

Modern TRIZ

Michael Orloff

Modern TRIZ

A Practical Course with EASyTRIZ
Technology

With 14 learning modules
and more than 340 examples



Springer

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For Valentina

– my dear wife, friend
and comrade-in-arms

11.10.2010

Do you remember how it all started?

How new it was...

*How we built boats and named them
"Faith", "Hope" and "Love"...*

*How we hacked off mooring lines
and watched
the earth slowly disappear
behind the horizon...*

And

*if the final destination remains the same
in good times and in bad times,
those
who have not lost their courage
and have not dropped their oars
will eventually find
their promised
land.**

* free translation from Russian; lyrics by Andrey Makarevich (b. 1953), co-founder of the Russian rock band *Time Machine* and creator of the *bard-rock* style; song title: *To Those Who Are At Sea*, 1982

EASyTRIZ: As Simple As Possible, But Not Simpler¹

Book Presentation by Prof. Seung-Hyun Yoo

The headlined quote from Albert Einstein, eminent scientist and productive inventor, provides an apt description of the aim that Professor Michael Orloff pursued when writing his book.

We have known TRIZ for more than 10 years, and have successfully used it in engineering consulting and student training. We realized that TRIZ users needed to develop reliable training methods for real-life problem solving, streamline the *Algorithm of Inventive Problem Solving* (ARIZ) study, and devise a new way to organize theory models.

And we saw a new TRIZ at lectures and workshops delivered by Professor Orloff in the Republic of Korea before experts working for SAMSUNG and other companies, and before faculty and students of several universities.

The author designed a simple and efficient crash course in primary TRIZ models based on the method of *extraction*, or *retrieval of invention models from any real-life objects (artifacts)*.

He suggested a simple *standard model* presenting the problem solving process as a four-step ARIZ: *Meta-Algorithm of Invention* (MAI). MAI radically improves training methods, and can be efficiently used to solve most real-life problems.

The author developed the method of *reinventing*, or "*modeling the process of inventing*", of any (!) artifacts on the basis of MAI. Reinventing makes it possible to quickly master the inventing process and identify correct approaches to solving new problems.

Using reinventing examples presented in a standardized MAI format, the author created a TRIZ Knowledge Base, now known under a working title of *Modern TRIZ Idea Pool*. This is a real "creativity machine" that pool-members can use to exchange their inventive and innovative experiences, continue their self-perfection through ongoing study of new examples and pool digests, and advance TRIZ through new research.

The book offers a number of accessible and practicable general-purpose tools.

I wish you success with this book!

Seung-Hyun Yoo

PhD in Mechanics (Stanford University),
Professor* of Mechanical Engineering, AJOU University,
Director of AUCHRD (AJOU University Center for Human Resource Development),
Suwon, Republic of Korea

16.03.2010

¹ In consonance with "Everything should be made as simple as possible, but not simpler" by Albert Einstein (1879-1955) – great German-born theoretical physicist, 1921 Nobel Prize in Physics;
<http://en.wikiquote.org/wiki/Einstein>

* In early 2000-es (for several years), Vice-President of Korea TRIZ Association

TRIZ Super-Task

Book Presentation by Dr. Anatoly Unitsky

With deep respect, I am presenting this book by Michael Orloff, expert in complex systems development management, researcher and global promoter of TRIZ – *Theory of Inventive Problem Solving* – which was discovered 55 years ago by Genrikh Altshuller.

For 15 years Michael – a considerate and empathetic person, a strong and independent individuality, and TRIZ expert – has been supporting my research and giving me the will to persevere, strength, and even inspiration to develop and build my inventions which, like TRIZ, must serve the entire mankind in the foreseeable future.

For more than 25 years, my ideas have always been fine-tuned with TRIZ and checked for compliance with TRIZ laws and models. And I see that our discoveries are aligned with TRIZ – and that in turn they reinforce TRIZ with "ideal" examples, corroborating the main TRIZ conceptual metaphors – "ideal solution" and "ideal machine".

Indeed, what can be more ideal than a string, if we need to build a straight and even speedway?! What can be more ideal than a self-ascending and self-returning string ring, if we need to create a transportation system linking the Earth's planetary and circumplanetary civilizations?

