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Using Creativity Tools to Improve the Product Development Process

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by

Rachel Wiatrowski

An Abstract of a Project
in
Creative Studies

Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Master of Science

December 2007

Buffalo State College
State University of New York
Department of Creative Studies

ABSTRACT OF PROJECT

Using Creativity Tools to Improve the Product Development Process

Throughout the product development process, problems arise that challenge the success and inventiveness of a product. Creativity tools and techniques enable the multi-disciplinary teams that develop these products to react to problems and thereby, develop superior products. However, when each member of a product development team does not have the same foundation of creativity training, it can be difficult to use these tools effectively. The purpose of this project is to assist product development in using creativity tools and techniques both in and outside of creative problem solving group sessions, and to improve the quality and originality of products overall. After a presentation of creativity tools and techniques, participants reacted positively to incorporating these tools into everyday problem solving in product development, and recommended expanding this program to other development teams.

Date

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Introduction

Product development is a complex process that often involves multi-disciplinary teams. I propose that the ability for these teams to solve problems is improved by using creativity tools and techniques. As a member of a product development team for children's toys, this project is an opportunity to incorporate these tools and techniques into my team's product development process. My goals for this project are to improve upon our ability to solve problems creatively, thereby enabling us to design and implement superior products.

This project began in response to my participation in group brainstorming sessions at work. Often these sessions included the same group of people on the development team responsible for solving the problem. At the end of the group session, the walls were covered with sheets of ideas. Later, when I was asked to lead these meetings, I found that there were not procedures to follow, and when I left the session, I was advised to have the notes and ideas typed up and to use these ideas to solve the product-related problem. However, it was difficult to sort through the ideas, some ideas were unclear or unfinished, and I tended to choose solutions that were closest to the ideas I started with.

The more that I have learned by taking part in the Creative Studies program, the more I have been able to apply basic creative problem solving principles – beyond just tools and techniques and three circles and facilitating sessions – to everyday problem solving. It has changed the way I approach a problem: I feel more empowered to address

issues that come my way, and I tend to incorporate these thought processes when assisting other people with product issues.

I think that our company is a truly creative environment – partially because we are forced to generate new product ideas all of the time, but also because it is a place that attracts those who are interested in problem solving in their own discipline. We come up with a “cool” idea, and then we fit it into the product line, work within time, cost, and safety constraints, and ultimately, put it on the market for children all over the world.

Designers in our organization expect to be invited to brainstorming sessions of one form or another. But there is little understanding of what brainstorming is, why brainstorming works, and what to do before and after. Employees do not know how to use tools besides brainstorming with Post-Its® and dot-voting, and those techniques are not always implemented well or to completion.

Most members of the design group stick with what they are comfortable – namely, generating ideas. However, choosing what ideas are the best solutions from the pool is not our strong point. Often, the decision is left to management based on a small group of ideas from the larger set that were generated, with little or no reference to those ideas left behind. Our brainstorming sessions do not usually conclude with converging tools – the most that is done will be dot-voting, where everyone in the group can put as many dots as they want on the ideas that they like, and then the session is over.

When a new employee starts at our company, he or she begins to be invited to brainstorming sessions, and must implement his or her own sessions, with little to no explanation of what to do, how to plan for the meeting, how to use tools, how to manage

a group setting as a facilitator, how to lead the meeting and own the content at the same time, and what to do with the information after the meeting is over.

Therefore, my presentation focuses on (a) how creative problem solving can fit with the ways that we are already problem-solving in product development, (b) what are tools that can be used both individually and with a group beyond Post-Its® and dots, (c) how can working with a facilitator be useful both in a session and outside of one, (d) how being a good client can help get better results.

I intend this project to give employees an overview of creative problem solving tools and techniques. Although initially presented to design team employees, eventually I plan to introduce these concepts to marketing and engineering team members as well. As a result of participating in this presentation, these individuals will be more confident participating in creative problem solving sessions, and will be able to use these tools on their own, outside of group sessions. Finally, I hope to show participants that using techniques of creative problem solving in different areas of product development can become a meaningful and effective way to improve the quality of our products.

Research Review

Research supports the incorporation of creative thinking tools and techniques into product development. There are multiple methods of creativity that have been directly linked to product development. Creative Problem Solving (Osborn, 1953), Synectics (Gordon, 1961), and TRIZ (a Russian problem solving process) (Altshuller, 1979) have all been used in the development of new products. My objective is to incorporate tools

that are appropriate to the product development process, and show how using creativity techniques can provide more successful problem solving results.

