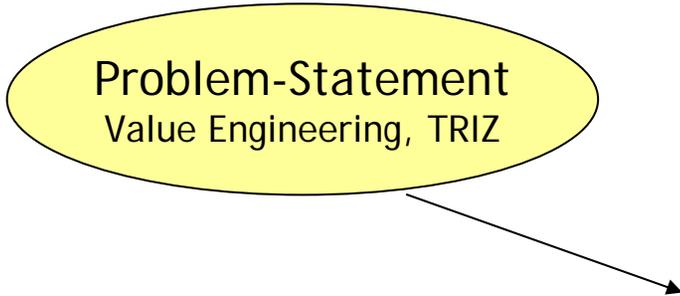


Today's Problems:

- 1) **System does not cool well enough**
- 2) **Sensor is not accurate - leads to overheating**
- 3) **Customers complain about Noisy Fan**
- 4) **Management pressure to reduce costs**



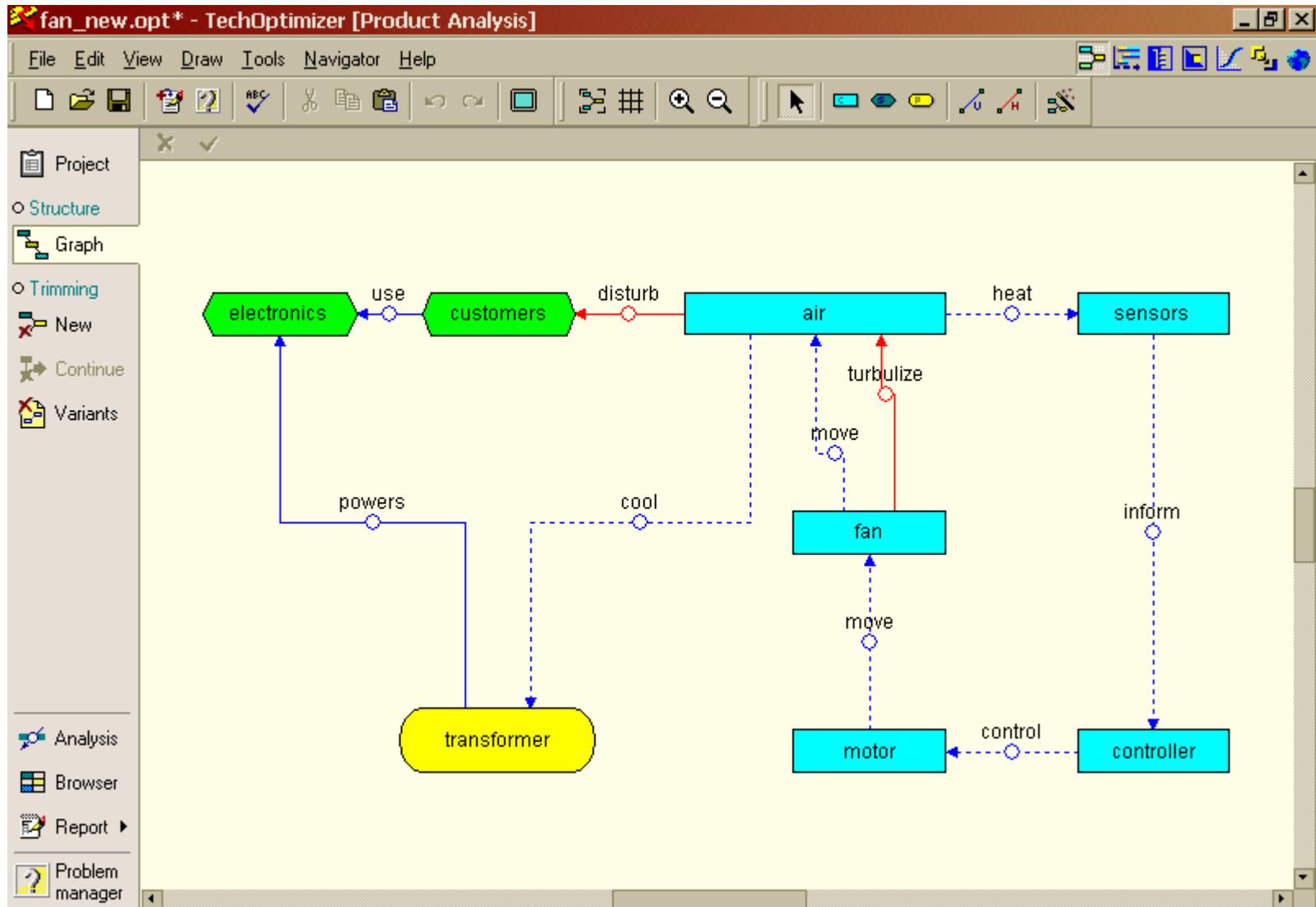
Step 1: Value Equation Development



Alternative Architecture
List of Problems

$$\text{Value} = \mathbf{F}/(\mathbf{P}+\mathbf{C})$$

Step 2: Function Modeling



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Step 3: Model Verification and Diagnostics

The screenshot displays the TechOptimizer interface for a project named 'fan_new.opt*'. The main workspace shows a system model with components: electronics (green), customers (green), air (cyan), sensors (cyan), transformer (yellow), fan (cyan), motor (cyan), and controller (cyan). Relationships are shown with arrows: 'use' (electronics to customers), 'disturb' (customers to air), 'heat' (air to sensors), 'powers' (transformer to electronics), 'cool' (transformer to air), 'move' (motor to fan), 'move' (fan to air), 'turbulize' (fan to air), 'control' (controller to motor), and 'inform' (sensors to controller).