Michael has reopened to us that such ideas are alight with providence and even epiphany, and they engender feelings of beauty and wonder of creation!

He teaches us to discover a miracle of creativity in each artifact, in everything that surrounds us. Because all these things were first created by inventors and then implemented by designers and engineers.

Everything was invented, created by someone for the first time once!

And just the process of discovering beauty and wonder, I believe, is the super-task of TRIZ, of this book, of its author, Michael Orloff.

I think that it is also the super-task facing each of us, readers – to comprehend, through TRIZ and together with TRIZ, the miracle of creating things that are new, needful, efficient, unexpected, overwhelming and inspiring!

To perceive the wonder of inventing the future.

Anatoly Unitsky

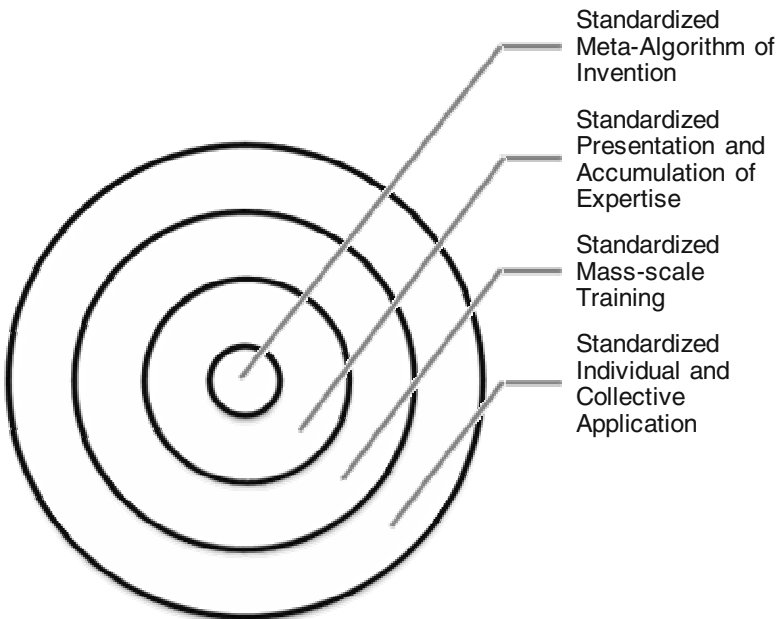
PhD in transportation, inventor² of String Transport Unitsky (STU),

Moscow, Russia

02.04.2010

² Anatoly Unitsky (b. 1949) – author of the conceptual framework underlying string technologies, inventor, researcher and designer of planetary and space-planetary transportation systems; www.yunitskiy.com

Modern TRIZ



About the "EASyTRIZ" brand

The brand "EASyTRIZ" has two connotations:

- 1) it contains a reference to the adjective *easy*, and
- 2) it is based on a radiolocation abbreviation *EASy* which is deciphered as *Early Acquisition System* (radiolocation: target acquisition and locking-in so early as possible to get advance for efficient reaction) – and with respect to training objectives is interpreted as

EASyTRIZ – Early Acquisition System for TRIZ

– to get right learning and skills in TRIZ as early as possible for efficient problem solving.

Who and How Taught Us to Think?

Author's Foreword



Photographic epigraph from the author:
General Electric Building, Rockefeller Center,
New York, 29.10.2006*

What was the starting point of your inventing experience?

Could it be the house that you once built with your favorite erector set? Or the sand castle that you made one sunny summer day on a small river? Or maybe the piece of pine bark that you turned into a small boat that you later launched down a short-lived rainwater stream? Or the toy airplanes that you manufactured first from newspaper pages or sheets torn out of your school notebook – and then from thin plywood, with wings of flimsy cigarette paper and engines of long tightly rolled elastic bands?

Or your drawings of bizarre flowers, trees and mysterious creatures that somehow always came out looking strangely human?

