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Six Thinking Hats Method for Lateral Thinking in Software Development Organizational Problem-Solving Process

BMTN Rathnayaka# and GIF de Silva

Department of Information Technology, Southern Campus, General Sir John Kotelawala Defence University, Sri Lanka

#rathnayakanawanjanathisaru@gmail.com

Abstract - Six Thinking Hats is a method that presents different thinking styles required by an individual while effectively analysing a given problem. The method gives different thinking perspectives used in a systematic problem-solving procedure using different coloured hats. By considering each coloured hat, one is able to focus on the different styles of thinking patterns and scopes associated with each coloured hat, so that the same problem can be analysed in different angles. This method supports lateral thinking and new outputs during problem-solving processes. So, the optimum solution for the considered problem can be found. In this paper, the researcher discusses how to adopt the Six Thinking Hats technique in an organizational problem-solving process. Each Six Thinking Hat is considered to be an independent entity in the thinking process and contributes to predominant personality trait classification with various categories of personnel. In such cases, thinking styles are also associated with these particular personnel/major decision-makers such as CEOs, directors, project managers, administrators, software developers and business analysts. This paper also considers the importance of the Six Thinking Hats method in individual and group thinking in solving software development organizational problems. The paper contains the attitudinal relationship in decision-making using the Six Thinking Hat technique, particular personality types associated with the thinking hats process, and use of this technique in organizational problem-solving Processes.

Keywords: Six Thinking Hats method, lateral thinking, managerial problem solving, organizational decision-making process

I. INTRODUCTION

Dr Edward de Bono introduced this technique called the Six Thinking Hats [1]. The technique introduced different thinking styles from different perspectives that are correlated with a different coloured hat. This parallel thinking approach gives insight to the employees and managers in business organizations to analyze a problem from several dimensions. By considering each type of hat, the manager focuses on the style of thinking associated with each colour. For example, meanwhile imagining from the red hat perspective, the manager will state what they feel about a particular situation. While imaging from the yellow hat the manager tends to think about the positive factors of a problem or situation, while the green hat encourages the managers to adopt the creative approach to give the problem to solve. The Six Thinking Hats encourage even the most negative manager in an organization to think of the positive ways, solutions for a given situation. By adopting this Six Thinking Hats technique the managers get a lateral way of solving a problem. Such lateral thinking for organizational problems helps to understand the problems quickly, develop solid solutions generated from different thinking styles, also give the chance to quickly identify alternative solutions to given problems by analyzing such solutions in different perspectives using parallel thinking. The six thinking hat method can be used parallelly with other problem analysis techniques such as SWOT analysis, PEST analysis, or ABCD analysis Technique including ABCD framework and ABCD listing. Other methods such as Critical incident technique: a learning intervention for organizational problem solving and developing ideal system concept and comparing it with practical systems to improve the practical system's characteristics towards ideal system characteristics. In this paper, researchers have

analyzed the use of the six thinking hats technique in the managerial problem-solving Process. A comparison is made between six thinking hat technique and traditional methods like typical interviews or discussions. Also, the importance of the six thinking hats technique in individual and group thinking in solving organizational problems is discussed. The paper also mentions the relationship in decision making using the six-thinking hat method, personality types that are associated with each thinking hats process, and usage of this technique in organizational problem-solving methods.

II. EXAMINE THE KEY ASPECTS OF DE BONO'S SIX THINKING HATS MODEL

The imagination of wearing different coloured hats, De Bono has designed a model which when applied correctly the person can think critically and create opportunities for solving any problem that might be considered a complex one. The model shows De Bono's belief that "simple methods used effectively are more valuable than complicated methods that are difficult to understand and confusing to use" (De Bono,1992: p. 6). In explaining the philosophical prospect of these six coloured hats thinking model De Bono (1992) [1] says that "when we attempt practical thinking, there are three fundamental difficulties" (p. 8) that encounters. He identifies those difficulties and explains them as 1) Emotions. We often have a tendency not to think at all but to rely on instant gut feeling, emotion, and prejudice as a basis for action. 2) Helplessness. We may react with feelings of inadequacy: "I don't know how to think about this. I don't know what to do next". 3) Confusion. We try to keep everything in mind at once, with a mess as a result (De Bono, 1992: p. 8). [1]