The bottom panel shows the 'Strategy' set to 'Value increasing'. A table provides performance metrics for various components:

Components	Function rank	Problem rank	Cost	Evaluation
controller	3.75	3.16	111.00	1.07
sensors	2.50	3.16	5.00	1.73
motor	5.00	3.16	55.00	3.08
fan	6.25	6.84	36.00	3.87
air	10.00	10.00	0.00	10.00

Below the table, a 'Diagnostic for Value increasing' section states: 'controller, sensors, motor are components recommended for improvement first in accordance with Value increasing strategy'.

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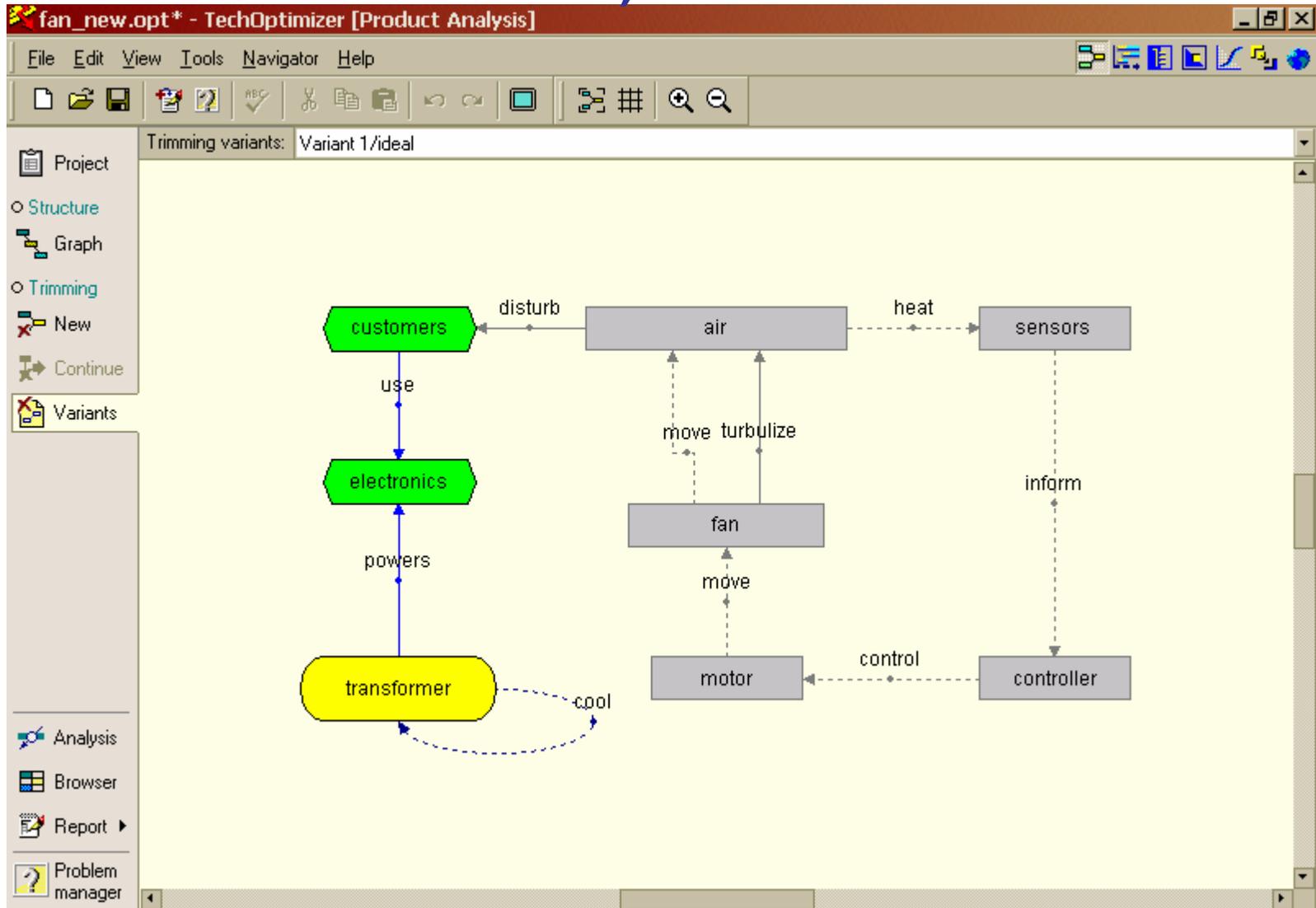


Step 4: Strategy Synthesis (Alternative Architecture Research)

Two strategies to approach Ideal System:

- 1. Improve low value components**
- 2. Remove low value components from the design, but preserve their functionality**

Step 4: Strategy Synthesis (Alternative Architecture Research)



