TRIZ creative knowledge spiral to solve nuclear safety business issue

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IRSN : Institute for Radiological Protection and Nuclear Safety

Agenda – knowledge spiral journey

2. TRIZ 4-step
- context of problem
- models (IP, laws)
- (free) resources

=> solving process

1. IRSN
- nuclear domain
- annual report
- time & data

=> business issue!

3. Workshop
- learn & solve!
- TRIZ guidance
- efficient time

=> concepts

4. Results
- business report
- best practices
- team succes

=> next step...

IRSN - nuclear safety in France

IRSN, the Institute for Radiological Protection and Nuclear Safety
- key competences within R&D and operational expertise capability
- information management and interaction with stakeholders and public
=> publishes regularly activity reports and technical publications,
- also thematic resources on radiation protection or nuclear safety.

For example, since 2004 the IRSN shall publish annually
- a report on the radiological state of the environment in France
=> radiological surveillance of the environment is a permanent mission
- part of public policies related to nuclear safety and radiation protection
- helping to ensure the maximum degree of protection of the population.

The radiological report facilitates access to information
- designed to provide quick access to all the information
- for actors on the monitoring of radioactivity in France,
- with the many results of the analyses.

IRSN
INSTITUT DE RADIOPROTECTION ET DE SÛRETÉ NUCLÉAIRE

http://www.irsn.fr/EN/Pages/home.aspx

IRSN report – business issue

Last year, a new challenge was proposed in a highly technological field:
- with many regulatory requirements, specific technical difficulties,
- high public visibility (especially since the Fukushima disaster),
- vast amount of complex data with highly expected accuracy,
- in a general context of cost reduction, and few resources,
=> with a small team in a limited time…

What should be done?

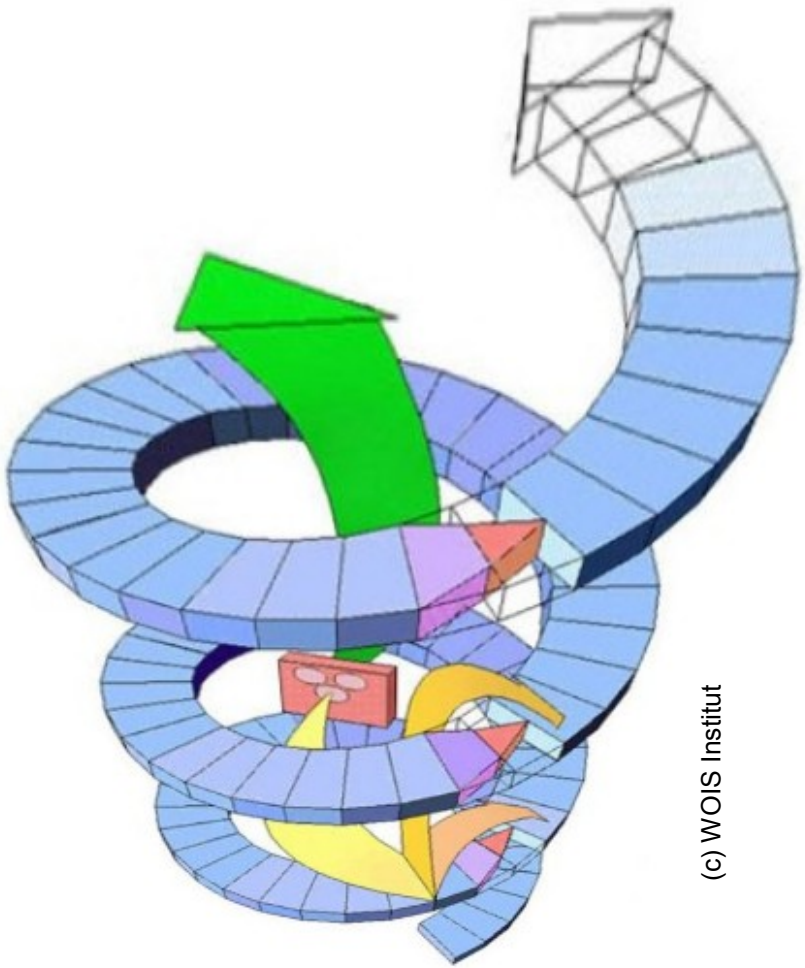
To produce the annual expertise report:
- highly expected by the state government,
- public organizations, businesses and citizens,
- collect, analyse and compare the data,
- to be complete, accurate, and reliable,
=> without compromising nuclear safety!