Creativity processes work because they have three characteristics that transfer well into the product development process and business practices in general. Most tools are rational, cognitive, and semantic. They are rational because the tools are logical (there is clear flow of tasks) and repeatable. The tools require different types of thinking skills, therefore they are cognitive. They are also semantic, which means they are language-based, and by using specific phrases, or statement starters, each phase assists in successfully using the tool. In this situation, success is represented by novel and realistic solutions to a product development problem.

An important aspect of my presentation is the inclusion and improvement of convergent thinking skills into the creative product development process. I do not intend to replace divergent thinking with convergent. However, it is important to have a partnership between the two. “The crucial idea here is that although both are needed for production of effective novelty, this is not necessarily at the same moment in the process; the creative person may alternate from one kind of thinking to the other, according to the demands of the particular phase of the process of production of effective novelty” (Cropley, 2006, p. 402).

This thinking is supported by the Creative Problem Solving (CPS) model. CPS is “a deliberate creative process [that] takes intuitive responses to open-ended problems and moves them from trial and error to targeted strategies” (Puccio, Murdock and Mance, 2007, p. 29). By deliberate, it is meant that there are specific steps that are taken to obtain solutions to problems. The CPS steps describe “what to do at each immediate step

in order to eventually produce one or more creative, workable solutions” (Davis, 2004, p. 125).

This is useful in product development because when identifying only one idea and moving forward, there is a high risk factor if the idea is not the best solution. It is possible to remove uncertainty about the appropriateness of a solution before investing resources by including a combination of divergent and convergent thinking. “It is more efficient to first lay out all of your options, then take time to deliberately review and evaluate a full range of alternatives to find the best course of action, than to make a snap decision that does not fully satisfy the needs of the situation” (Puccio et al., 2007, p. 41).

Product development is all about working in groups or teams, and our company environment is no different. We work in cross-functional teams, which include design, marketing, and engineering, as well as numerous product support groups. CPS is a process that relies on group work, and it “provides a framework through which group members can productively work together to resolve a complex problem” (Puccio, Firestien, Coyle and Masucci, 2006, p. 27).

Real experiences on using Creative Problem Solving to solve plant maintenance problems were found by Thompson (2001). Thompson observed the ability of three different companies to identify problems, use CPS tools, and ultimately generate appropriate and innovative solutions. There are a number of general outcomes that Thompson observed from these case studies. He observed that different groups of employees, at all professional levels, are able to use CPS tools. “A diverse range of problems” are appropriate for the CPS process, “including organizational matters, human factors, process conditions, equipment design, and maintenance software” (Thompson

2001, p. 195). Thompson (2001) also determines CPS to be “a cost effective approach to identifying the causes of maintenance problems and to finding solutions to particular maintenance problems of diverse kinds” (p. 195). These observations are very specific results due to the types of issues that were faced by the companies in these case studies. However, similar issues, related to cost, process and design, are faced in all types of product development.

Another creativity model that has assisted in product development is Synectics, which uses “conscious, analogy-based and metaphor-based techniques for bringing together...different elements” (Davis, 2004, p. 159). Developed by William J.J. Gordon, this model uses unrelated objects, environments, ideas and combines them in order find a new product or solution. Often, the Synectics process looks at objects in nature to blend their qualities with a product challenge. For example, “when a business wanted a better way to package and ship potato chips so they would not break, noticing the way wet leaves can be compactly packed into garbage bags because they conform to one another led to the development of Pringles Potato Chips (Gordon, 1980)” (Puccio et al., 2007, p. 67). Velcro was developed after seeing how burrs get stuck on clothing, while product developers were looking for a stronger fastener. Each of these examples used Synectics tools to find new and innovative solutions to challenging problems.

The innovation occurs because using analogy to transform knowledge from one environment and compare this information with an unrelated set of knowledge forces problem solving groups to look at the problem in a new way. Dahl and Moreau (2002) state “people can borrow both attributes and relations from existing base domains and use them in the creation of a novel target” (p. 48). People are inspired by the way things

work and are able to transfer that information from one system or domain of knowledge to another. Dahl and Moreaus's (2002) research proposes that "firms may find that encouraging the use of analogies from several disparate knowledge bases" (p. 59) in order to produce original solutions. Applying analogies from more than one knowledge domain increases the likeliness of a novel, yet appropriate, solution.