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Step 5: Concept Generation

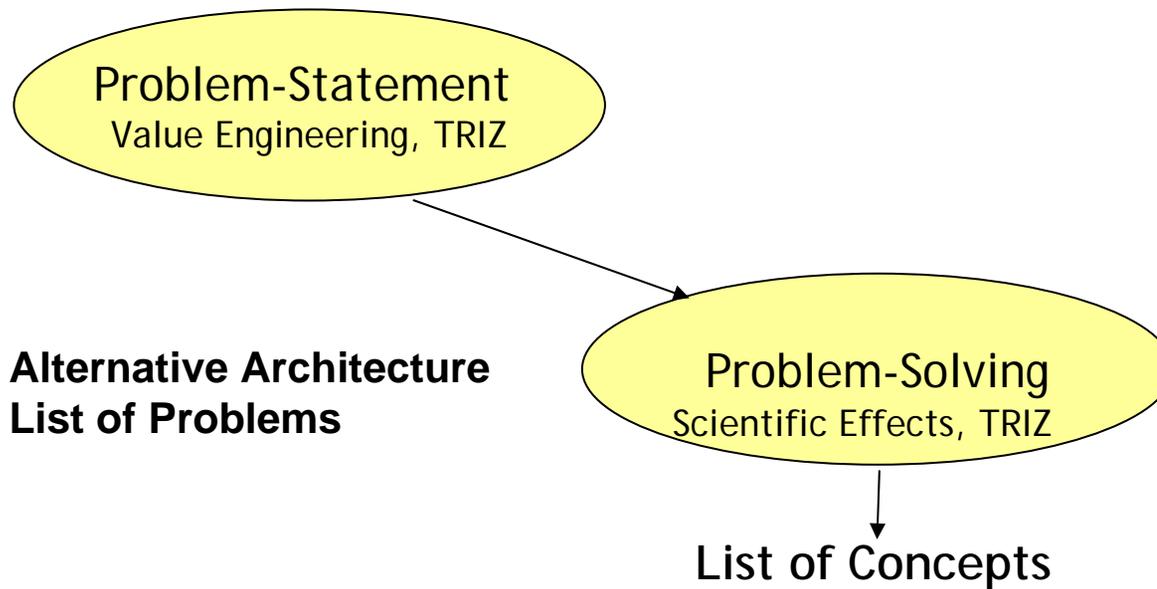
The screenshot shows the 'Problem Manager' software interface. The window title is 'Problem Manager' and the menu bar includes 'File', 'Problem', 'View', 'Tools', and 'Help'. The toolbar contains icons for file operations and problem management. The main interface is divided into several sections:

- Problems and Concepts:** A tree view on the left showing a hierarchy of problems and concepts. The selected concept is '272.0 "cool transformer" transfer', which includes sub-concepts like 'Transformer cooling', 'Thermomagnetic effect', and 'new concept here'.
- Problem description:** A diagram showing a box labeled 'air' connected to a yellow box labeled 'transformer'. A dashed blue arrow labeled 'cool' points from 'air' to 'transformer'. A red arrow labeled 'cool' points from 'transformer' back to 'air', indicating a feedback loop. Below the diagram, the text reads: 'Function cool transformer performed by air is transferred to transformer. How to make transformer perform cool transformer?'
- To solve:** A section with a 'Recommended' button and an 'Add new concept' button.
- Concept:** A large text area for entering a new concept, currently containing the placeholder text 'new concept here'.
- Author:** A dropdown menu currently set to 'no'.

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Problem-Solving (Concept Generation Process)



**Alternative Architecture
List of Problems**

List of Concepts



Postulates of Conventional TRIZ

- 1. Problems and solutions were continuously repeated across different industries: Different solutions solve the same contradictions**
- 2. Patterns of technical systems evolution are repeated across different industries. Systems are being developed in the directions of:
(i) increased ideality; (ii) increased degree of flexibility**
- 3. Best innovations use scientific effects from different fields**



Traditional TRIZ: Effects

The screenshot shows the TechOptimizer [Effects] software interface. The title bar reads "Untitled* - TechOptimizer [Effects]". The menu bar includes "File", "Edit", "User", "View", "Tools", "Navigator", "Bookmarks", and "Help". The toolbar contains various icons for file operations and navigation. Below the toolbar is a search bar labeled "I want to :".

The main interface is divided into two panes. The left pane, titled "Function Groups", contains a tree view of function categories:

- Fields : Absorb
- Fields : Accumulate
- Fields : Detect
- Fields : Prevent
- Fields : Produce
- Parameters : Change
- Parameters : Decrease
- Parameters : Increase
- Parameters : Measure
- Parameters : Stabilize** (selected)
- Substance : Accumulate
- Substance : Combine
- Substance : Detect
- Substance : Eliminate
- Substance : Form

The right pane, titled "Functions Group: Parameters : Stabilize", displays a list of 10 items under the heading "Parameters : Stabilize: 10 items":

- [stabilize concentration parameters](#)
- [stabilize deformation parameters](#)
- [stabilize disposition](#)
- [stabilize electric field parameters](#)
- [stabilize electromagnetic waves, light parameters](#)
- [stabilize fluids parameters](#)
- [stabilize geometric parameters](#)
- [stabilize motion and vibration parameters](#)
- [stabilize shape, configuration](#)
- [stabilize thermal parameters](#)

An "Add Concept" button is visible at the bottom right of the right pane.

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Traditional TRIZ: Effects

Solving Tool [Effects]

File Edit User View Tools Navigator Bookmarks Help

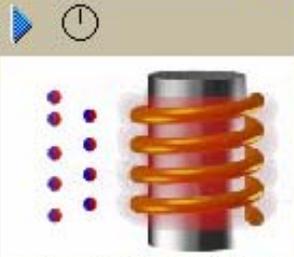
I want to: make "transformer" perform "cool transformer"

Function Groups

- ✖ Loudspeaker with magnetorheological susp...
- ✖ Magnetocaloric refrigeration system
- ✖ Mechanocaloric refrigerator
- ✖ Mirror cooling system
- ✖ Moist bubbling bed cools steel solid
- ✖ Peltier effect
- ✖ Pressure and temperature drop in expandin...
- ✖ Producing temperature gradient in gas (Ran...
- ✖ Quench cooling of part in bubbling magneti...
- ✖ Quenching of steel article in magnetic fluid
- ✖ Radiative cooling of atoms
- ✖ Reduction of phase transfer temperature of ...
- ✖ Reverse pyroelectric effect
- ✖ Rotation decreases heating of anode
- ✖ Spray cooling effect
- ✖ System for cooling printer heads
- ✖ Temperature-sensitive resistor regulates file...
- ✖ Thermal insulation in aeronautics
- ✖ Thermoacoustic cooler
- ✖ Thermoacoustic effect
- ✖ Thermosiphon cools automobile engine
- ✖ Thin-wall electric holder cools electrode
- ✖ Thomson effect
- ✖ **Transformer cooling**
- ✖ Working medium cooling

Example: Transformer cooling

[Problem](#) [Solution](#) [Advantages](#) [References](#) [See Also](#)



Problem
An electromagnetic device, e.g. a transformer, heats up during operation. Usually it is cooled with oil. Gravity-induced, natural-convection heat transfer, however, is not sufficiently intensive. There exists a problem of stirring the cooling fluid.