Innovation as a process for all

My intention is to show that
the process of solving problems
- is accessible to everybody,
- very important to learn,
- *and* fascinating all over.

> *Genrich Altshuller*

I do not search, I find!
> *Pablo Picasso*



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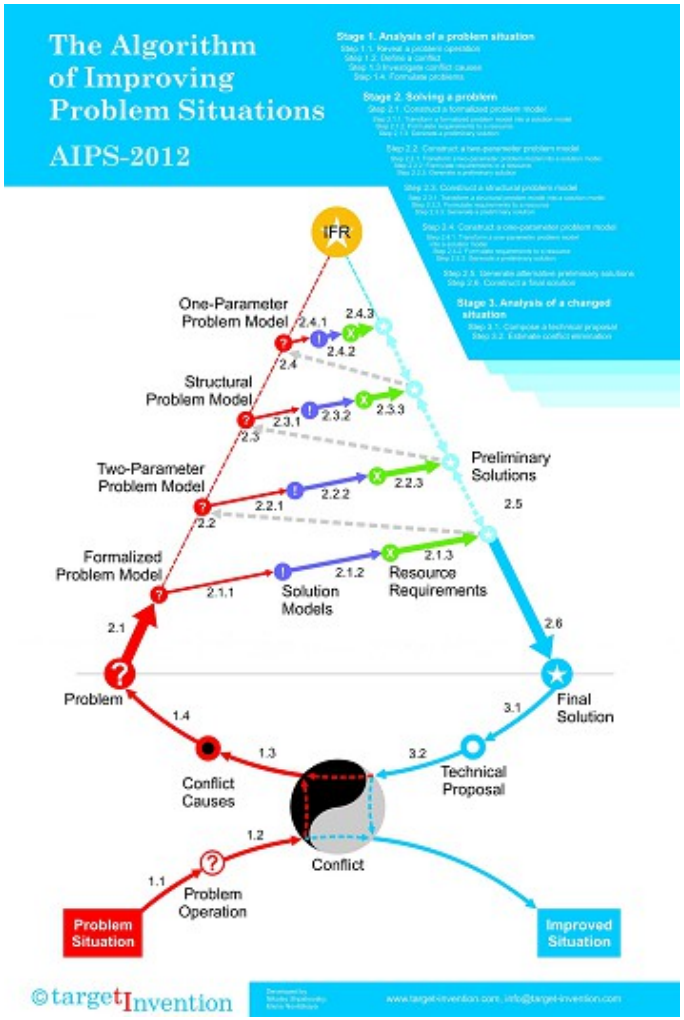
Essence of TRIZ in 50 words

