



DEVELOPING CREATIVITY



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About the Tutorial

Creativity, unlike what people often feel, is not exclusively an innate quality gifted only to a few selected people. It is true that some people are born with prodigious amounts of creativity, but the truth is that creativity is present in everyone. Interestingly, creativity can be learnt, nurtured, and practiced by interactive techniques.

This is the reason why the scientific community wants Creativity to be taught as a part of the educational process, so that young minds can see and offer different points of view to standard norms. In this tutorial, we will discuss all the areas that creativity influences and how to nurture it in one's career path.

Audience

More the creative abilities of the people, the more creative results they tend to achieve. Once people start thinking beyond the standard problem-solving modes, they begin to consider a wide range of alternatives to their problems. This tutorial will motivate all those readers who seek creative solutions to problems and in turn increase their productivity and quality of output.

Prerequisites

This tutorial was designed to identify the differences between general problem solving methods and creative problem solving methods. The readers need to have a basic knowledge about the various organizational scenarios that people may face at their workplace.

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1. Developing Creativity – Introduction

There are numerous ways of describing Creativity, out of which the one that most scholars agree is that – it is the **supply of imaginative ideas** which provide innovative solutions to problems through a new approach to the problem. It is also defined as a novel approach that can integrate with an existing knowledge in an organic manner.

In addition to all these features, creativity should also result in ideas that are valuable or have any positive evaluation. If a creative idea is not practical, then it ceases to be of any value. Such creative ideas are not considered creative, but impractical.

Creativity involves the dual processes of generation of new ideas, as well as generating different ways of seeing the same events, both are important to achieve creative solutions to the problems.



Creativity involves the generation of new ideas or the recombination of known elements into something new, providing valuable solutions to a problem. It also involves motivation and emotion. In this tutorial, we will discuss all the areas that creativity influences and how to nurture it in one's career path.

Defining Creativity

Creativity is a unique quality of human intelligence in general. It can be found in everyday situations that people face in their lives, such as the association of ideas, recalling, having a perception, analogical thinking, and engaging in self-criticism.

There are three kinds of Creativities which tell us different manners of supplying novel ideas:

- **Combining Creativity** - This is a new combination of tried and tested ideas.
- **Exploring Creativity** - New ideas are generated from exploring concepts.
- **Transforming Creativity** - Transforming set structures to enhance new ones.

Creative thinking is credited with playing an important role in innovation. In fact, people even go to the extent of saying that both Creativity and Innovation are complementary activities. Pursuing a creative thought results in innovation. Pursuing different ways of solving problems results in getting creative answers.

For creativity to convert into innovation, a proper organizational culture is necessary. A right organizational culture provides opportunities and support for the creativity processes for the development of personal and group creativity skills.

Significance of Creativity

One of the foremost objectives of engaging people in a creative thinking process is as follows:

- To make people think without boundaries
- To initiate curiosity in something
- To steer clear of conventional yet traditional ideas as well as reoccurring procedures and
- To only rely on one's imagination to consider multiple solutions and alternatives to a problem.

The outcomes of a creative thinking process are specifically important in the world of business. The managerial decisions and corporate behavior of any organization are dependent on its skills of adaptability in a fast changing and increasingly ambiguous market scenario.

This is the reason behind the acute needs for creative solutions and creative action-based strategies. The more the managers increase their understanding of problematic situations and learn finding multiple solutions to the problems; the faster they will be able to get themselves and their teams ready for any possible alternatives in various possible situations in the future.

2. Techniques of Creativity

Creativity can be enhanced through many creative techniques. In fact, creativity can not only be enhanced but also directed and focused on a branch of study or craft. For example, people in sales and marketing may utilize a different set of creative techniques, as compared to those in quality management.

Attempts to enhance the creativity in the minds of people can be put under two important classifications:

- Techniques suited to enhance creativity in individuals, and
- Creativity enhancing techniques for a group of individuals, which suits the needs of the working force.

Improving creativity for individuals is the act of enhancing the powers of intuition and removing mental blocks, such as fear of criticism and ridicule. At the basic level, enhancing creativity in work circles is not possible without first enhancing team building. This will bring a change in group dynamics and will pave the way for creative thoughts and innovation.

All group creativity techniques can be applied to individuals successfully. That is because Creativity is an attribute of an individual person, however it can be developed more efficiently in a group or a team because individuals need to interact with other individuals to express their creative ideas and make a practical working model based on it.