Similar to brainstorming, Synectics requires participants to defer judgment on an idea, and to focus on improving the idea. There are two parts to this process: the first is to emphasize all the positive attributes of an idea, and the second is to look at any challenges as opportunities for improvement (Nolan, 2003). The Synectics process is also relevant to the product development team because its tools are used by a group of people of various knowledge domains. "Synectics ...[holds] on to the behavioural aspects of group dynamics while also seeking to establish specific structural features to support group behaviours stimulating creativity" (Rickards, 2003, p. 31).

The Theory of Inventive Problem Solving (TRIZ) is a scientific approach to solving product-related problems creatively. Developed by Genrich Altshuller, it uses a "process of generating inventive ideas based on the utilization of accumulated knowledge of human innovation" (Gonzalez, 2002, p. 43). The source for this accumulated knowledge is an extensive patent database, which is used to determine how the problem can be solved based on the evolution of existing products and technologies. "The fundamental idea of TRIZ is to provide them [inventors] with easy access to a wide range of experiences and knowledge of former inventors, and thus use previous solutions for solving new inventive problems" (Moehrle, 2005, p. 4).

The foundation of TRIZ is that each product-related problem is due to a contradiction of criteria or requirements. When this contradiction is resolved, then the problem is solved. In order to uncover innovative ideas to resolve these contradictions “inspiration need not be random in the generation of new ideas, yet we can take a systematic approach to harness and control the innovative process” (Gonzalez, 2002, p.44).

TRIZ incorporates a combination of divergent and convergent thinking tools which “include the concepts of ideality, the resolution of contradictions, and the identification and use of unrecognized resources” (Gonzalez, 2002, p. 47). Altshuller defined a set of 40 Inventive Principles and 39 Features, based on his research of the evolution of inventions. These are used to identify potential opportunities and common problems that are uncovered when investigating a product development problem. TRIZ also uses software programs and a patent database to assist in finding an inventive solution.

Each of these three creativity models demonstrates different techniques to help the problem solver (developer, designer, and inventor) make the shift in his or her thinking processes to identify and refine solutions in product development. Therefore, in order to improve upon our team’s product development process, I chose to incorporate creative problem solving tools and techniques into the presentation.

Methodology and Process Plan

The objectives for this presentation, “Tools for the Creative Process and how to make them work in your product development” are (a) to show how creative problem solving tools can fit into the ways that we are already problem-solving in product development, (b) to identify and demonstrate diverging and converging tools that can be used both individually and with a group, (c) to demonstrate how working with a facilitator can assist in creative problem solving both in and outside of a group session, and (d) to clarify the roles of the client both before and during the problem solving group session.

The presentation consists of PowerPoint slides, a notepad and markers to further clarify any information or techniques, Brainwriting sheets, and Evaluation Matrix sheets. The PowerPoint slides are not a complete presentation, but instead were heavily supported by my delivery and explanation of the information. To view the complete PowerPoint presentation, please see Appendix B.

I begin the presentation by providing the group with an overview of what they can expect to cover throughout the presentation. The purpose of the overview is to prepare the participants for the topics and build expectation for those parts of the presentation in which each person is interested.

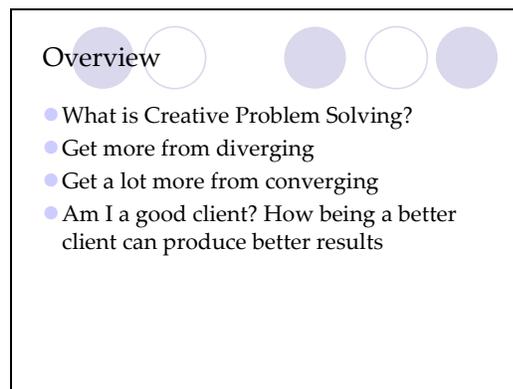


Figure 1 – Overview of presentation objectives.

A brief overview of Creative Problem solving began with a quote to demonstrate how using creativity to solve real problems can change the approach by removing randomness and uncertainty.