Then, how does De Bono's method of wearing the six different thinking hats enable them to overcome these mentioned three difficulties? The power of De Bono's-colored hats method addresses these difficulties and

the ability of the hat wearer to take off one coloured hat once they have finished deciding to use it and wear the other one. The process of wearing different coloured hat enables the wearer to bring a different perspective to thinking critically about the considered issue and to trying to find alternative solutions to any problem. Arguing that "Emotions at the right place in thinking are essential [but] emotions at the wrong place can be disastrous, [De Bono, 1992] the six hats method allows to use emotions and feelings at the right place" (p. 8). Arguing that helplessness arises when don't have a clear plan of action to take when confronted with a problem, De Bono (1992) suggests that the wearing of different coloured hats "provides us with a basic framework for thinking actions and define next steps that can be taken" (p. 8) to solve the problem. And as for the third problem, De Bono (1992) says that "confusion arises when we try to do too much at once, but the six hats method allows us to take one direction at a time" (p. 8). [1]

The six thinking hats method represents six different cognitive approaches for critical thinking and analysis.to understand the problems and issues and helps to come up with an appropriate logical solution. In the method, the six hats are coloured as Black, Blue, Green, Red, White, and Yellow, and each coloured hat represents a different logical approach to critical thinking about a problem and helps to solve it. Figure 1, which summarize the conceptual thinking associated with each hat. De Bono (1992) says that "the six hats method allows students to think more richly and more comprehensively" (p. 15). [1]

Figure 1. A synthesis of De Bono's Six Thinking hats model.

Source: Using De Bono's Six Thinking Hats Model to Teach Critical Thinking and Problem-Solving Skills Essential for Success in the 21st Century Economy, Charles Kivunja

Referring to Figure 1, De Bono's model presents six different coloured hats. Each hat represents a different way of thinking and how to deal and think critically about how to solve a problem. As summarized in Figure 1, the black hat is for caution in critical thinking. De Bono has chosen the colour black for the cautious critical thinking perspective because the word critical has its origin in Greek where it means to judge. De Bono (1992) So, the colour black is appropriate for this way of judgmental thinking because it represents a serious consideration of problems to solve. Also, the black hat is associated with thinking that always questions and checks the feasibility and validity of proposed solutions, evaluate them and pass judgment. One may think it's too dark a thinking method to follow. But it does not represent negative thinking. De Bono (1992) says, "With the black hat, the words checking and checking out are very important to explaining its uses. These words convey the essence of critical thinking—and do not carry a negative image" (p. 31). [1][2] This shows that critical thinking which provides caution also helps to solve the problems. Critical thinking and problem solving while wearing the black hat create a good opportunity for assessing the possible consequences of decision maker's decisions and can save the costs of implementing doubtful strategies or disastrous courses of action.

According to Figure 1, wearing the blue hat brings the perspective of organizational critical thinking and metacognition. This remark blue hat thinking different from all the other hats because while the other hats are concerned with thinking about how to solve a particular problem, blue hat thinking is focused on thinking about thinking that will lead to a solution. Also, blue hat thinking brings to the critical thinking and problem-solving process which involves active control over the cognitive processes in seeking a reasonable solution to a considered problem. It helps to identify strategies and to plan activities that can be implemented to solve a given problem. De Bono mentioned its colour as: "We can associate the blue hat with the blue sky which is above everything. If we were up in the sky, we could look down and see what was happening on the ground below. With the blue hat, we try to rise above the thinking that is taking place and to get an overview of this thinking. With the blue hat, we try to take charge of our thinking to organize what is going on. (De Bono, 1992: p. 102). Blue hat thinking pattern gives a special way to critical thinking and problem solving which helps to define and get a clear idea about the nature of the problem and then set clear objectives or target to solving the problem. Also, helps to identify alternative steps to be taken in the pursuit of the solution, assess again and again to made clear progress in solving the problem, and continually decide about the next steps to takes place towards the planned output.