There are many computer-based creativity supporting tools, such as artificial intelligence models, information systems, etc. which can be used to enhance creativity, explore alternatives to fixed ideas and to encourage imagination.

Analytical Techniques

Analytical Techniques involve a linear approach to thoughts as in a sequence of steps to follow. A prime examples of this technique will be the “Wh-question” technique, where the participant is encouraged to carry his thought forward by asking him leading questions such as, “Who, What, When, Where, Why and How). These questions are known to stimulate different directions of thought and help in organizing all the points of these thoughts under one context or narrative.

Intuitive Techniques

In comparison, Intuitive Techniques are less structured techniques, where the instructor has the option to skip a few steps and allow the participant to give a whole answer at the end, as per his narrative. It is often compared with the “Wishful Thinking” technique.

Divergent and Convergent Thinking

A third classification of creativity, apart from the Analytical Approach and the Intuitive Approach, is dependent on **Divergent Thinking** and **Convergent Thinking**.

Divergent Thinking is the process of encouraging generation of free-flowing ideas, which are then channelized in different directions depending on the requirements of the process.

In contrast, Convergent Thinking is all about filtering all the free-flowing thoughts generated during the Divergent Process and subjecting them to further filtration to single out those ideas that have a truly innovative and practical value.

Both these thinking processes are complementary and help people find numerous alternatives to seeing the same situation and finalizing the one that can be implemented. Caution must be observed in comparing divergent thinking with combination thinking, which may sound the same but are different.

In **combination thinking**, the conflicting ideas of people are put in a coherent context, so that everyone agrees to the final suggestion without feeling that his/her idea has been stifled or compromised with.



3. Characteristics of Creative Thinkers

Creative thinkers try to play with the fundamental concepts of all established facts using different analogies and metaphors and through the usage of unique symbolisms. They try to find as much similarity of their idea with the present situation so that the listeners do not get alienated and then pitch in their individual thoughts. This saves them from premature judgement and filtering.

Creative thinkers take caution that they don't sound too extreme in their ideas. They always opt for the intermediate approach while building imaginative and ideal situations. They also share techniques in which their vision can become a feasible reality and they do it by relating their ideas with previously mentioned processes and find links with them, which makes the listeners think about the idea in a different light.

The most effective methods to increase creativity in a team are:

- To be happy and cheerful
- Encourage transparent communication
- Trust people and accept failures
- Be in contact with external information
- Be independent of apprehensions
- Support participation in decision making
- Encourage new ideas

While innate creativity doesn't need to be particularly nurtured, training the management staff in creativity should be done by experts on how to stimulate creativity in their team members and how to provide motivation. The management should also encourage people for the use of creative techniques and initiate their team mates towards them.

Application of Creativity

Creativity uses a generation of ideas with value to combine various features from them and create a new path to solve concrete problems. This helps people in adapting to change, while still improving the performance of the organization. Creative thinking encourages participation in crucial decisions which immediately changes the attitude of the staff of the organization in a positive direction.

Some expected results of the creativity process are as follows:

- Innovation through new product and processes
- Improvement of existing products or services
- Increase in employee productivity
- Increase in work efficiency
- Increase in flexibility
- Increase in quality

Characteristics of Providers

The implementation of creative techniques in an organization needs the assistance of external consultants and experts who undertake such projects and are well acquainted with the implementation of such processes within the boundaries of the organization.

Their job description revolves around presenting different techniques, teaching their application, profiling people based on their job requirements and providing them with focused training methods. They also define the problems and initiate the changes as per the needs of the process.

4. Organizations that Treasure Creativity

Creative processes are implemented constantly by many big companies in private and public sector organizations. It is prevalent in sectors where people management plays a huge role like manufacturing, services, banking or the construction industry. Big car manufacturing firms, software development firms, railroad industries and pharmaceutical firms use creativity experts to teach their employees new techniques to increase their efficiency and quality of output.

Nearly all new management techniques that can be applied in companies come from creative processes. They include benchmarking, employee involvement, marketing, etc. In fact, creative thinking has become so prevalent that even small firms and organizations are collaborating with biotechnology companies to creative techniques to solve problems and to improve the efficiency of working techniques.



Creative techniques may be applied in any area of the company, be it

- Business Strategy
- Product Development
- Human Resources
- Sales and Marketing
- Collection of information
- Product Design
- Quality Management, etc.