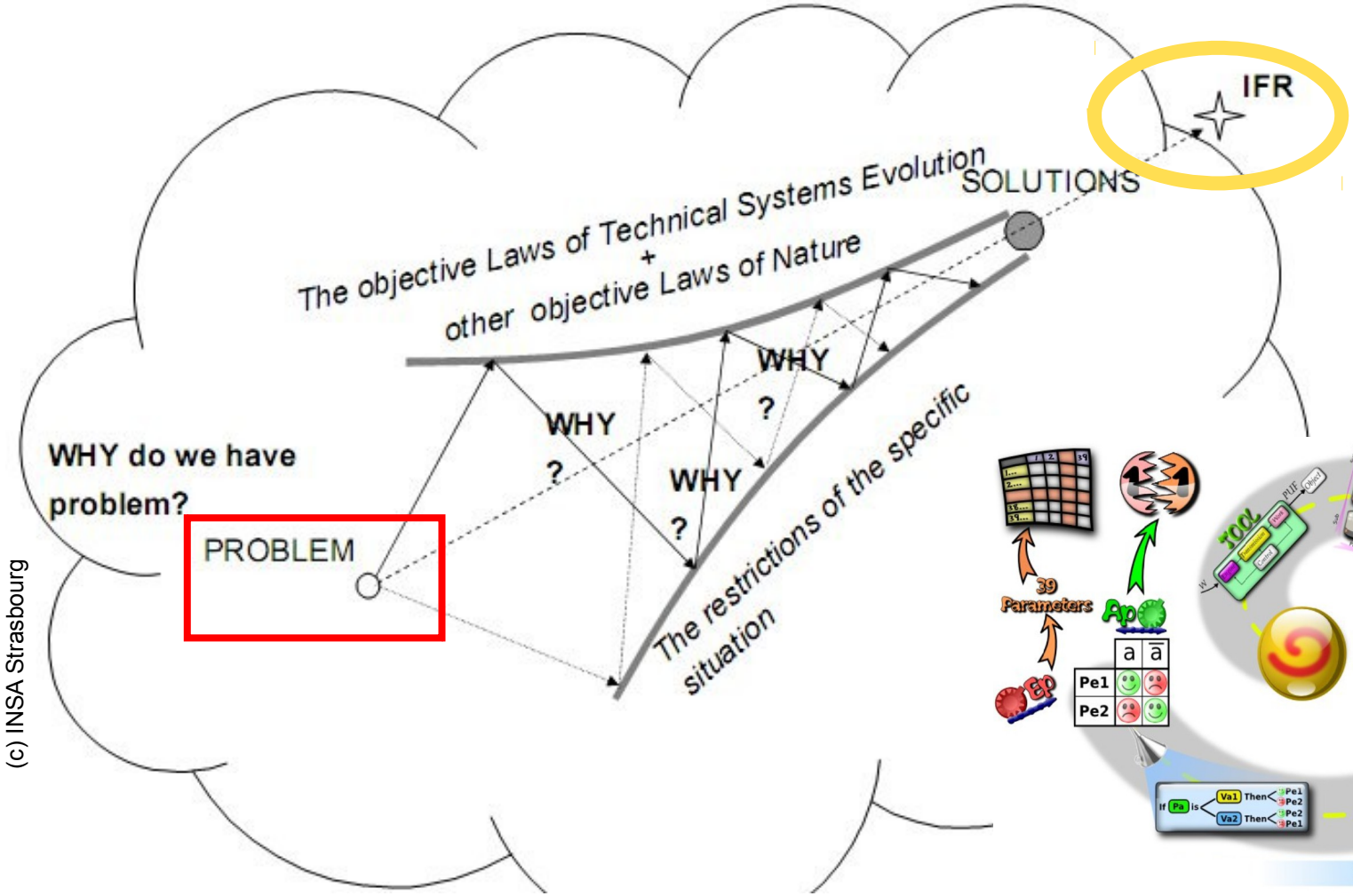
Recognition that
- (technical) systems evolve
- towards the increase of ideality
- by overcoming contradictions
- mostly with minimal introduction of (free) resources;

Thus, for creative problem solving,
- TRIZ provides a dialectic way of thinking,
- to understand the problem as a system,
- to image the ideal solution first,
- and to solve contradictions.