Referring to Figure 1 can identify that the green hat is for creative critical thinking and problem-solving.

De Bono (1992) explains the essence of the green hat perspective when he says: "We can look at the word creative in two ways. The first way means "generating, producing, creating something which was not there". The second way means "having new ideas, fresh ideas and ideas that have not been used before". (p. 72)

Also, De Bono (1992) says that the colour green conjures up images of nature and vegetation and so green can easily symbolize the productive capacity and energy bound in the natural resources. It brings to the critical thinking and problem-solving process new insights, new possibilities, new suggestions and proposals which did not offer before. So, it represents thinking creatively and innovatively. "This means moving forward to possibilities and new ideas" (De Bono, 1992: p. 72).[1]

Also, Figure 1 shows that the red hat brings the table to the critical thinking and problem-solving process opportunities to express personal emotions. These are expressed without fear of being judged and with no need for justification. Emotions and ideas are shared under a free environment and free expressions.

If considers a group, group members are free to say how they feel about an approach being taken in attempts to solve a problem, without having to explain the particular idea, or giving excuses/reasons for their feelings. Because there

is freedom of expression and no need for justification. All participants are free to express their feelings without pretending to be logical and rationalising for those feelings. This hat creates opportunities for participants to be real, not pretending, and free to hold on to their beliefs. De Bono justifies the use of red for this hat saying, "Think of the redness of fire. Think of anger and joy but also warmth and contentment. The red hat includes both intense and more gentle feelings" (De Bono, 1992: p. 87).

Also, under the red hat, there are feelings, emotions, and intuitions. The emotions brought to the thinking process with this hat include many emotions such as joy, fear, anger, jealousy and sorrow. Feelings are much broader than emotions and include likes, dislikes, anxiety, uncertainty, interest, excitement, aesthetics,

respect and camaraderie. Intuitions are even broader than emotions and feelings. They surface when one acts instinctively without subjecting their actions to rationalization. They might be logical, but they involve no deliberate cognitive processing, and their probabilities are unknown. Essentially, red hat thinking helps to answer the question "What do I feel about this?" [4]

In Figure 1, white hat thinking brings critical thinking and problem-solving process requests for information that is needed to help solve the problem at hand. Its focus is on three questions; "what information do we have? and to increase the information base, what information do we need? and how do we get the information we need" (De Bono, 1992: pp. 57-58). Also, the white hat thinking provides for going out to collect that information. This involves a single person as well as a group searches for information. De Bono says this type of thinking with the white hat associate information with a typical typed report which provides information on white paper. He also mentions the information in computer printouts which are conventionally produced on white paper. Also, De Bono associates with the colour for this hat is information in newspapers which is again conventionally printed on white paper. He extends his justification for associating the colour white to information by suggesting that the whiteness signifies neutrality and objectivity of the information sought while wearing this hat because all that this hat seeks is "just information, with no suggestions, ideas or arguments. Feelings do not come into it. Never mind the arguments. What is the information here?" (De Bono, 1992: p. 57). This hat determines its integrity and validity. When the manager wears the white hat it brings a proactive approach to go out and look for data so that members of the group rather than waiting for a problem solve automatically but look for information on how it might be solved.

