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“SYMPHOS 2013”, 2nd International Symposium on Innovation and Technology in the Phosphate Industry

Innovate: Yes You Can

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Abstract

This article introduces the basic principles of creativity: how to create conditions to promote creativity and the emergence of ideas leading to discoveries and innovation: 1) how to think outside the box and become flexible, 2) major steps to innovation: what are the scientific stages of invention, 3) what are the obstacles to innovation, and 4) how to innovate? Two methods, creative breathing & TRIZ, will be discussed.

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1. What is innovation?

According to the French Academy dictionary, the term innovation dates back to the 13th century and is borrowed from the Latin word “innovatio”, which means “renewal”. The innovator is therefore someone who “tries something new”. Arnaud Groff defines it as the ability to create value by bringing something new to the domain while ensuring that ownership of this innovation is done optimally. The 3 pillars of innovation are: creativity (the generation of new ideas), value (estimated value, use value, and exchange value) and integration (mastering the process of change). Quite the jargon! Yet, what are we really talking about?

2. The requirements for innovation

If I ask you to continue counting: “1, 2, 3...” and your answer is 4, 5 or whatever else or if I ask you to stand up and touch your toes and you try to do it while keeping your legs straight, acting like a flexible athlete, then you are not thinking outside the box. If, on the other hand, your answer to the first question is, for example, “ba m’cha Isbata...” or “a 0 to the left”, then you are able to think outside the box. This is the first requirement for innovation. As Albert Einstein once said, “Any intelligent imbecile can make things bigger and more complex. It takes a touch of genius and a lot of courage to move in the opposite direction.”

In 1800, people thought it was impossible to catch smallpox if they had already had cowpox. After 20 years of work, Edward Jenner (1749-1823) successfully demonstrated that they were right and for over a century that didn’t change. Until 1879, when Louis Pasteur, while studying cholera and preparing bacillus cultures, was able to separate the idea of the vaccination from the disease cowpox and apply it to something else. He was thinking outside the box.

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If I ask you what a glass can be used for and your answer is: “to put liquid in”, then you have trouble seeing things from a different angle. The glass, in fact, can serve for an array of uses, like a magnifying lens to start a fire, a table leg, an ashtray, a flower pot, a circle print, a fly trap, a measuring cup, an aquarium, a xylophone, a projectile and if it is broken, it can still be used for a whole new variety of things. Seeing things from different angles is the 2nd requirement for innovation. Comedians, magicians, and other artists use it all the time.

Here are two examples. The first: “I find that television is very educational. Every time someone turns it on, I go to another room and read a good book.” The second, “Mrs. Asri wakes her son: “It’s time for school, son! I know you don’t want to go, but you have to!” He answers, “I don’t want to go to school anymore. The teachers don’t like me and the students won’t stop making fun of me. Why should I go?” She replied... (Try guessing by looking at it from a different angle)...”But, son, because you are 40 years old and the principal of the school.”

How did Thomas Edison think of the light bulb? While researchers were trying to create a vacuum (to remove the oxygen) to slow down or stop the filament from combustion, he managed, after some time, to analyze the problem from a different angle: how to get rid of the bulb of oxygen and replace it with another gas, instead of trying, in vain, to create a vacuum. Edison used to say, “Genius is 1% inspiration and 99% perspiration.” The third requirement for innovation is therefore work, a lot of work. To attain a level of excellence, according to Anders Ericsson, you must put in 10,000 hours, 6 hours per day for 5 years or 3 hours per day for 10 years.

The fourth requirement is that you must take risks. It is fundamental to always remember that in every era, men and women have been incapable of seeing certain things, which would become obvious to the coming generations. To give a few examples, T. Watson, president of IBM, estimated in 1943 that 5 computers would be sufficient to meet the world market demand. Even better, in 1981 Bill Gates said, 640K computers would be enough for everyone. And one last example: take a piece of paper. It has 2 sides. Can you imagine a sheet with only one side? Impossible! But actually it is possible: the A. F. Möbius Strip.