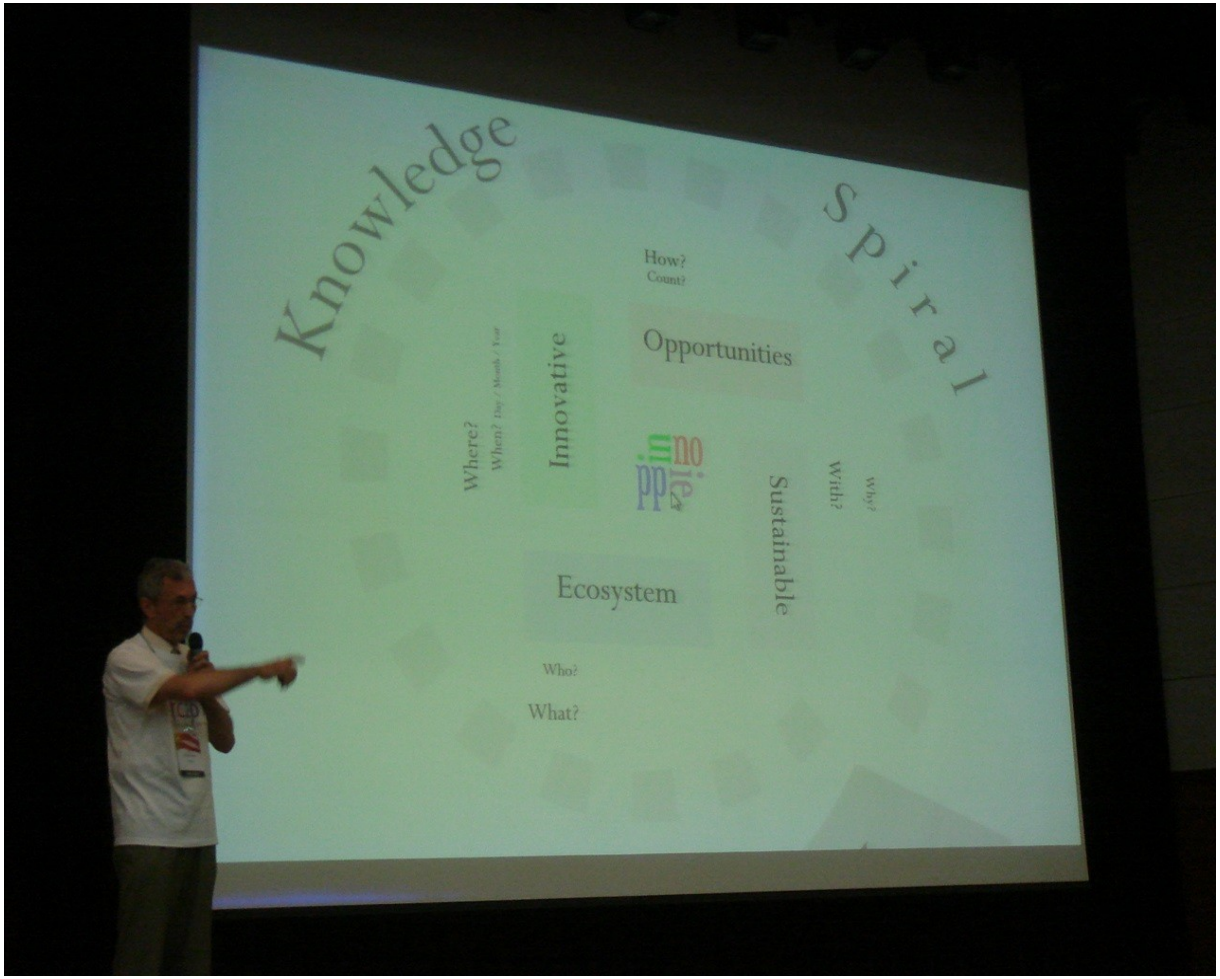


http://www.triz-journal.com/archives/2001/06/d/index.htm

TRIZ convergence in one slide



Applying the knowledge spiral



A systemic inventive approach based on Classical TRIZ, ARIZ and OTSM-TRIZ, with existing models, incorporating specific local resources and new technologies, quickly and easily overcomes the obstacles and difficulties.

1. Context: ideality, contradiction

At first glance, the team thought that the problem was a "**first of its kind**" because of several specific properties: high-level and sensible technology, many data of different types, stored in a dozen databases, top management validation process due to public visiblity and state regulations, etc.

Which tool to use?

- Reformulation, 5-why?
- Time-Size-Cost operator?
- Ideality (Ideal Final Result)?

=> Ideality = Useful functions / Costs + Harmful functions

Ideality discussion:

- Rapidly, immediately, reuse
- Itself, aggregates & binds, SEO
- Manufacture a "custom report"?
- Smartphone: participatory field analysis?

=> Industrialization of the expert report?