Referring to Figure 1, yellow hat thinking gives the critical thinking and problem-solving process a sense of optimism and determination to succeed. It is looking for the strengths that have and the opportunities that the situation presents to the team. It seeks the present strengths and successes to advance to project success. Current success rate courage for further success and open up for new opportunities. This hat leads to alternative options that can improve performance and effectiveness of decision making. De Bono (1992) says it involves looking for four facts; "(1) good points, (2) benefits (3) reasons why an idea will work, (4) likelihood of success" (p. 44). De Bono[5] associates this optimistic approach to problem-solving with the colour yellow because he says, "Yellow can mean sunshine and optimism and looking on the bright side of things" (p. 43). This optimism is based on supporting evidence and is not just fantasy or mere wishes driven by emotions. This differentiates between the emotions brought to the critical thinking and problem-solving process under red hat thinking. The optimistic approach not only leads to a great outcome but also analyses the benefits that can flow from those great outcomes and why the actions taken would lead to improved results. The yellow hat, "A suggestion is made, a solution is offered, a plan is put forward. The benefits that are claimed for each of these are going to come in the future. …we must have good reasons for claiming that these benefits will come through" (De Bono, 1992: p. 43).

III. SIX THINKING HATS ANALYSIS: MANAGERIAL PROBLEM-SOLVING PERSPECTIVE

The researchers conducted a observation sessions and interviewed 10 different software companys and sample development teams to

understand the nature when it comes to decision making. Considering gathered data, when making decisions about important things in a software development team, it is not easy to conclude which is common factor. The usual traditional approach of communication and thinking is indeed not lateral. Especially when an individual or team decision needs to be taken, it should be collaborative, supportive, 360 degrees thinking, understanding from all angles and then reaching a decision. Researchers found that the six hats thinking extremely useful in the decision-making process both in personal and professional life. Considering the organizational context, a decision to fill a software project manager position may involve various concerns. The question is should promote an existing person from a lower-level position and give time for him to fit the requirements of the functioning or should keep it open and recruit a person from outside who experienced, has an impressive track of record but who might demand much higher amount salary than what you have to pay for the insider. Giving opportunity to the insider will boost the morale of all employees who looking for their turn in future promotions at the organization. It will be rewarding for the promotee too. The organization will save much revenue on paying him or her but will be able to pay much less amount after he or she is trained enough. Also, he or she knows the particular frameworks and procedures used for software developments of the particular organization. So The danger of wrong decisions or delay is lesser than recruiting outside software project manager even temporarily. If the organization have never been anticipating this to happen and have not designed a careful career plan for the employees it is going to be very tough in the end. In either case, a delay of decision is bound to hit the company reputation, revenue and overall business process drastically.

Dr Edward de Bono's Six Thinking Hats outlines different thinking styles that are associated with a different coloured hat. The organization should imagine they are wearing a particular hat when taking decisions.

A summary of each hat for managerial aspect is outlined in figure 2:

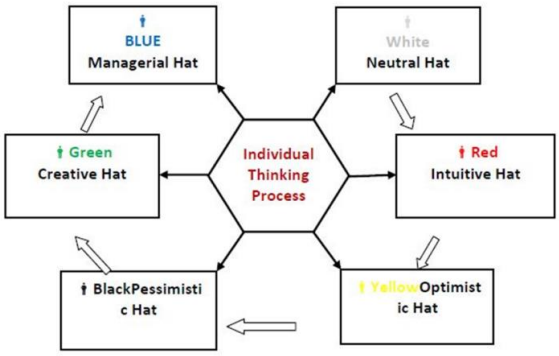

Figure 2. Block diagram connecting six thinking hats to the individual thinking process.

A. White: Neutral Hat

White hat's role is to collect data, facts, stats and create information that function as foundations for thinking. In this case, find out the educational qualification like PMP qualified or not, experience in Agile/Scrum project management, and performance of the employee taken into consideration. Collect information on the salary and benefits he or she is getting now and that of the position to which considered. Also gather information on the extent of expertise required for the position of software project manager, the profile of aspirants in the job market in the software development industry and their expectations. Look at the organization's interest up to what limit it can afford to pay or not, the possibility of merging the responsibility with another position.