Implementation Cost of Creativity

Creative techniques are employed by all organizations and firms who deal with new scenarios every day and are expected to resolve the issues that come up because of these scenarios. They also look for bringing improvements in their products or services.

Most often, creative techniques are adopted to enhance personal creativity in individuals who work on new product development. For example, scientists who research in laboratories. However, the objective of the company focus is to enhance the group creativity, then it needs to first form a collaborating team of at least 20 employees including 3 members who will fulfill the roles of the managerial staff. The application of creativity techniques is not a discrete process. It should be practiced continuously in regular sessions within work groups.

The regular timings to practice these creativity techniques are company facilities during normal hours and working conditions. The implementation of a creative technique includes

- The costs of external consultant fees
- Preparation for a session of creativity
- Application of creative techniques and
- Evaluation of the employees.

It also includes the cost of software packages used during the training program and the hardware rented or bought for the successful implementation of the program.

Conditions for Implementing Creativity

When it comes to the implementation of creative techniques, it has been found that some of them are easy to implement, whereas other techniques need adequate and proper infrastructure, experts and training. In such cases, **organizations generally contact and hire external consultants.**

In addition to the external consultants, the company itself also practices on providing a creative environment. This is done by making the employees participate in various concerns and decision making process of the company. They are also encouraged in an open and flexible method of learning on the part of the management.

Some of the factors that help nurturing a creative work climate are as follows:

- An interactive environment with the minimum interference.
- An organizational culture that encourages discovery and problem solving.
- Rewards for employee performance and constant motivation.
- Managers willing to risk failures to encourage creativity and innovation.
- An open and flexible policy for working and performing.
- Providing people with creativity enhancement training.

There are other important factors behind the successful application of creative techniques within teams in a company, such as properly trained human resources, clear strategies, focus on the core competencies and knowledge on key areas of business such as marketing, engineering and design.

5. Developing Creativity – Case Study

How Dyson Created a Storm from Vacuum

James Dyson invented the **Cyclonic Vacuum Cleaner** when he faced a production problem in the Ball barrow (a wheelbarrow with the front wheel replaced with a ball) factory. The resin powder that formed the coating of the metal parts of the Ball barrow kept jamming the filtration system.

Dyson initially was deciding to use an industrial cyclone that is used to remove dust from the sawmills to separate the fine powder from the air. While installing this cyclone, James Dyson was inspired with the idea of developing a domestic cleaner that used the cyclone principle to separate the dust from dirty air.

Although the cyclone cleaner idea came to Dyson by chance, it also proves that Dyson was always looking for ideas and as with the Ball barrow, Dyson's cyclone cleaner was a figment of his imagination that became an application after connecting with likeminded individuals.



Dyson started by gauging the commercial potential of the cyclonic vacuum-cleaner before attempting to build it, which is, once again, the hallmark of a great **Technopreneur**. If the product is not going to see any mass consumption, then there is no point in attempting to develop it.

In this case, especially because it was a novel product, costs were likely to be too high for an independent inventor, so he started looking to get the license production to a major manufacturer. Although they were interested in his invention, the initial manufacturers were unwilling to license it for production because most of them feared the alien concept and thought such a new idea represented too great a risk and challenge to the established technology.

Unwavering in his determination, Dyson kept conducting further design and development, and kept coming up with better and better work. He designed the product in pink color to bring out an innovative streak in it and made the enclosure transparent, so that customers can see the swirling dust particles.

After a lot of initial hiccups, Dyson's design was successfully licensed in 1986 to a Japanese manufacturer and today Dyson's company has moved from strength to strength to design products based on cyclone principle such as

- Powder carpet cleaner
- A wet-and-dry tank cleaner
- A stick-shaped compact cleaner
- A back-pack industrial cleaner and
- A 6-device for removing soot from diesel exhaust.

There are a few more such projects in the pipeline which will also be launched in the coming future.

6. Developing Creativity – Brainstorming

Brainstorming is one of the most frequently used **group-based creativity process** used for problem solving. It is a method using which numerous ideas can be collected from a group of people in a short time. It also provides a good background to have open discussions and communication during the entire project's duration.

Brainstorming sessions generally take place between 10 people, however the numbers vary depending on various factors. The discussions of the group will be moderated by a leader who can also help in triggering different thoughts, which gives the participants time to connect their thoughts organically.