Solution
A transformer is put in a housing filled with a ferrofluid. The ferrofluid is a colloid that contains suspended magnetic particles. Magnetic particle magnetization is temperature dependent. The magnetization decreases in the proximity of the hot transformer. Cold magnetic particles from the periphery have a higher magnetization and are attracted to the transformer. They wind toward the region of a strong magnetic field. These particles transfer the impulse to the cooling fluid. The fluid, as a result, circulates round the transformer and cools it.

Advantages
Forced mixing of the cooling fluid is not required.

References
U.S. Patent. 5.462.685: Ferrofluidics Corporation.

Add Concept

Courtesy of Invention Machine Corporation. Used with permission.



Traditional TRIZ: Matrix of contradictions

The screenshot shows the TechOptimizer software interface. The title bar reads "Untitled* - TechOptimizer [Principles]". The menu bar includes File, Edit, View, Tools, Navigator, Database, and Help. The toolbar contains various icons for file operations and navigation.

Browse the Recommendations list

Contradictions Engineering Physical

Improving

1 device complexity

Worsening

2 reliability

Recommendations

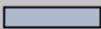
- 13 - 'The other way around'
- 35 - Parameter changes
- 1 - Segmentation

Examples

- Assembled silicon structure
- Formation of buried oxide inside silicon
- Grooves prevent strain
- Heterostructural field-effect transistor (fet)
- Low temperature silicide formation

Problem: I want to improve the transformer cooling
by replacing air advection with ferrofluid advection
but there is a problem intensity of cooling may not be enough

Concept: Segmentation

-  Divide object
-  Disassemble
-  Strongly divide

- divide an object into independent parts
- make an object easy to disassemble
- increase the degree of fragmentation (or segmentation) of an object

Navigation: Previous Next

Add concept

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Traditional TRIZ: Trends of Evolution

Solving Tool [Prediction]

File Edit View Tools Navigator Database Help

Problem Manager Concept Selection

Trends of Technology Evolution

Dynamization 11 of 19

Immobile system Joint Many joints Elastic Liquid, gas Field

Steering-wheel shaft

Rigid Articulated shaft Multi-joint steering Flexible steering Hydraulic steering Electrical steering

Door

Single-leaf Two-leaf Accordion door Roll-up door Air curtain Light lock

Examples

- Automobile v
- Arc welding

Engineering systems having stiff elements are poorly adapted to operating conditions. The designers try to make stiff elements more flexible, more dynamic. Joints are incorporated into the stiff designs, their number increases, and a transition to flexible systems is performed. Implementation of elements of the engineering system on the molecular and field level provides its maximum flexibility.

Close Help

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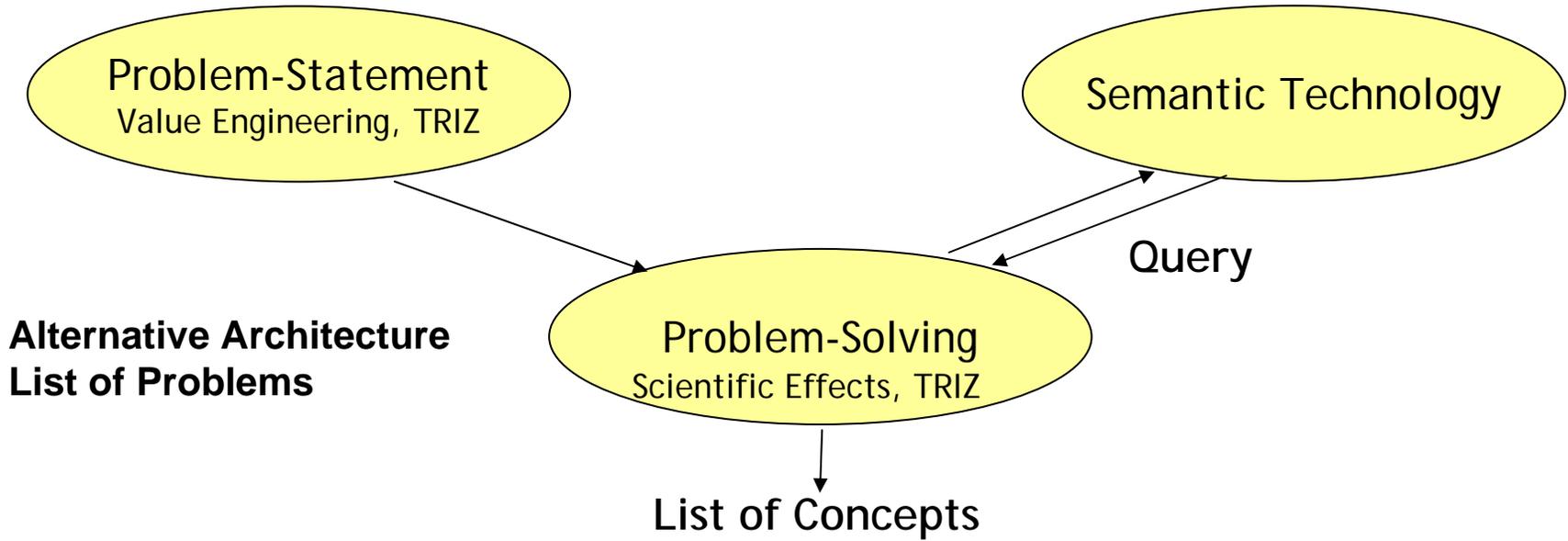


Some Questions...