B. Red: Intuitive Hat

The red hat will use feelings and emotions of intuition to find appropriate solutions to the problems. Analyze the feelings of the other software development teams or director board about the decision, what it means to the organization, to the employee to be considered, to his or her superior, and to other employees in the company. Motivation, morale, personal flexibility to work, the relationship between colleagues, how he or she treats others, anger management ability, status quo, changing relationships, all emotional aspects required consideration.

C. Yellow: Optimistic Hat

Yellow hat's role is to logically present positive plans of action to be taken that will help overcome the problems in reality. Consider his or

her potentials. How he or she has been doing in his previous jobs to the date, active contribution to the given tasks, ability to grow, self dives, capacity to assume responsibility, respect the command, the loyalty displayed to the organization and the team and above all the company's recognition of his potentials by providing an opportunity to him, and how challenging he will take it.

D. Black: Pessimistic Hat

The black hat is considered a bad one because of its negative approach. But it is one of the most important hats because it will help to get a better understanding of the pitfalls of your thinking pattern. In this case, can look at the cost of probable damages due to the new promotee's inappropriate managerial decisions. Consider the cost and time required to train him/her. What if he or she fails to live up to expectations even after a given period? What will happen if he or she could not deliver the expected outcome on time? If he or she has poor communication with the client and create problems what kind of damage can happen? What would be the consequence of his or her own wrong decisions on the professional capacity and organizations trust in that person? If recruit new buy how would the outsider adjust to the organization's culture? How long he will last? How to assure that he or she will perform well. If performance is not up to expect what kind of decision to be taken regarding such issues. These are the facts consider when it comes to black hat.

E. Green: Creative Hat

Green hat role is to bend the rules because of its creative thinking pattern, to think out of the box and expand the possibilities of the improbable in unique ways. The Green hat will help to come up with creative solutions and opening the doors to new opportunities and avenues of thinking. For example, if an organization thought to build a holographic agent program that acts as a software project manager or a project manager sound like Siri.

F. Blue: Managerial Hat

Blue hat's role is to manage and direct the thinking process, sort out all possible alternative solutions and apply managerial techniques. Finally, knowledgable to choose best among the options. Indeed, this phase; managerial problem solving is very challenging. This is the phase they decide whether they recruit outsider or promote insider and train or build a programme which can act as a software project manager.

Even though the Six Thinking Hat model seems specifically targeted as a personal problem solver who or in group decision-making context related to academics and business. But this six thinking model can use for organizational level too which suggests different types of thinking according to six thinking roles for which differ from colours. Through practice and systematic implementation of this process, no one will ever feel the need to give up searching for a perfect solution to the problems or circumstances using this method.

IV. SIX THINKING HATS ANALYSIS: GROUP DECISION MAKING

In this phase when deciding on a group, members assume different hats of thinking and go forward to share the ideas according to the hats. Different kind of views which can be collect, access and use for effective decision. The key factor in using the Six Thinking Hats and applying them in practical situations depends on the clear understanding of the process and facts that the hats are used for. When considering a specific problem or topic it is recommended to start with the white hat which allows all the foundation information to present and documented. Once the problem is clearly identified and defined then the red hat is used to ask questions from participants about how they feel about the problem or current situation. Then participants' emotions, feelings and reactions are documented. Then next is to use the yellow hat to capture the positive factors of the problem from all participants. Then follow with the black hat. After the black hat process is done then follow the green hat where encouraged to use creative thinking to overcome the issues and develop new alternatives to solve the problems. The red hat usage of at this stage to consider the feelings of group members. Normally, group members who were previously too concerned about the problem now might feel more positive towards the situation after going through the process of using the different hats. As the final phase, use the blue hat which allows group members to evaluate the proposed process has offered proper solutions. Also, the blue hat provides

process control to ensure the right approach was taken by group members. If the solution was not identified, then another process would be suggested as most relevant to solve the problem. Details of such a process are given in table 1.