The whole process of brainstorming often takes one hour and is conducted through several stages, the first one of which is stating the topic of discussion and calling for different solutions. However, a creative thinking expert will replace the standard approach from "How to...", and put it down as "In how many ways can we...".

The **four basic rules of brainstorming** are:

- No prejudice against any participant.
- No criticism of any idea, however unlikely.
- More the ideas, the better. People use them to connect different thoughts.
- Sharing relevant experiences to help people use ideas to construct new ones.

Like the verbal communication method used in brainstorming, there is also another written medium of creative thinking known as **Brain-Writing**. In this process, ideas are generated by individuals and then written down on a piece of paper. These notes are then reproduced and exchanged with other members of the group, who will then read these notes and write down ideas.

Generally, Brain-Writing follows the **6-3-5 Method** in which six members of the group generate and write down three ideas in five minutes. After five minutes, each member of the group will pass his paper to the participant on the right, who reads it and adds three new ideas in another five minutes. This process continues until each participant gets the original piece of paper back.

7. Developing Creativity – Storyboarding

Storyboarding is a creativity technique that often uses stick diagrams to explain a scenario, so that the planning for that scenario can be done. Just like brainstorming, this is also mainly employed by groups. It requires a moderator and takes place in a group of 8-12 people. The moderator will first arrange the ideas obtained from the brainstorming session in a logical order on a white board.

A story will be created around it with the maximum interconnection of ideas and different pieces. The pictorial representation helps keep all factors in front of your eyes which helps in interconnecting different factors while searching for solutions. Every phase has a Critical Section in which participants discuss their story board.

The story boarding process includes four phases:

- **Planning:** This phase begins with the issues clearly spelt out and defined by the moderator. He then takes a piece of paper and gets ready to take down notes of the participants.
- **Ideas:** In this phase, the ideas are put on and different plans for people are arranged as per the sequence of the new ideas.
- **Organization:** During this phase, the participants decide who among them is going to implement the finalized solutions and the timing of the plan to implement.
- **Communication:** In this phase, the participants are asked to share their storyboard with all the members in the organization. Through this process, they can use match-stick figures, balloon sketches and flowcharts to give a visual graphics to their idea.

In the next section, we will discuss the excursion technique and its benefits.

The Excursion Technique

This is a very effective method of persuading a group of people to design and develop new thought patterns to address unique situations and to formulate strategies based on their analyses.

This process usually involves five steps:

- **The First Step** – The instructor asks the participants to take an imaginary journey to a place that seemingly has no connection with the issue at hand. Some of such places could be a museum, jungle or another planet, etc. After the journey is over, the participants need to draw 8-10 images based on their experience of that place.
- **The Second Step** – The consultant asks participants to draw similarities and establish relationships between the images of their imaginary excursion, and the real-life issues they are presently facing in their scenario.
- **The Third Step** – The participants are now instructed to analyze the connections between the problems and the analogies and identify the ones that are the closest and most distinctly linked with all the factors.

- **The Fourth Step** — Participants share their experiences from their imaginary journey with their team-mates about what they saw, whom they interacted with, what analogies they drew and their solutions.
- **The Fifth Step** — Like brainstorming, participants discuss each other's ideas and find out a common solution to the issues, and a common narrative that can include all their ideas.

8. Worksheet – Employee Creative Thinking

Through this worksheet, we will try to understand how creative is the thinking of each employee.

- Employee Name: _____
- Date: _____
- Position/Title: _____
- Supervisor Name: _____
- Business Name: _____

Section 1: To Be Completed by the Employee

Imagine that you are working in your own office, minding your own business. That's right – you have your own business and your own company. The name of the business starts with the name you wrote in the spot beside "Employee Name."

As with any other business, your business will also have a customer. In your case, your business will have one customer: **Your Employer**.

Your top priority customer is your employer. He is your supervisor and also your customer. Now, as a business house, here is what you can offer your customer for sale:

- Your Energy
- Your Ideas
- Your Creativity
- Your Talents
- Your Labor
- Your Time

Your employer — who is also your customer — has already made it clear that he is interested to purchase labor, talents and all you have on offer. That is why your employer, your customer, has decided to buy these services and hence, he is paying you your salary.

To get a higher valuation of the services you provide, you want your customer to be impressed by the quality of your goods and the value addition these goods bring in his life.

