

THINKING SKILLS FOR INNOVATIVE LEADERSHIP

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In the past, we could invent something once and enjoy benefits till the rest of our lives. Time has changed. Today we need to continuously stay innovative and maintain leadership - which means we need to possess “power” thinking skills to be able to constantly come up with new winning ideas. But what are the differences between “regular” and “power” thinking skills?

Due to nature of my work, I have had a unique chance to meet many great people: outstanding thinkers, inventors and innovators from different areas: technology, business, arts. Below I would like to summarize these 12 differences, based on many years of observations.

1. Multi-Screen Thinking vs. Spot Thinking

In most cases, when we attempt to solve a problem, we usually focus on a very narrow spot where the problem takes place. As a result we limit ourselves to considering only those components that immediately form the problem. However looking at the problem from the viewpoint of its relationships with a rest of a system where the problem has arisen helps identifying much broader scope of opportunities, better understand roots of the problem, and identify different strategies of solving the problem at different levels. Thus we should always try to see a problem as a part of a bigger system and also recognize how our future solutions to the problem will impact the future of a system and its environment. When we want to innovatively improve a certain system – technical, business, etc., - it also makes sense too look back to the past to find out what changes the system experienced and what were key drivers of these changes.

Seeing a problem or a system under different angles also helps to recognize different types of solutions and evolution strategies. (“Multi-Screen Diagram of Thinking” is one of the key TRIZ components, also known as “System operator”, or “9 Windows”.)

2. Abstract Thinking vs. Specific Thinking

Specific thinking forces us to stay at the level of details within a scope of already known solutions and concepts and try to adapt them to our problem. As a result, we either stuck or come up with small incremental improvements. Abstract thinking helps to migrate problem solving to a new level and to fight psychological inertia which is produced by mental images formed by specific information and details. It also helps to recognize analogies in totally different areas.

Say the word “wall” and we usually imagine a wall of a house made of bricks or stones. However, if we replace the word “wall” with the word “barrier”, we expand a space of possible meanings. But the wall can be also a waterfall, a steam flow, a light lock... By saying the word “company” we immediately start imagining an office filled with people and desks while a company can be virtual, with home-based employees, etc. The term “organization” helps to be more abstract.

Specific terms always constraint our creative thinking because they are associated with specific images and patterns which increase our mental inertia. Abstraction furthermore helps to recognize links among seemingly unrelated objects and events and come up with totally different ideas and concepts. Development of abstract thinking greatly boosts our creative skills.

3. Breakthrough Thinking vs. Trade-off Thinking

TRIZ states that emergence of contradictions is a major driving force of evolution of technological systems, and resolving contradictions by their elimination instead of trading-off helps achieve a major qualitative jump in evolution of a system. The idea of resolving contradictions to achieve breakthrough solutions was not introduced by TRIZ: it was developed in the 18-19th centuries within a branch of philosophy known as dialectics by German philosophers Immanuel Kant and Georg Hegel. TRIZ managed to turn theoretical aspects of dialectics to the applied science.

For instance, a speed of a chariot will be always limited by speed of a horse, no matter how much effort we put to redesigning a chariot, or how greatly we feed horses, or how many horses we have. To find a breakthrough solution - to reach a higher speed, we need to oppose the existing concepts and think of replacing a horse with something that makes the chariot move much faster, for instance by a diesel motor. But it is not always necessary to introduce radical changes: sometimes even very “heavy” contradictions can be resolved by minimal changes in an existing system.

Apparently this is valid for many other types of man-made systems. For instance, during evolution, business, social, and political systems experience numerous contradictions as well. However when we face contradictions, our mind tends to soften conflicting demands and search for a compromise instead of targeting at breakthrough solutions that would completely eliminate contradictions and help us to come up with disruptive innovations. Thus contradictions remain unsolved - but unsolved contradictions tend to deepen over the time. Early recognition of contradictions and resolving them is one of the most important features of “power” thinking.