Table 1: Attitudinal relationship in decision making using six thinking hat technique

Colour of Hats	**Basis**	**Consideration**	**Attitude**	**Action**
White	Quantitative thinking	Use of facts and figures.	Judging	Apprise the entire background situation
Red	Humanity based thinking	Absorb feelings in form of comments, criticism and carefulness	Assigning	Unearth negative consequences
Yellow	Optimistic thinking	Based on hope, positive and speculative	Defining	Exploring strengths
Black	Negative thinking	Based on negative consequences	Redefining	De-limit drawbacks
Green	Creative thinking	Based on ideas and lateral thinking	Refining	Considering alternatives
Blue	Managerial thinking	Based on planning, organizing,and controlling	Appropriating	Taking appropriate decision

V. SIX THINKING HATS PROCESS ACCORDING TO PERSON

Each of the six thinking hats considered to act as an independent entity in the thinking process and such attributes affects personality traits. The personality types and the co-relation between hats given in table 2.

Table 2: Personality types associated with thinking hats

Colour of Hats	**Way of Thinking**	**Personality Trait**	**Type of persons**
White	Neutral Quantitative Thinking	Quantitative thinking using facts & Figure	CEO/Administrator/ Stakeholders
Red	Humanity thinking,	Humanity based Thinking based on ethics, Values, emotions & feelings	Human Resource employees
Yellow	Optimistic or Positive thinking	Optimistic thinking based on hope, positive & speculative	Board of Directors
Black	Pessimistic thinking or Negative thinking	Negative thinking based on comments, critics, cautious & careful	Managers
Green	Creative and Innovative thinking	Creative thinking based on ideas and lateral thinking	R&D department employees/ Innovators/Scientist
Blue	Managerial thinking	Managerial thinking based on planning, organizing and	Managers/Executives

		controllin g aspects	

VI. USAGE OF SIX THINKING HATS IN ORGANIZATIONAL PROBLEM SOLVING

Every organization has a specific goal and a set of the objective to achieve along with their vision and mission. Organizational managers have the utmost responsibility to fulfil organizational objectives by making the right decision at right time considering short term and long term problems. Many methods have been used in organizations to find optimum solutions like organizational behavioural theories and operational research techniques. The Six Thinking Hats method can be used in the organizational problem-solving process. This method can use by managers to identify and analyse organizational problems in a logical way. When governing can use six thinking hats method in organizational problem solving and should consider these facts such as Organizations are complex human initiatives which involve functional interrelationship and interdependency, Organizational problems create many complex situations which take considerable time to decision making process, the major challenge is to create the most effective solution in the minimal period, managers have to think from different angles to understand the dimensions of the given problem, data gathering (objective and extensive), consider all qualitative and quantitative information for the decision-making process (White hat).

Next, consider the human factors affected and all made decisions (Red hat), Positive solutions should not overlook because they are vital to any good decisions (Yellow hat), Negative factors of any decision should analyze in caution (Black hat), Creativity is must for good decisions. This will involve risk-taking but also gives the advantage of lateral thinking (Green hat), Then the application of managerial thinking leads to planning upcoming processes, organizing, and controlling to get better solutions (Blue hat), Success of organizational decisions depends on the action taken from team members and organizational problem solving is challenging for top management.

VII. CONCLUSION

Individual decision making for a managerial problem is by itself very difficult when it comes to organizational matters. The group decision-making process is much efficient considering individual decisions. In the end, efforts made to systematically analyze the problem and leads to various alternative solutions to choose from. In this systematical decision-making process, the six thinking hats method can play a major role in the organizational problem-solving process where a manager or team of managers work for effective decisions. Considering that each subject matter and personality traits of the six hats help the organizational problem-solving process. Six Thinking Hat as a method will help the manager to take control of his problems effectively. With the practice and systematic implementation of the six hat thinking method, the managers will never give up searching for an ideal solution to organizational problems.

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