Your customer is also willing to pay more if he feels that the goods you are selling have increased in value or has become more valuable to him in the process, so that he can keep himself more profitable.

Keeping this scenario in mind

- How do you plan to increase the value of labor you're offering to your customer?
- What can you do, so that the customer will agree to pay more for your labor?
- How can you help increase the profitability of the business?
- How can you improve the efficiency of your output?
- What can you add to your current set of skills?

Approach

List down all the things that make you valuable at your work. Think in terms of energy, ideas, and creativity. If these are your valuable assets, then what can you do to increase their value? Write from the perspective of a business owner and explain how you plan to increase the value of your services.

Section 2: To Be Completed by the Supervisor

Your employees are the most significant assets that you have invested in your business. Just as any team is as good as its teammates, any business is only as good as its employees. Imagine a situation when your employees take the effort to increase their productivity and efficiency, so that they can add value to their business. If they manage to be successful, they will bring more profit to their business.

Your employees have given a list of ideas to you on how to improve their performances. Please read them carefully and provide a healthy critique of the ideas, which will work and which of them won't. The brainstorming of these ideas with your employees may trigger some creative thoughts in your mind as well, so try to find a strategy in which these ideas can be exchanged and responded to.

Please include an explanation on which of the ideas mentioned by the employees are feasible and logistically possible. You may add a few notes explaining how the ideas that work will increase productivity and suggest some changes from your experience, so that the value addition of the employees is maximum.

9. Computer-Aided Creativity

Computer-based supporting techniques to stimulate the human creative process have an immediate and pragmatic aim, which is the implementation of computational models (computer software) for enhancing and organizing ideas for creative work.

They are used more frequently in –

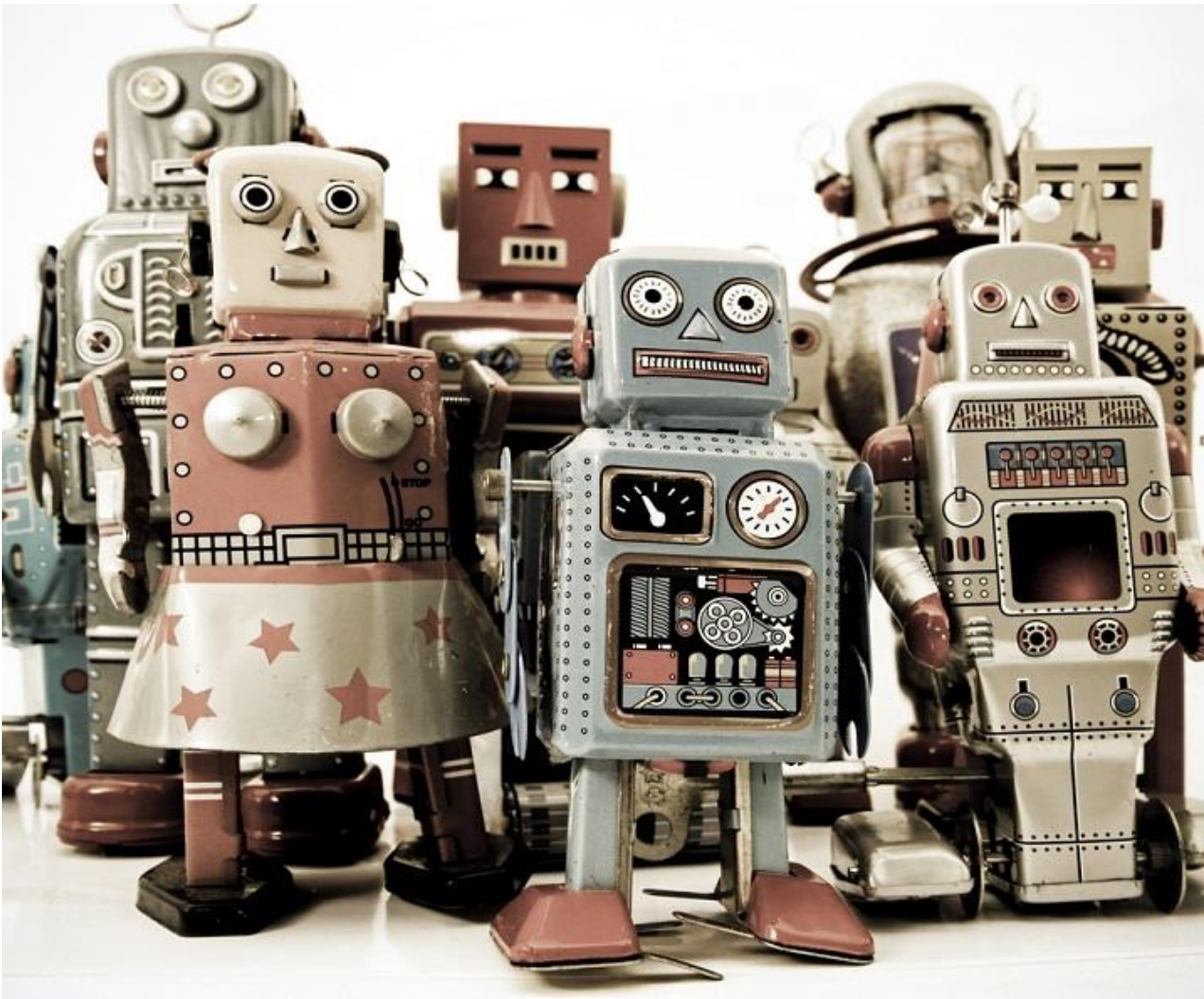
- Research planning
- Product design
- Knowledge acquisition
- Decision making
- Motivation, etc.

