

Social Innovation in Industry 4.0
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Lecture 25
Creativity Tools and Techniques (Part 1 of 4)

Welcome to the next topic of discussion Creativity Tools and Techniques. Creativity is something which certain people have inbuilt, many of them have acquired while running through in their life that comes by maturity or that comes by observational skills. We are now focused more towards creativity of those, people who have built the skill by observation. Only 1 percent of the people have creativity inborn, but many of them acquire during their journey.

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So, here we will try to have an introduction, then understanding creativity process, then divergent thinking. Some of the tools say for example, brainstorming technique or a tool, then Scramper technique, then random word association, then, mind mapping.

I always have a example from my childhood days, this random word Association, I always try to have lot of biological names, I used to randomize it and then, I used to connect with one of my classmates name. So, by doing, I always used to remember the biological name. So, my mapping will be to identify my own name, my friends name, from my friends name, a randomized word association, from a randomized word association, I will go back to the original. It was fun because biological terms are very difficult for a normal man to remember, the words are little complex.

So, here we will use a similar thing, but not with analogy acronym, but something else.

Introduction

"Creativity is intelligence having fun." - Albert Einstein

Creativity is the key to:

- Unlocking new possibilities,
- Driving innovation, and
- Finding unique solutions to complex problems.

In today's rapidly evolving world, the ability to think creatively is becoming increasingly vital for success in various domains

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Creativity is intelligence having fun, this is what Albert Einstein said. How do you look at an object, how do you look at a problem is creativity. So, by looking at the problem many a times, you will say, I did not study properly. If some student says, I failed in the business, if you say, that is one more information.

So, I have put it into my data point and that is it. There ends the matter, but if you look at why did it fail and what are the root cause, then maybe if I can do cut and paste across different ideas. Then, creativity comes into existence. Creativity is the key to unlocking new possibilities, deriving innovation and finding unique solutions to complex problems. So, these are the three important things which are part of creativity, unlocking new possibilities.

There will be a possibility people would have said that, it is beyond the scope of thinking, beyond a technology or beyond safety or something like that. Then, what you do is, you try to look into it and then try to remove the hurdles which are there, unlocking new possibilities, deriving innovation.

I have already told if there is a need statement and you observe it and then you keep on brooming around it, you will see several or similar things around it, try to do a cut and paste comes a creative idea. Cut and paste means, you see cut paste and customize leads to innovation or creativity right. So, the next one is finding unique solution to complex problems.

There can be a humpty number of solutions trying to find out a unique solution such that, it is cost effective and it is sustainable, then you call it as a unique solution. In today's rapid evolving world, the ability of thinking creatively is becoming increasingly vital for success in various domains. What was a practice which was going there for long years

cannot be continued. Can you look into the pain points of the process and then, try to bring in some amount of creative thoughts such that, it will be taken to the market. So, becoming increasingly vital today to have creative thinking.

Understanding Creativity

Creativity is the ability to generate original-

- Ideas
- Approaches
- Solutions

It is a complex process that involves a number of different cognitive skills, such as:

- Divergent thinking
- Problem-solving
- Imagination

Creativity is multidimensional, it can be expressed in a variety of domains, including

- Arts
- Sciences
- Business

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Creativity is the ability to generate original ideas, approaches and solution. It is not a simple process that involves a number of cognitive skills in this process. So, you will have divergent thinking, you should have or you will have problem solving skills, you will also have imagination to come to a solution to the problem with creativity. Divergent thinking, problem solving attitude is very very important for an innovator. If there is a problem, try to go around the problem, looking for solutions is really a skill.

Trying to look into say for example, if I take 10 minutes for entering the data and recording the data, can I reduce the 10 minutes recording into 1 minute, can I make it digital? When I make it digital, it is transferable, it is consistent, it is reliable, it is cost effective, it is easy or it is quickly been made, time consumption is very less. Now, rather than writing it digitally, if I could make it like an auto system itself using sensors, then that is much more easier. So, you will look forward for problems, look forward for solutions, the problem solving skills are very important, then, you should also have an imagination. Imagination is a horse, which you should always kick and allow it to run. Many a times during imagination, you will have wild thoughts.