Or the feeling of awe inspired by the spring sunlight filtered through the arabesque filigree of maple leaves, the synchronic flight of doves, the myriads of stars dotting the fathomless dome of the night sky, the deafening roar of thunder and the blinding flash of lightning, the rainbow stretching above a humbled field, the weird world peering at you through a magnifying glass, the inscrutable attraction and repulsion of magnets, the magically slow emergence of pictures on sheets of photographic paper in the developing bath (now extinct "owing" to digital cameras and digital printing)?

Or could it be the village, complete with tiny houses and birch copses, that you built in the middle of the shiny wooden floor on the mountainous back of a good-natured "sea monster" made of a thick dark-green quilt? Remember how that "sea monster" carrying an entire living world on its back floated along under the sultry sun of exotic seas for what seemed to last an eternity... That is, until the evening came, and your parents returned from work, and your Dad asked you whether you had memorized the Pushkin' poem assigned by your teacher, whether there had been anything of interest in the paper that day, and whether you had thought up a move in the chess game you had started the day before...

* *Wisdom and Knowledge shall be the Stability of thy times*, Isaiah 33:6

I was about five years old.

Some of us were older, others younger – when at some point in time, somewhere in our inconceivably distant childhood, there happened something that led us, like the thread of Ariadne, through the labyrinths of life, something that prompted us, first young and inexperienced and then mature and sophisticated, to invent things that were exceptional, amazing, impossible – and at the same time very important, things that we would use doing our work, playing with our children, writing our lectures, consulting with our clients – engineers, managers, pedagogues.

I am not idealizing my childhood perceptions. On the contrary, more and more often I am haunted by realization of a strange, improbable and frightening fact: *nobody taught us to think*.

Indeed, did we learn to think while we memorized arithmetic rules or learnt theorem proving methods? And does anyone really remember those methods, or use them in his or her daily life? Well, definitely those who have become mathematicians, maybe some of those who have become engineers. A very important – or rather THE MOST IMPORTANT – component is conspicuously missing in our learning practices: we are not taught to "cogitate". None of our teachers told us about special "*cogitation*" methods designed to help us acquire skills required for *purposeful generation of ideas, resolution of intricate complex situations, conflicts and contradictions*.

The way I see it, we simply learned to live by *doing* things that we were required to do on an everyday basis at home, in the street, at school or at work. In a *certain learning environment* our brain apparently can master the ability for more or less *efficient, purposeful and inventive thinking*.

So we learned to think – widening the gap between ourselves and all other living things – animals and plants.

We had dreams and aspirations, we eventually amounted to something, achieved something, invented something – some of us wrote books and poems, while others composed beautiful music and imagined wonderful fairy-tale worlds.

And life went on – driven by the power of goodness and love, by the natural and sacred faith in the family, by the belief that we can become immortal through our children, and by the hope that we can change our way of life and make it more equitable and beautiful.

How and why did keeping that faith become the focal point of our lives and the lives of many other normal people who somehow still manage to keep the world going round? After all, all of us should have inevitably and inexorably become criminals totally devoid of any and all vestiges of morality – that is if we had succumbed to the infinitely iniquitous turpitude of movies and television shows, commercialized pseudo-music and pseudo-painting art, unrestrained squalor of the Internet, and persistent cruelty and amorality of many schoolyards...

I am surprised that, despite the overwhelming impact of evil and corruption spewed out by our TV screens and computer monitors, we are not turning into *mowglis* who are not destined to evolve into human beings despite Rudyard Kipling's benevolent fantasies. It is known that if a small child is not brought up by people, he or she *cannot become a human being*. Do we really want to spawn

*mowglis*³ who only look like people (and even that is not a given)? Do we want to let them walk among us, or control us?

It was only my pedagogical and psychological experience that helped me regain composure by identifying, in our collective socialization experience, certain prerequisites and indirect "techniques" which indicate *who and how taught us to think*. And there were many people who taught us to think. Some of them are mentioned in this book. But my "researcher gene" – the master of my subconscious – immediately and automatically triggered off a "reality check" alarm and demanded answers to more uncomfortable questions, such as these: Who and how taught us to resolve conflicts and contradictions? Who and how taught us to understand beauty? Who and how taught us to empathize and help other people? Who and how taught us to seek mutual understanding and engage in joint creative pursuits? Finally, what is the secret of survival of Personalities whose deeds keep humanity alive despite its stubborn endeavors to go to hell in a hand basket? Where are guarantees that our civilization will continue to develop and evolve?