- **Is the Contradictions Matrix statistically stable to a number of patents analyzed?**
- **Are discovered trends of technology evolution statistically stable to a number of patents analyzed? Do they cover all existing trends in the current world of technology?**
- **How does one cross a chasm from a general recommendation to a specific innovative idea?**

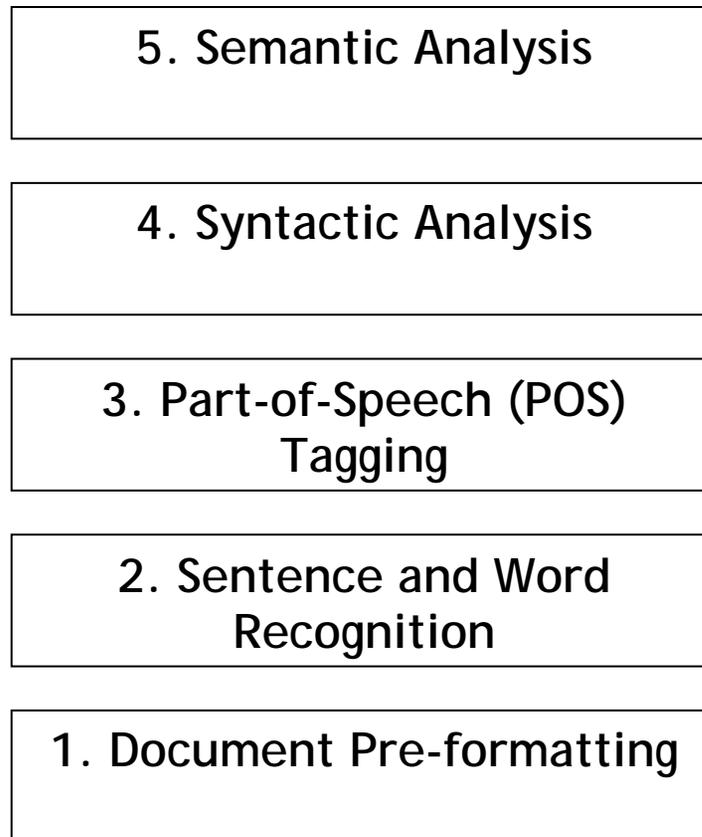


Semantic TRIZ





Semantic Processing Stages



Searchable Semantic Index



Unstructured
Text



Sample content:

“Or the **Curie temperature** can be **controlled** by using **two or more rare earth elements** and adjusting the composition ratio between them.”

Subject

Action

Object

Earth
elements

control

Curie temperature

1. What controls
Curie temperature?

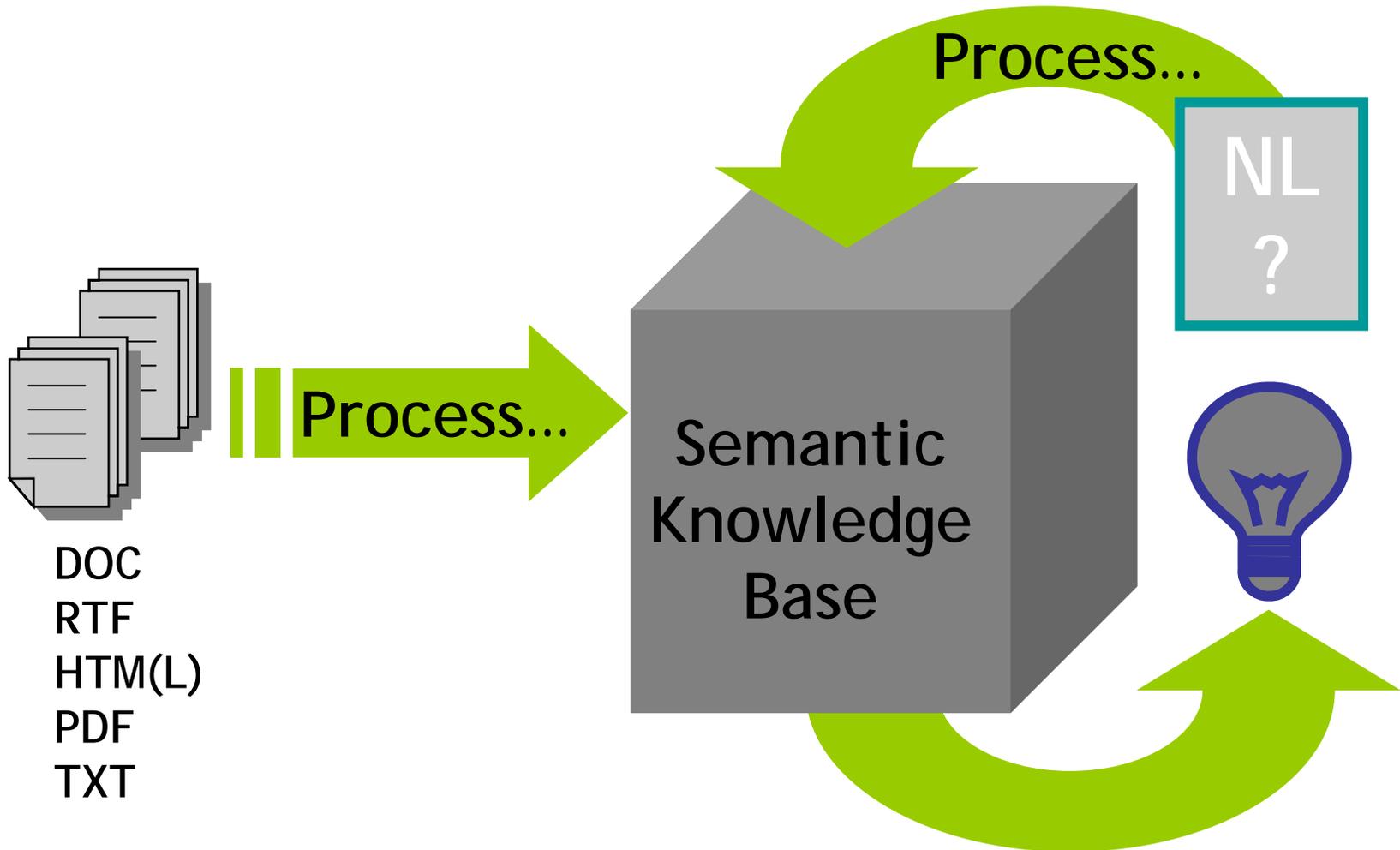
?