The fifth and last requirement is to have the right to fail. John Rices, vice president of General Electric, says that the greatest challenge for innovation is the right to fail. To succeed, a company must create a culture where failure and “apparent loss of time” are acceptable, because innovation also requires a lot of patience, especially during the reflection or latency period, where inventors are very vulnerable. You must protect these people from rash judgement. The company Dupont starts with 3000 initial ideas, only to keep 300 realistic ones of which they will realize 2 and end up with one commercial success.

3. Companies and innovation

Your products are in the process of becoming commodities. Your technology and products are progressively more mature. The competition is limiting you more and more with patents. Your technical problems are increasingly more complex. Your technical and financial performances meet your expectations and standards less and less. The competition is stronger and more complex. How do you overcome these obstacles? In most companies, in Morocco and elsewhere, there is no engine for innovation. Companies are afraid of taking risks, which kills innovation and favors inertia. Very few companies have established a work program for innovation, because innovation is still perceived as R&D work. However, if you are not innovating, your company is going nowhere.

Innovation is the most important skill for the future. Innovation is a performing, organized system capable of continuously creating and developing promising ideas or solutions that can be transformed into powerful, creative new ideas that bring value and wealth. Companies with an innovation culture have institutionalized a reliable, reproducible, and flexible work program to generate solutions to problems and create innovative processes/products that will be able to compete with the competition. However, don’t forget that it is people that are innovative. Do you remember the company Sony? They invented the Walkman. Sony mastered the technology of miniaturization and signed exclusivities with several artists. Due to a lack of innovators, however, Sony didn’t invent the iPod, iPhone, iPad or even iTunes.

4. How to do it?

We are all potential creators. With training and a lot of work, we can all play soccer. Of course, we cannot all become Ronaldo (for the Madrid fans) or Messi (for Barcelona fans), but we can still play. Innovation, on the other hand, requires implanting a structured approach in a business environment to channel our creative process!

There are numerous methods that stimulate innovation and they all rely on thinking outside the box and looking at things from a different angle. To keep it simple, we will cite only 2 methods that seem to be complete opposites: the first is creative breathing and the second is the TRIZ method.

In the first method, the creative process is typically based on a series of phases called divergence and convergence, which aim to explore, rephrase, produce and select. This simplified plan helps highlight that the creative process is not just brainstorming. There are, in fact, four phases that can be successively repeated:

- Explore: in the beginning, there is freedom to explore by spontaneously generating ideas and concepts;
- Rephrase: the second step is for questioning and explaining, which helps test the robustness of the expressed ideas and the level of interest;

- Elaborate: the third step is where a regeneration of ideas occurs, but with the question/problem to be solved as the background;
- Select: finally, the fourth step, called “selection,” is where the leads that are retained are sorted and prioritized.

The second method is called the TRIZ method. It was developed by the Soviet inventor and science-fiction writer, Genrich Altshuller. He began developing it in 1946 while working in the “Invention Inspection” department of the Soviet Navy. By 1969, Altshuller had looked at approximately 40,000 patent summaries to learn how innovation took place and developed the concept of technical contradictions. TRIZ is a theory that considers engineering problems and suggested solutions based on their structure. It states that technical systems evolve towards increasing what is ideal by overcoming contradictions, often with a minimal introduction of resources. Most innovations are transpositions of known solutions in other fields. Altshuller put together 40 Principles. I will talk about the fifth principle or Grouping, where we associate identical (or similar) objects (or ideas) or objects that operate similarly. Based on this principle, there is an infinite number of examples: a scooter (bicycle + engine), a suitcase with wheels, an electric toothbrush, etc.

5. Conclusion

It doesn't matter which method you use, what is most important is to believe in it, work at it and achieve your goal. Think about the problems in the world: global warming, dwindling energy and clean water supplies, scarcity of new materials, etc. I would like to close with a quote from the book, “A Brief History of the Future” by Jacques Attali, “When we lack something, it pushes us to go find a new resource. Scarcity is a benediction for the ambitious... Another lesson: it doesn't matter who invented the technology, what is important is to be in a position – culturally and politically – to implement it.”

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