It is difficult to answer all these questions. And there is yet another thought which vexes me – and justifies the emotional intensity of this address. It is the thought that arming people with inventive problem-solving methods fails to resolve the moral issues related to potential uses of this new "weapon". In other words, I am preoccupied with who and how will be exploring the new avenues opened by *efficient and powerful thinking*.

Contemporary history abounds in examples of situations where certain forces regard democracy exclusively as an irresponsibly generous, completely defenseless and basically gratuitous nutritional environment conducive to their amoral and criminal schemes. These forces, similar to democratic societies, organize into mimetic movements and associations which immediately declare that they intend to "fight for their rights". They rob normal people of benefits and resources and use those to disseminate evil and recruit new victims, e.g. through the drugs. As a result, we are being demoted to the bottom of the food pyramid which is topped by vice and iniquity. Our society is doomed to moral slavery because of our ignorance, indifference and cowardice – which for some inscrutable reason are called "tolerance". Well, be advised that evil is anything but "tolerant".

If some of you find this invective irritating, or believe that it distracts from their perception of their mission in life – which for many is as simple as the recipe for the proverbial Big Mac (incidentally, I have nothing against McDonald's technologies, with the proviso that their fast food cannot completely satisfy nutritional needs of a healthy human being) – this book is not for you; moreover, be warned that you may well be on the way to becoming both the victims and – *attention!* – agents of evil.

I am not trying to intimidate anybody – many are already scared of their own shadows having watched too many thrillers, but that does not stop them from gorging themselves on that drug because they know no other values or motiva-

³ Abandoned "man cub" *Mowgli*, raised by wolves in the Indian jungle, is a main character of fable-stories *The Second Jungle Book* (1895), performed many feats of valour in jungle; created by Joseph Rudyard Kipling (1865 – 1936) – British poet and writer, Nobel laureate (1907)

tions, because they cannot imagine that life can be different, because they have become willing participants of a global – and very real – *Truman*⁴ *Show*.

I have lived 60 years and mastered several crafts, and this experience has made me recognize the reality of active evil at work in the world, dispelled any illusions I may have had that good always triumphs over evil (evil can be prevented and defeated only by *active good*), and taught me to respect laws of system evolution and understand models designed to project future trends and study the driving forces of development. Naturally, this knowledge is imperfect and incomplete – as is any emergent knowledge – but it is enough to help me comprehend the *modus operandi* employed by evil, and understand (to my sincere regret!) the risks and dangers directly associated with the possible destruction and degeneration of our civilization.

Life would be impossible if we did not believe in goodness and fairness, in our friends and colleagues, in reasonability and inventiveness of the human race.

So – forward!

Keep doing your work day in day out – step by step, letter by letter, thought by thought, question by question.

Forward!

This is what I tell myself before making every step – however small – through the years of learning the world and making my own way.

This is what helps me push ahead even when my tormented eyes refuse to look at the monitor, when my joints and muscles scream for mercy after twelve hours of cruel and unusual punishment by intractable keyboard and recalcitrant mouse. Will these torture devices ever disappear from our lives?! I KNOW they will, and I know how it will happen, but they are still here... For the time being, special relaxation exercises remain my only solace. Write to me, and I will be happy to share my self-rescuing and pain-killing experiences.

Forward – all those who seek perfection and wish to make this world better.

Forward – starting with changing yourselves!

For a wise man once said^{*}: *be transformed by the renewing of your mind*.

YOUR mind!

I wish you luck and well-being.

Michael Orloff

Berlin, Germany

May 9, 2010

Special thanks: I would like to express my respect and thanks to translator Val Prokhozhy for great pleasure of working together for almost a year, and for the nice fruit of that labor – the English translation of this book.

June 10, 2011

⁴ fiction-movie *The Truman Show* (1998); directed by Peter Weir, Paramount Pictures Corporation

* *Transformamini renovatione mentis* (Romans 12:2)

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