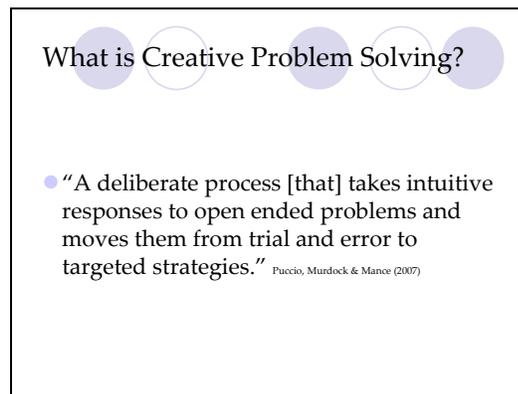


Figure 2 – Benefits of using Creative Problem Solving.

Following this slide, I provide the group with a few tips to put creative problem solving into the context of our product development. I explain how each of us can use any of the techniques that will be discussed in the presentation not only in group brainstorming and formal creative problem solving sessions, but also individually.

The next section of the presentation is divided into three parts: (a) stage 1, defining a problem statement; (b) stage 2, diverging for ideas; and (c) stage 3, converging for solutions. The first stage, defining a problem statement, begins with examples of some of the problems that we face in product development and where those problems come from. Some examples of these problems are reducing cost, using new technologies, and identifying the best play patterns. A play pattern is the way that a child interacts

with a toy. These challenges come from consumers, competition, and market trends. Many products that we design are in response to problems, and we choose solutions that will meet the needs of both internal and external customers. Internal customers are team members of other disciplines, such as marketing or engineering. External customers are not only the children that play with a toy, but also the parents, grandparents, or friends that purchase a toy.

When a product problem needs a creative solution, phrasing the problem statement in the form of a question helps to give a different perspective. Figure 3 shows two examples of statement starters used in creative problem solving. Also, because there are many criteria to determine a problem statement, it is useful at this stage to evaluate the importance of each one. Therefore, when later evaluating solutions, these same criteria can be used to balance the appropriateness of each solution.

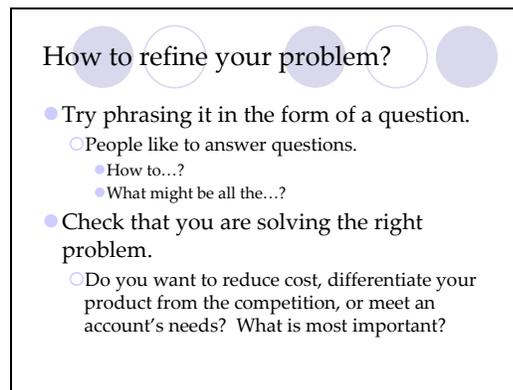


Figure 3 – Defining the problem statement.

In stage 2, the focus turns to divergent thinking techniques, where the objective is to build upon the tools that the team already uses. Our product development process encourages the use of brainstorming with Post-Its® to identify possible solutions to

problems. I define here the rules for divergent thinking (see Figure 4) and clarify each description for the benefit of those participants who are not as familiar with the diverging process. I highlight the positive results from working within these rules.

Deferring judgment allows consideration of those ideas which may already have been tried, by allowing these ideas to become foundations for new ideas. When a creative problem solving strives for quantity, the sheer number of ideas increases the probability of coming up with an appropriate solution. Seeking novelty and trying for wilder ideas is a useful rule in order to create more innovative ideas. Finally, building on other ideas can lead to combining the positive aspects of more than one idea. As a facilitator, I have found that it is also common for group members to dismiss an idea that is repeated. However, I prefer to call attention to these idea repeats because it may be an indicator that there is something successful about the idea, so these ideas deserve further development or may become a foundation for generating more ideas.

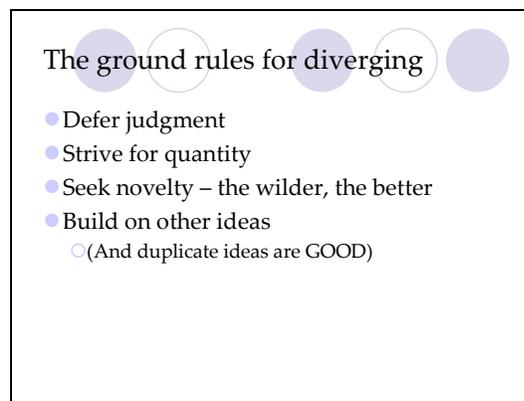


Figure 4 – Rules for divergent thinking.