We can distinguish groups of computerized creativity techniques, such as AI models, Idea Processors systems and visualization and graphical systems.

Artificial Intelligence Models

From the time of the invention of computers or machines, humans have developed the power of computer systems in terms of their diverse working domains, increasing speed and reducing size with respect to time, so that their capability to perform various tasks grows exponentially.

Artificial Intelligence (AI) pursues the technology of creating computers or machines that are as intelligent as human beings. Artificial Intelligence is a way of making a computer or a computer-controlled robot think intelligently, like how intelligent humans think.



AI is implemented after understanding how the human brain thinks, learns, decides, and works while trying to solve a problem, and then uses these analysis to develop intelligent software and systems.

A few Artificial Intelligence based programs of creativity are mentioned below:

- The **Copycat Program** that can search for analogies in alphabetic strings.
- The **EURISKO Program** uses an exploratory process in a range of domains.
- The **AARON Program** for exploring line drawings in various styles and coloring.
- The **BACON Program** of exploratory creativity can model scientific discovery.

AI has been dominant in various fields such as **strategic gaming**. For example:

- Chess
- Poker
- Tic-tac-toe, etc.

In the above-mentioned games, machines can think of large number of possible positions based on **heuristic knowledge**.

The largest application of Artificial Intelligence has been in **vision systems** that understand, interpret and comprehend visual input on the computer. For example,

- A **spying airplane** takes photographs, which are used to figure out spatial information or map of the areas.
- Doctors use clinical expert system to diagnose the patient.
- Where law and order is concerned, the police use computer software that can recognize the face of criminal with the stored portrait made by forensic artist.
- **Speech recognition robots** have become so advanced nowadays that they can handle different accents, slang words, noise in the background, change in human's noise due to cold, etc.

We now have robots that can also use a **handwriting recognition software** to read the text written on paper by a pen, recognize the shape of the letters and convert it into text in a soft copy format.

10. Software Visualization Tools

Computer aided visualization methods that use techniques of representation of data using graphical techniques for expressing visual phenomena and displaying knowledge about data in a rule form are also available. Visualization of data and graphical techniques make it easier for people to come up with creative alternatives.

These software work with visual data such as –

- Images
- Drawings
- Sketches
- Diagrams
- Charts
- Graphs
- Graphical Objects, etc.

All these above-mentioned visual data aspects are related to the domain of the organization, and using these various data modes, they express ideas and concepts using sketching and annotation, leading to alternative views of the same data.



There are many such systems like **UML** that provide a range of opportunities to the users. For example, Inspiration Inc. is a visualization system that gives a blank canvas to the user in which an individual can record and arrange ideas as per occurrence, so that he can later connect and organize his thoughts with a visual approach.

Another visualization system is **AXON 200** that creates flowcharts or concept diagrams to list all the influencing factors by using visual attributes like shape, size, scale and depth. Such systems are enabled to help users connect all related ideas using connectors, so that a graphical map of the user's thought process can be shared with someone else.