+

+

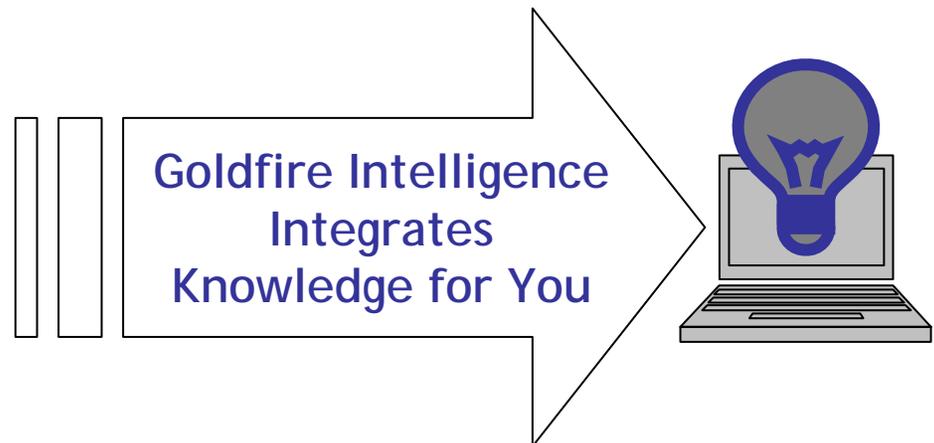
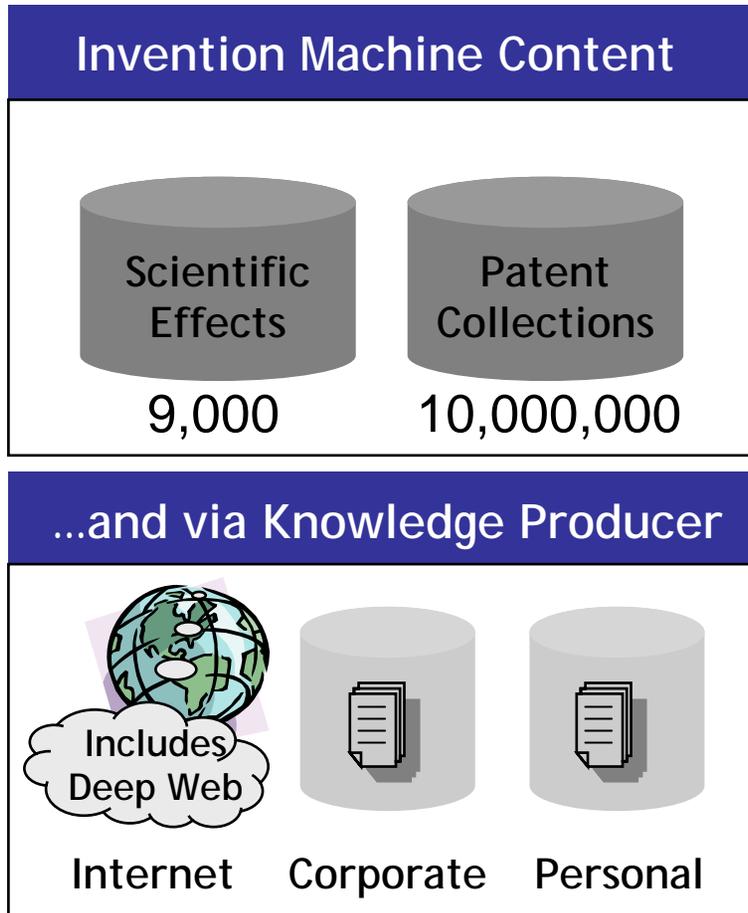


Goldfire Innovator matches the semantic structures of your query to the semantic structures in the Knowledge Base





Access to External and Internal Intellectual Assets



DASHBOARD

OPTIMIZER

RESEARCHER

Knowledge Search

Patent Collections

IMC Scientific Effects

Inventive Principles

System Modification Patterns

Saved Solutions

Natural Language

[Clear Query](#) [Open Query](#) [Save Query](#)

Type your question or statement using Natural Language

Query:

Find

Example: how to reduce cholesterol?

Search In:

Patent Collections

- U.S. Granted
- U.S. Applications
- European Granted
- European Applications
- WIPO PCT Publications
- Japan Abstracts

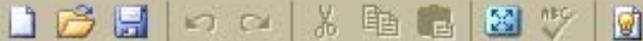
Personal Knowledge

- curie temperature
- Sonoluminescence
- laser diode
- heavy hybrid

IMC Scientific Effects

- Scientific Effects

[Build a Knowledge Base](#)



DASHBOARD

OPTIMIZER

RESEARCHER

Knowledge Search

Patent Collections

IMC Scientific Effects

Inventive Principles

System Modification Patterns

Saved Solutions

Knowledge Search

Select Task

Natural Language

Clear Query Open Query Save Query

Type your question or statement using Natural Language

Query: How can we control Curie temperature?

Find

Example: how to reduce cholesterol?

Search In:

Patent Collections

- U.S. Granted
- U.S. Applications
- European Granted
- European Applications
- WIPO PCT Publications
- Japan Abstracts

Personal Knowledge

- curie temperature
- Sonoluminescence
- laser diode
- heavy hybrid

IMC Scientific Effects

- Scientific Effects

Build a Knowledge Base

Project Explorer

Save Solution(s)...