These wild thoughts are to be recorded in a diary and you keep it aside. May be one of the thought when later technology comes, becomes easily adaptable imagination. So, the creativity it is a complex process, that involves a number of different cognitive skills, such as divergent thinking, then you will have problem solving and imagination. Creativity is not a single dimensional attitude, it is a multi dimensional approach. You will have x, y, z.

All the things have to be done in a continuous fashion. So, creativity is multi dimensional. It can be expressed in a variety of domains including arts, science and business. We are more focused in this on these two science and business for social innovation.

The Creative Process

The creative process is a complex and iterative process that can be broken down into four main stages:

- Preparation - Gathering knowledge, insights & inspiration
- Incubation - Allow ideas to incubate & letting the mind make connections subconsciously.
- Illumination - Experiencing the "Eureka" moment or sudden insight
- Evaluation - Assessing feasibility of implementing idea.

The creative process is not always a linear process. Sometimes, you may find yourself going back and forth between the different stages.

Creativity is a fluid and iterative process, and ideas and insights can emerge at any stage.

Creative process

- complex cognitive
- multi dimensional
- iterative
- non linear process

The creative process as I told you, is a complex and an iterative process. So, complex process multi dimensional, the dimensional cognitive skill process and it is not that one shot, you go to the solution. Creativity is also an iterative process, which every time, you have to improvise and try to think out of the box and move towards problem solving.

So, creativity process is a complex and iterative process, that can be broken down into four main stages. If you want to eat an elephant, you have to start eating the elephant bits by bit or bytes by bytes. So, that means, to say a complex problem is dissociated into simple problems and for each dissociated problems, you have to do a preparation.

What is a Preparation? Preparation is nothing, but gathering knowledge, insights and inspiration. It is gathering knowledge insights and inspiration is a preparative stage or a preparative process in creativity. So, then it is Incubation. Incubation is you go around the idea, allow ideas to incubate and letting the mind make connections subconsciously. So, this is very important.

So, Incubation means what? You are trying to do some growth, you are trying to have something in incubated means, you are trying to remove all the noise factors have only the signal. For example, many a times, the newborn baby is put under Incubation. So, why is that Incubation? Incubation means, you have all other environmental clean or you try to cover the baby into an environment where, all other factors which is, there inside the environment is controllable and conducive for the baby to grow. So, that is incubation. So, in the same way, allowing ideas to incubate is letting your mind make connection subconsciously.

Then Illumination, Illumination is experiencing the eureka moment or sudden insight. This is very important sudden insight. Illumination, you flash with an idea then, whatever idea comes to you, you assessing refining and implementing idea is important. So, the creativity process, is complex and iterative, it is divided into 4 stages. These 4 stages are major stages big stages.

Inside this each stage, you will have to do several micro management. I am only covering the several big big stages. So, Preparation stage, then Incubation stage, then Illumination stage and Evaluation stage and mind is pretty interesting. Many a times, you would have seen, you would have studied a similar problem, but not the same problem while preparing for the examination, but during the time of examination or at the exam in the examination hall, when you start solving a problem, you will always try to get a new idea. Flash idea, which is an interconnect between several of these ideas, you will try to solve and then get good marks.

So, that is a eureka moment. After you do an eureka moment, then what you do is, you try to evaluate that is assessing, refining and implementing the idea. The creative process is not always linear, it does not go step by step in a linear fashion. For example, Preparation, Incubation can go first step and then, rather than going into Illumination stage, it can go back to Preparation stage. So, the creativity process is not always linear.

It is a non-linear, if I want to put all the creative keywords, creativity process. Creative process is one complex cognitive multi-dimensional iterative non-linear process, creative process or creativity means. These are the keywords which you should come sometimes, you might find yourself going back and forth between the stages, this is what I said up and down you move to the next one up and down from here, it is again up and down. Creativity is a fluid and iterative process an idea and insight can emerge at any stage.