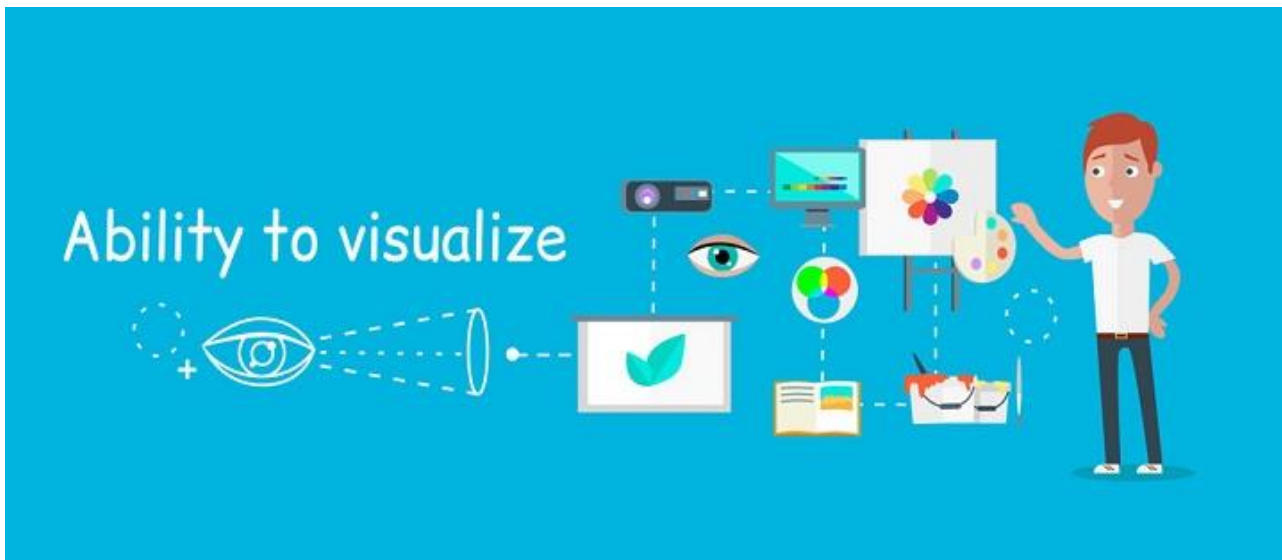
11. Spatial Representation Tools

Like all the visualization processes, computer-based communication systems are also available in the market that help in making accurate representations using two-dimensional cognitive spaces.

Some representations use spatial proximity to bring a relation between objects in the space and others are used by people in the Marketing & Design departments as “Mood Boards”, which collect images as metaphors and reflect the quality of the products.

Spatial Information Systems

Spatial Information Systems are designed to enhance creative visualization by mapping text objects, design requirements, etc. in two-dimensional planes and then using knowledge processing tools to provide a statistical analysis of available data.



Users are also given the option to select an area of this space and to create a new space from the **Principal Components Analysis**. For example, these systems can be used to browse various research papers to find the occurrence of a certain keyword and to use Principal Components Analysis to display the keywords and their mutual relationship on a common two-dimensional space.

Spatial Hypertext Systems

Spatial Hypertext Systems help in finding of alternative structures for applications and their content in those cases where the domain doesn't have any fixed or well-defined structure in the beginning; or is flexible enough to change during the task. In Spatial Hypertext Systems, the links between nodes are expressed by connecting them through connectors and pin structures.

Nodes may also be displayed under different contexts, when there are multiple spatial references that connect to the same underlying content. The users can use a window as a workspace in

which they can organize their thoughts and different ideas. The nodes are displayed on a two-dimensional space and represent links to familiar objects such as

- Documents
- Images
- Comments and
- Hypertext Pages

Creativity processes are implemented constantly by many big companies in private and public sector organizations. It is prevalent in sectors where people management plays a huge role, some of these sectors are:

- Manufacturing
- Services
- Banking
- Construction Industry
- Big car manufacturing firms
- Software development firms
- Railroad industries
- Pharmaceutical firms, etc.

All the above-mentioned industries use creativity experts to teach their employees new techniques to increase their efficiency and quality of output.

Creativity uses a generation of ideas with value to combine various features from them and create a new path to solve concrete problems. This helps people in adapting to change, while still improving the performance of the organization. Creative thinking encourages participation in crucial decisions which immediately changes the attitude of the staff of the organization in a positive direction.