4. Intensification Thinking vs. Sheltered Thinking

We are often afraid to think outside of existing concepts and ideas. But all breakthroughs happen only when we overcome barriers set up by our mental inertia. To break these barriers, it helps to intensify given tasks, conditions, or requirements. Often we need to intensify them to such a degree that they start seeming to be “impossible”.

For instance, we want to develop a new concept of a mobile phone. How small the phone should be? We can start thinking about usual dimensions of the mobile phone – for instance, its length is around 10 cm. So shall it become 6 cm? Wrong! Imagine that the phone’s length should be 1 cm, or, better, 1 mm, or even a size of a biological cell. It is clear that the entire concept of a mobile phone should then become totally different. Or we want to have a screen of a mobile phone which completely fills our field of sight. It is also clear that we should think about totally different idea of the screen: probably, a projected screen, or a screen mounted in glasses, etc. By pushing existing limits far beyond we increase our chances to come up with radically new solutions.

5. Non-linear Thinking vs. Linear Thinking

It is known that about 80-90% of long-term forecasts made by even very renowned futurists appear to be wrong. A common mistake which is often made is focusing on extrapolating existing trends without recognition of radical changes or new factors which will become important tomorrow and which are not visible or not possible to predict today. The same happens with problem solving: staying within a frame of known concepts and relationships it is not possible to recognize non-linear connections. Non-linear thinking also helps to bring together things that are not related today but can be linked in the future and produce a great impact on technology and society, such as was, for instance, development of a personal computer.

Non-linear thinking is not easy, since to understand the factors leading to non-linearity in evolution of a certain system, we should also recognize how the system, as well as its supersystem are going to evolve by taking into account how today’s contradictions will be resolved tomorrow.

6. Diversity Thinking vs. Uniformity Thinking

Breakthrough innovations are almost always based on outside knowledge. Thus it was not surprising that I noticed that one common thing among great inventors and thinkers I was lucky to meet has been their “hunger for knowledge”. And what is important, all these people do not limit themselves to a single specific area of interest: as a rule, they consume a lot of information from totally different areas.

A library of Voltaire who lived in the 18th century counted 6.814 books, more than 2.000 of which had his handwritten remarks. A library of Thomas Edison consisted of 10.000 books. A friend of mine,

who invented a disruptive technology for chemical industry, has also a library of 10.000 of scientific and technical books, and he read most of them.

Diversity helps to both see solutions in other areas and develop unique experience which helps to recognize patterns between seemingly unrelated things.

7. Structured Thinking vs. Random Thinking

We often think that to solve a “big” problem in a creative way we must “unlearn and unstructure” as much is possible. True, because it helps us to fight our mental inertia. But as noted by G. Altshuller, the originator of TRIZ, unlearning and unstructuring work well when we solve problems of low degree of difficulty that do not require numerous trials to find a solution. Once in a lifetime we can be lucky. But when we constantly facing problems of high degree of complexity, we must structure the problem solving process. We must have a roadmap how to navigate from a problem to its solution, reuse previous experience, and patterns of strong solutions.

Does introducing a process kill creativity? Not at all. In ancient Rome, the mathematical operation of division was considered to be an art and was based on heuristic rules. Today this operation is fully formalized and automated and nobody seem to suffer from that. Bringing structure to support creative processes does not mean replacing creativity with formal procedures: creative imagination remains of great importance to find a final solution. But we can drastically save time and efforts by structuring the process and thus avoiding unnecessary errors which often cost billions of Euros and dozens of years. Most important is that a structured and well-defined process is repetitive.

8. Ideality Thinking vs. Consumption Thinking

Since our childhood we learn that if we want to get something, we need to pay for it. If we want to have a car, we should pay a certain money equivalent for it. If we want to launch a new enterprise, we need to invest, find new people, purchase needed technologies, office furniture, etc. If we want to build a house, we need bricks, glass, wood, etc. However these “payments” can be totally different to get the same result and it is something that we do not learn neither at schools nor universities.