Divergent Thinking



Divergent thinking is a cognitive process that involves

- Exploring multiple perspectives
- Generating a wide range of ideas
- Thinking beyond conventional boundaries



It is a key component of creativity and allows for exploration of

- New possibilities
- Unconventional solutions

Benefits of divergent thinking:

- Increased idea generation
- Enhanced flexibility
- Encourages originality

↓
Supports the generation of unconventional ideas + groundbreaking innovation

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Increased idea generation - Divergent thinking expands the pool of potential ideas.
Enhanced flexibility - Allows for exploring multiple approaches to adapt to complex changes.

What is divergent thinking? You remember, I said three things one is Divergent Thinking, problem solving and imagination.

Let us start looking into these three. What is Divergent Thinking? Divergent Thinking is a cognitive process that involves exploring multiple perspectives, generating a wide range of ideas, divergence and then convergence D, C. So, it is exploring multiple perspectives generating a wide range of ideas thinking beyond conventional boundaries. These are part of divergent thinking. It is a key component of creativity and allows for exploration of new possibilities and unconventional solutions.

These unconventional solutions are out of the box thinking. So, what are the benefits of Divergent Thinking? It has increased idea generation Divergent Thinking expands the pool of potential ideas. Then, enhanced flexibility means, it allows for exploring multiple approaches to adapt to complex changes. Encourage originality means, it supports the generation of unconventional ideas and ground breaking innovation. So, these are the benefits. This is a divergence, this is convergence.

Divergent Thinking

Examples of divergent thinking:

- Brainstorming
- Mind mapping
- SCAMPER
- Random word association

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So, some of the examples of Divergent Thinking are brainstorming examples means, these are the tools, which are used under Divergent Thinking is Brainstorming, Mind mapping, SCAMPER and Random Word Association. We will see one after the other, these are some of the techniques.

Brainstorming

Brainstorming is a divergent thinking technique for generating a large quantity of ideas in a short period of time.

It is a group activity where participants are encouraged to come up with as many ideas as possible, without judgment.

Key principles of brainstorming:

- Suspending judgment
- Encouraging wild ideas
- Building upon others' contributions

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What is Brainstorming session? Brainstorming is a Divergent Thinking technique for generating a large quantity of ideas in a short period of time. For example, you try to have time versus large number of ideas right.

So, if you plot it the number of ideas in the initial phase, will be more and then it gets saturated. So, what we are trying to tell you is, we are trying to say you, stop at some point where in which, you get maximum ideas and then, you try to do the Brainstorming session. This can be equal to 15 minutes, 10 minutes, 1 day whatever it is, it depends upon the problem and it depends upon the number of ideas. So, it can go like this, but in the initial stages, you will have more ideas and in the later stage, you will have only

small number of ideas. Maybe the small number of ideas are very good, but initially you will have more ideas in brainstorming, we need more ideas to put into and then look forward for a solution.

It generally happens as a group activity, where every participant is given a time on a circular fashion say for example, each one talks for a minute gives multiple ideas and then, you will try to do this round robin thing for maybe 3 times, n equal to 3 times to get all the generation or what you can do is, you can also try to have crisscross interaction, say for example, one person says the other person criss, then you try to go here, then you try to go here, then he comes here.

So, you can start doing it. So, here it will be once, somebody throws an idea, the other person adds to the idea or gets something which is deviated from that idea. At this point, there is no idea judged. I or you will not say oh, this is a bad idea, this cannot happen because I have done it in the past, no you just jot down all the ideas which come to all the participants in the group and mind my friends, once I say group activity, you have to choose your group properly.

If you choose your group, all of like minded people, then the solution whatever you get is not going to be feasible or it is not going to be unique. It is always good to have a group with complementary thought process for example, I know materials, he knows business, the third fellow knows sales, the fourth fellow knows all the manufacturing processes, fifth fellow can understand customer.

So, you see all these people are complementary, you can have multiples of them for example, marketing there can be two, there can be one fellow who can understand the business totally, then one fellow who understand sales, one fellow who understand or two fellows who understand marketing. So, two fellows can be for material. So, now, you see a team of 10 will be there.