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DASHBOARD

← Knowledge Search > Results

Select Task

Clear Query Open Query Save Query

OPTIMIZER

How can we control Curie temperature? Find

Your query was processed as a **Natural Language** expression. Click here to process the query as a **Boolean** expression. Click here to perform a fielded search in Patent Collections.

RESEARCHER

Patents Personal Effects

128 most relevant

Try synonyms: adjust administrate affect alter change command control correct determine govern ...

Knowledge Search

Most relevant:

Most

- 1. A magneto-optical recording medium according to claim 5, wherein **Curie temperature** of at least one of the plurality of heavy rare earth and iron family amorphous thin films of the first magnetic layer is **controlled** by addition of a nonmagnetic element.
[US-20030133366 A1](#) Magneto-optical recording medium
 5 Most relevant and 166 Related result(s) from this document
- 2. Changing the composition can **control** the **Curie temperature** of magnetic powder, for example, by partially replacing Ni or Mn of Ni ferrite or Mn ferrite that is a basic component with Zn or Cd, preferably Zn.
[US-20010022259 A1](#) Magnetic powder for validity determining ink, manufacturing method for magnetic powder for validity determining ink, magnetic ink for validity determination, printing member for validity determination, detecting device for printing member for validity determination, and validity determination device
 4 Most relevant and 59 Related result(s) from this document
- 3. Changing the composition can **control** the **Curie temperature** of magnetic powder, for example, by partially replacing Ni or Mn of Ni ferrite or Mn ferrite that is a basic component with Zn or Cd, preferably Zn

Patent Collections

IMC Scientific Effects

Inventive Principles

System Modification Patterns

Saved Solutions

Project Explorer

Save Solution(s)...

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Innovator as a Contradiction Table

The screenshot shows the Goldfire Innovator software interface. The title bar reads "Untitled* - Goldfire Innovator : Researcher". The menu bar includes "File", "Edit", "View", "Tools", and "Help". The toolbar contains various icons for file operations and search. The left sidebar has a "RESEARCHER" section with options like "Knowledge Search", "Patent Collections", "IMC Scientific Effects", "Inventive Principles", "System Modification Patterns", and "Saved Solutions".

The main window displays a search query: "How can we increase area, and decrease volume?". Below the query, there are buttons for "Clear Query", "Open Query", and "Save Query". A "Find" button is also present. The search results are categorized under "Patents", "Personal", and "Effects". The results are sorted by "81 most relevant results".

The search results are as follows:

- 1.** The folded or shaped top woven wire mesh or perforated sheet **increases** its surface **area** and **decreases** the **volume** of a heat exchanging space which will thereby reduce the overall pressure drop when in service. [US-20030019613 A1](#) Heat exchangers that contain and utilize fluidized small solid particles. 2 Most relevant and 6 Related result(s) from this document.
- 2.** In the use of an oxypolycarboxylic acid, a hard aqueous alumina gel is formed, and this alumina gel **increases** specific surface **area** of the alumina composition but **decreases** pore **volume** thereof. [US-20030044348 A1](#) Alumina composition, method for preparation thereof and use thereof. 1 Most relevant and 75 Related result(s) from this document.
- 3.** Since low pressure in the receptacle causes the receptacle to collapse, and this collapse **decreases** the **volume** within the receptacle and **increases** the exposed **area** of the refrigerant to the contents, for example a beverage, this increase in the surface area of contact... [US-5704222](#) Refrigerating apparatus and method. 1 Most relevant and 40 Related result(s) from this document.

The bottom of the interface shows a "Project Explorer" and a "Save Solution(s)..." button.

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Innovator Generates Trends of Technology Evolution

The screenshot shows the Goldfire Innovator software interface. The main window is titled "Untitled* - Goldfire Innovator : Researcher". The interface includes a menu bar (File, Edit, View, Tools, Help) and a toolbar with various icons. On the left, there is a vertical navigation pane with the following items: DASHBOARD, OPTIMIZER, RESEARCHER, Knowledge Search, Patent Collections (selected), IMC Scientific Effects, Inventive Principles, System Modification Patterns, and Saved Solutions. The main content area is titled "Patent Collections" and contains a search interface. The search interface has two tabs: "Natural Language" (selected) and "Boolean Search". Below the tabs, there is a text input field for a query, currently containing "How can we detect a gas leak?". A "Find" button is to the right of the input field. Below the input field, there is a "Search in:" dropdown menu set to "All available Text fields". A "Calendar" dialog box is open, showing a date range from 1971 to 2004. The date range is displayed as "1971 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03 2004". Below the date range, there are two date pickers: "1/1/1971" and "12/31/1975". At the bottom of the search interface, there are two checked checkboxes: "WIPO PCT Publications" and "Japan Abstracts". The bottom of the window features a "Project Explorer" pane and a "Save Solution(s)..." button.

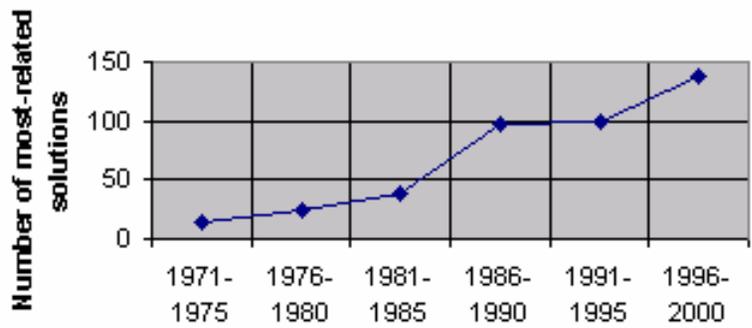
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	A	B	C	D	E	F
1	1971-1975	1976-1980	1981-1985	1986-1990	1991-1995	1996-2000
2	15	24	39	98	99	137
3	acoustic		acoustic			acoustic
4	radiative	radioactive				
5	heat	heat	heat	heat		heat
6	electro-magnetic	electro-magnetic	electro-magnetic	electromagnetic	electromagnetic	electromagnetic
7	mechanical	mechanical	mecanical	mechanical	mechanical	mechanical
8	chemical	chemical	chemical	chemical	chemical	chemical
9		ionization		ionization	ionization	ionization
10		video system	video system			
11			optic, lasers, fiber optic	optic, lasers, fiber optic		
12				infra-red radiation	infra-red radiation	
13				flurocarbon tracers		odor tracers
14						audio-visual
15						mass spectrometra

How can we detect a gas leak?