Once I was involved to helping a customer who had a problem with a robot which was not properly adapted to do a job, and as a result there was persistent loss of a product. The customer contacted the robot’s manufacturer who proposed to upgrade the robot within several months by adding new electronics and precision mechanics, but such solution would cost my customer around Euro 500k. A bit too expensive, but there seemed to be little choice. However by formulating an “Ideal Final Result” concept we were able to solve the problem within one hour and our solution was implemented next day: we only used resources which were available directly in the customer’s manufacturing process. Result: no product loss any more.

Ideality is an extremely powerful concept which forces us to recognize already available resources to achieve what we want. A few years ago, if we wanted to have a video streamed from our company website, we would pay a large amount for an expensive broadband internet channel. Today we just upload our video to YouTube, link to it, and pay nothing at all. Such resources are everywhere – and smart thinkers achieve extraordinary results by timely recognizing and using them, or even by creating them to be used by others.

9. “Ultimate Goal” Thinking vs. Shallow Thinking

Goals are everything. Goals predetermine our results, our intentions, and our strategies. If we set up a wrong goal, we are doomed to fail; if we set up a weak goal, we will get weak results. I remember that several years ago I read a cover article in *Time* magazine, where the author was exploring a progress in cancer research. His conclusion was that most of research in the US was focusing on decreasing tumor sizes rather than on completely eradicating the tumors... But does reducing the tumors mean their elimination? Not necessary at all. In TRIZ, G. Altshuller introduced a concept of an “Ultimate Goal”: let us set up goals which do not seem to be achievable today: for instance to reach the stars, to completely eliminate hunger, eradicate poverty, find a cure for cancer, and alike. Probably, we will not achieve them even during our lifetimes, but the progress made would be considerably greater than defining weak goals in the very beginning.

10. Evolutionary Thinking vs. Trials and Errors Thinking

Before TRIZ, the vast majority of innovations were made by trials and errors. However TRIZ studies uncovered laws and trends of man-made systems evolution and knowledge of these trends becomes essential to define what to create next without blind guesses. For instance, we know that a specific system in the beginning of its evolution might tend to increase the degree of dynamics by increasing dimensions, breaking to many parts, and introducing flexible links between the parts; but when the system moves over a certain point of its evolution, a number of parts, dimensions, and the overall degree of the system’s dynamics tends to decrease.

For instance, consider a history of evolution of large-capacity computer memory storage: the first electromagnetic devices for storing information included large and bulky components with moving parts (electromagnets) and occupied entire rooms. Later they were replaced with tape recorders, hard drives, and optical disks (DVDs). Today we are even getting rid of hard drives: they won’t be needed since they will be completely replaced with small, energy-saving, large-capacity solid-state memory devices (similarly today’s USB memory sticks) without any moving parts.

Understanding mechanisms of evolution helps to considerably shorten time for new ideas development and making right decisions.

11. Long-term Thinking vs. Short-term Thinking

Quick fixes or investments to the future? Ok, in some cases quick fixes are necessary and justifiable, but when our thinking is only limited to quick fixes we might be drowned in them. One day it might become clear that quick fixes do not work any longer but we do not have neither enough time nor physical resources to avoid a disaster. Thus quick fixes might be ok only if they are balanced by proper investments to long-term goals.

12. Wild Thinking vs. Down to Earth Thinking

This is where a role of creative imagination becomes crucial. In his book *“The Psychology of Creativity”* published in 1896, French psychologist Theodule Ribot revealed that we reach a peak of our creative imagination in the age of 12-14, and then our creative imagination gradually degrades. And it is true: when we are young, we read fairy tales, we play games in which we invent new fantastic characters, explore space, etc. and thus we boost and develop our creative imagination skills because in these games, no one demands us to stay within the borders of “reason”. Thus we push borders beyond known limits and relax our mental constraints. When we grow older, we sink in the world of reason and rational thinking; and we even might be punished for “crazy” thinking. But there is no other way: moving “out of the box” demands crushing our mental barriers. Luckily, creative imagination is not magic; everyone possesses it and can further develop it.

And finally - I strongly believe that most important contribution of G. Altshuller and TRIZ was not a toolbox introduced to support creative phases of innovation, but that it was revealed how “power” thinking can be learned and developed.