So, it is a group activity where, participants are encouraged to come up with as many ideas as possible without judgment. So, I was told in a corporate company, you know major auto giant company every day, they encourage their employees to give creative innovative ideas. They all have to do is, just write the idea in a piece of paper and drop it in a box. Moment, they drop immediately, there is an auto generated coupon, which comes for ice cream.

So, now, people who want to eat ice creams free of cost, they start looking for ideas and all these ideas will be accumulated and there is a committee, which goes through these ideas and in that small sheet, what they do is, they ask only two questions, what is this idea? How is this idea going to impact you? Next is, company they will have to write those things and then drop it into, if there is a genuity.

So, then, they immediately take that idea and then start working further and what worth of it, they are encouraged by giving more ideas, they get a free coupon for ice creams or whatever it is. So, they try to get. So, here what they are doing is, they are not judging any idea and here when I said, group activity, all the employees in the factory are trying to give ideas and I told you in the sheet, you have to say, what is your idea? How is it going to impact you or your productivity in the factory?

The next one is going to say, how is the company going to get benefited? Say for example, if you say, I am sitting in a location or I am standing in front of a CNC machine and I am keep on the operating or automatic assembly machine, I am standing all the time, if you can provide me a chair to sit and then continue the operation, I can increase the productivity by reducing the number of scrap possible.

If you can give me an air conditioned environment, my productivity improves, that is true. For example, today long distance truck, the driver cabin is now made out or is now given AC. So, why is it given air conditioned because the driver's fatigue is reduced and he has better concentration and he can travel faster. So, making that small cubical air conditioned is not going to be expensive. So, now, that is a creative innovative solution, where in which, the productivity is enhanced.

One getting lesser number of times fatigue or trying to stop lesser number of times thereby, increasing the productivity. So, this is one idea and it is only trying to improve the productivity of that particular person and the final impact is the company can get lot of once, the turnover time is reduced, there will be more longer distance.

It can transport and moment it has a longer distance to transport, the company becomes or makes more profit. So, that is what is its individual impact? What is the company's impact? The key principles of Brainstorming is suspending judgment, I will not judge your idea, whatever you say is fine keep the putting all these ideas into a box or keep sticking all your ideas onto a wall, right a take a blackboard and then start writing it with different colored chalk pieces or take a stick post, small papers and then, in that, you start writing all your ideas and spaced it. So, encourage wild ideas.

Some years back, when people were talking about drone in a conference, there was a visionary, who came and said, in future, there will be human lifting drones. So, initially it was thought for hospital or ambulance to replacing helicopter.

So, they were trying to think of in that way, but now, what has happened, they have started bringing that, in under the umbrella of tourists. So, someday, somebody gave a wild thought, "Why do not a drone lift a person?" What the initial drones were used for photography and videography and one person said, "Why do not I use it for recording marriage events?" And, now it has become a mandate in all marriages. The photographs

are taken by drones and the complete video is taken aerially through drones. So, it is a wild thought, but you have to encourage that thought, today it has become reality. So, encourage wild ideas, wild thoughts, then build upon others contribution.

So, that is what I said. You can have a time 't' given to every individual, they speak their ideas or if one person give their idea, you try to add to that idea yes, I am also sure I saw in that product. So, then you try to complement or you try to contribute to that idea. So, the three principles are going to be never judgmental. Try to encourage very wild thought process. The third one is, try to build upon others idea or comments whatever it is.

So, this happens during a Brainstorming session. The Brainstorming session can happen for 3 hours, 15 minutes, 10 minutes, 5 minutes. I have attended 3 minutes Brainstorming session, they come into the room, everybody sits, they say now we start doing Brainstorming session, here is a problem statement, everybody starts throwing their ideas and they say thank you gentlemen for your ideas, you can leave now. That is all.

They do not even give time for the others to assess the idea. They write it down and then they call us the next day again for 3 minutes, start adding some more ideas, the next day, start adding some more ideas.

At the end of the week, the problem statement has more than 150 to 200 ideas. So, that is Brainstorming. Thank you very much.