2. Models: system, 40IP, laws...

System:
- Fusion "project picture" all databases
- Transformation of input-output formats
- Automatic controls, manual extraction

Subsystem(s):
- Automatic extraction
- Wording suggestion (hypothesis)
- Personalized selection

> zoom "postal code"

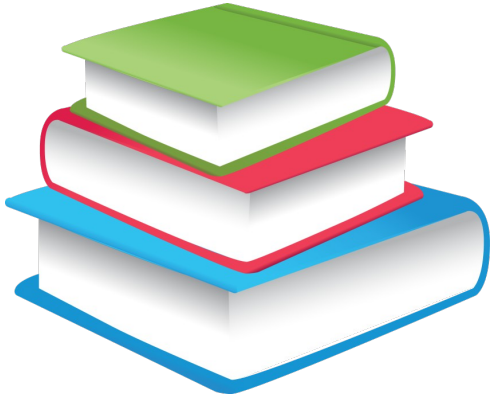
- Topics of interest

> living conditions

Models discussion:
- Intranet & suggested homepage
- Contextual analysis of patents
- Book: reader, message, inter-chapters,

> editorial board, translation

- Open data: accessible public data



3. Resources & 4. First results...

Universal resources:
- Materials, fields
- Time & space
- Functions
- Information

Resources discussion:
- Annual report, pre-defined sections
- IRSN value: analysis, synthesis!

> explain & discuss with stakeholders

> objectify the work to be done.

Results (not all disclosed)
- 1000 paper format, PDF
- extract for tablet, devices
- website, etc.

=> Deliverables (on USB key)

1. TETRIS presentation

> Introduction to contradictions

> Contradictions exercises

> Function writing exercise

> Cause/effect wall charts

> System evolution

> Fields wall chart

> Contradictions wall charts

2. Useful tools (among others)
- 40 Inventive Principles book
- TRIZ matrix (39 parameters)
- « Chicken and the Universe » (for teaching kids... and adults)

http://jlproj.org/this_bibl_e/pub/flash/chicken.html

IRSN report – SWOT analysis (1/2)

Strengths

- Common sense, commitment, motivation
- 40 principles, 39 parameters
- Different views, debate
- Human approach, capacities
- Systematic (document)
- To think otherwise, spontaneous, simple

> Different solution without conflict

- Function "bypass"!

Weaknesses

- Lost (vocabulary)
- Understanding of the problem
- Group discussion, brainstorming?
- Mixed "training/resolution"

> Explain the tools

> Used "unknowingly"

- Difficulty of implementation?
- Be guided?

IRSN report – SWOT analysis (2/2)

Opportunities

- Synergy, group enrichment
- See the problem differently
- Find the right problem
- Look for ideas elsewhere
- Technical solutions, experiments, processes, etc.
- Spinoff "Innovators network"
> Enrich the portfolio of IP rights
- Potential innovation/channel!

Threats

- Limitation of the method, simplify?
- Team orientation
- Wrong focus on the subject?
- Lack of imagination
- Wander in different directions?
- Conceptual blockages if diversity?
- Fear of initial error on the problem?

IRSN business issue – solved!

After the first half-day of the workshop, the team was able to decide itself to investigate 5 problems (real situations that the professionals had to face), spending 1-2 hours on each within the remaining day.

Focusing in this study case on the second problem (how to build an nuclear expertise report with a small team and limited time), the 4-step process helped the project owner to discuss freely and efficiently with the team members (not linked to the project, even not knowing about it), along the “knowledge spiral” path they just learned.

The industrialization of the “radiological assessment” process quickly appeared possible, with enough openness to consider the ideal final result, make analogies with other domains, see the apparent complexity as a system, easily identify subsystems design, build on existing models, discover added value, leverage opportunities for automation and benefit from "big data" technologies, etc.

IRSN report – lessons learned

After 1-2 hours of “guided discussion” for each problem to solve, the team collectively agreed about the visible strengths and potential opportunities of the TRIZ “knowledge spiral”, and the objective effectiveness of the 4-step process, but is still confused about the approach of "learning by solving", afraid to miss the initial problem or to follow the wrong path, even if they understand the systemic guidelines of this TRIZ-based methodology to innovate.

However, the key success factors were clearly the support of the manager and the methodologist, who were curious to know more about the “TRIZ spirit” and to implement it in concrete cases, which allowed the team to feel authorized to innovate...

As a result, almost all issues were clarified during a single workshop, with patentable solutions, and some members were identified to be innovation catalysts for the next workshop...

Thanks! ...next « knowledge spiral »

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TFC 2014
Lausanne (CH)
> Sire, Gillmann
> TRIZ “knowledge spiral” (and first steps of ARIZ) solving Civil Engineering “thermal link” issue