Conclusions

- Major steps of innovative design: (i) diagnostics of the current design; (ii) identification of the ideal design; (iii) moving current architecture closer to the ideal
- Traditional TRIZ tools: Physical Effects, Matrix of Contradictions, Trends of Technology Evolution
- If questions are formulated directly, Semantic TRIZ works as a customization of scientific effects data base;
- If questions are formulated as a contradiction, Semantic TRIZ works as a huge (currently $10^7 \times 10^7$) matrix of contradictions providing specific answers on how this contradiction has been solved
- If questions are formulated relative to a specific time domain, Semantic TRIZ generates exact trends of technology evolution



- Theory (TRIZ, a theory of invention),**
- Method (Altshuller's step-by-step creative process)**
- Tool (ex. Goldfire¹), SDM's evaluation**

A theory of invention, as stated by Altshuller the inventor of TRIZ should:

- Be systematic, a step-by-step procedure
- Be inclusive to a broad solution space hoping to include the ideal solution
- Be repeatable and reliable independent of psychological tools
- Be able to access and add to the body of inventive knowledge
- Be close to the inventor's mindset, offering a general approach to solve problems

¹ Product of Invention-Machine



- The process of concept creation is the coupling of an intent-function pair with a form that performs it
- By the application of TRIZ principles, the software works as a mind teaser, in a similar way to De Bono's *Lateral Thinking*
- The automation comes from the use of a concept from a different context – but linked through the semantic engine – in order to solve a problem analogous.
- The form is the suggestion of these effects/patents/contradiction pairs



- The mechanics of the TRIZ principles make us think about what are the effects that have been separated, and the contradiction therefore eliminated
- It allows going into detail, because the separation of the whole into parts that are in contradiction, maps out the invention, but, also maps the benefits provided by each individual part on its own
- Contradiction: we want fresh air but to avoid light
 - Sol'n: Venetian shades separate the flow of air from the flow of light
- Semantic TRIZ methodology is structured, the statement of the problem has to be stated through a contradiction, and this requirement guides us through an exercise of identifying the problem with surgical exactitude, and dissects the different factors that intervene.



- understanding comes from playing with different concepts, patents, scientific effects, and technology trends.
- The fact that the intent is expressed in a high level allows thinking in a broad range of solutions.
- A deep web search on patents classified through the use of the semantic engine, again here the patents help to clarify the idea, but also allow to guide the search to areas that are “hot” in creativity, or where there has not been much advancement recently
- A set of organized scientific effects that are invoked when the problem statement is analogous to one of the effects in the family. While not all the effects will be effective, they allow to think in a higher level of abstraction, and to disengage from a form-linked need statement. The “customers” have sometimes problems making the needed abstractions for a higher-level statement, and, come looking for a validation of their idea. The scientific effects, coming from pure science, forces the “customer” to think “out-of-the-box”



How and where TRIZ can facilitate the creative processes in concept creation¹

- The process of concept creation is the coupling of an intent-function pair with a form that performs it. There are several ways to do this, and some of us just have it as a talent. However, when trying to do this commercially, it is not feasible to trust in a group of artists that will invent when they feel like doing it. It is very important for a corporation to create “deliberatively.” Companies have more demand for SA development than the number of SA wizards available. Therefore, improved education in SA (a la SDM) and tools will help satisfy the demand.
- By sketching steps, and using a systematic approach, some of the risk of not finding the right solution is reduced, and in a business environment, low risk and high productivity are important values. So, for the corporation as a stakeholder, the TRIZ software intent is to deliver a semiautomatic solution-finding machine, and while not finding the solution by itself, it increases the productivity of the people in charge of doing it. The value delivered are therefore solutions, which have the attribute of being novelties and with a steady flow. The process is therefore conceptualizing, and the operand will be the solution that changes from non-existent to existent, delivering value to the Corporation (the beneficiary)
- In the case of the user, the benefit is slightly different. Because of the exposure to many different ideas, the semantic TRIZ excites the creativity [puts you in the creative zone of thinking] and helps to increase the universe of reachable concepts, and also encourages the association of ideas, because of the quick presentation of lots of information from different sources.
- The value for this stakeholder is the inspiration, and it operates into the universe of ideas increasing its number and simultaneous availability. This stakeholder receives value when the showing of these ideas occurs.
- The automation comes from the use of a concept from a different context – but linked through the semantic engine – in order to solve a problem analogous. Here again the idea is to save time to the corporation, increasing the performance and efficiency, by “not losing time”
- Analyzing now the architecture of the semantic TRIZ itself is possible to see that the intent is to systematically approach the invention process, with a solution that has all the advantages of the intended effect, and none of the disadvantages of the counter effects, looking through the broadest possible field of concepts.
- The form is the suggestion of these effects/patents/contradiction pairs in the hope that the human brain will pick the needle in the hay.
- From my own experience with the software, the use is limited and perhaps more interesting than the application of TRIZ principles, the software works as a mind teaser, in a similar way than De Bono’s *Lateral Thinking*.

¹ Friedenthal, Cantanzaro and Speller