When considering specific tools and techniques for this presentation, I wanted to include those that could build upon the foundation of knowledge that the team already used, but pushed the participants to consider creative problem solving from a different

point of view. I give a brief overview of the benefits of brainstorming with Post-Its®, including the ability to move ideas around later, to be able to display a large number of ideas at one time, and also to allow a group of people to participate. When each member of a creative problem solving group writes his or her own ideas down, it maintains the idea in its original form, rather than allowing a facilitator to transcribe, and thereby possibly change, what the idea is.

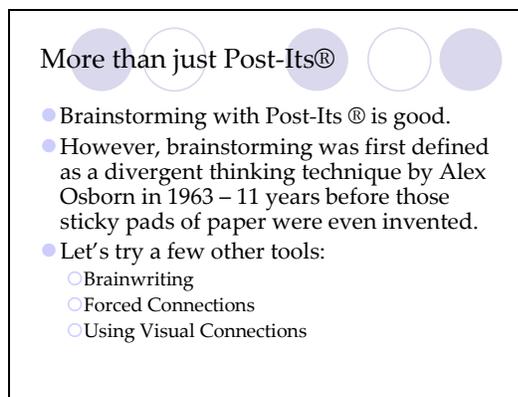


Figure 5 – Multiple divergent thinking tools.

Brainwriting is a common tool that is used as a Post-It® alternative, and leads to a large number of ideas in a short period of time. To demonstrate this tool, I request a problem statement from the team, distribute worksheets to each participant and we work together to generate ideas. The opportunity with this tool is to continue to build on the ideas that have come from others in the group. Due to the high level thinking capabilities of the group, in order to maintain the group interest, and familiarity with divergent thinking, I teach this tool in the context of real issues. A sample of a brainwriting worksheet is in Appendix C.

The next two tools presented are forced connections and visual connections. The forced connections technique is explained, and then demonstrated using objects in the

conference room where the class takes place. I believe that this benefits the group, because it is not a staged demonstration of the tool. I prefer to use the problem statement that is being used in the brainwriting exercise because it builds on the different types of ideas, and different ways to approach a problem using various divergent thinking tools.

I also take time to clarify how forced connections and visual connections are similar, and in what way they can be used differently. I prefer to give examples that separate the tools. The forced connection tool is an opportunity to use a random object and force it into the problem. For example, what would happen if the problem was combined with the characteristics of a wall clock? Is it round? Are there numbers on it? Does it have moving parts? Is there a time element that can be added? All of these are characteristics that could be applied to the problem and could lead to a solution.

When demonstrating visual connections, I display an image and ask the participants to get impressions from the image and apply them to the problem. Does an image inspire a feeling, a change of environment, or a memory? How can these be applied to the problem? I use a visual connections book that I have created in my creative problem solving sessions, and I include this in the presentation as an example to assist in explaining the visual connections tool. The visual connections book is a set of images meant to inspire feelings or thoughts and consists of pictures of people, environments, food, vehicles, and visuals like these that can give a strong impression when viewed. I include these two techniques – forced connections and visual connections – in the presentation for two reasons: 1) images and objects are appropriate for both of these tools and 2) these tools are simple to use with or without a group and in any location.

The final creative problem solving techniques that I address in this presentation is at stage 3, convergent thinking tools. Participants are not as familiar with this part of the process because it is not included as part of our brainstorming sessions. Therefore, I begin with a simple definition of the word, and why it is important to include convergent thinking after the divergent phase is complete (Figure 6).

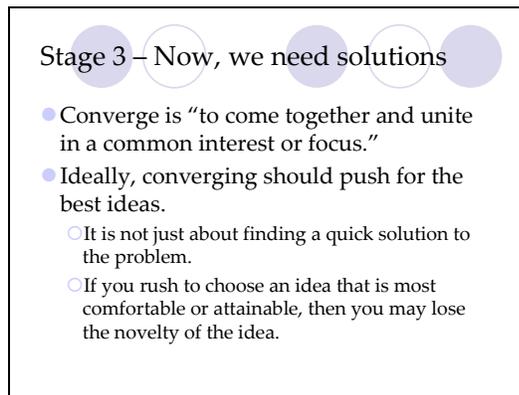


Figure 6 – Introduction to convergent thinking.

Similar to the divergent thinking part of this presentation, I include the rules for convergent thinking (see Figure 7) and explain how each of these is helpful when choosing a solution. Here, I emphasize the importance of using judgment in a positive way, in order to allow ideas to be fully considered before being dismissed. I also point out that referring to the criteria used when forming the problem statement is an important way to increase the likelihood of a solution being successful.

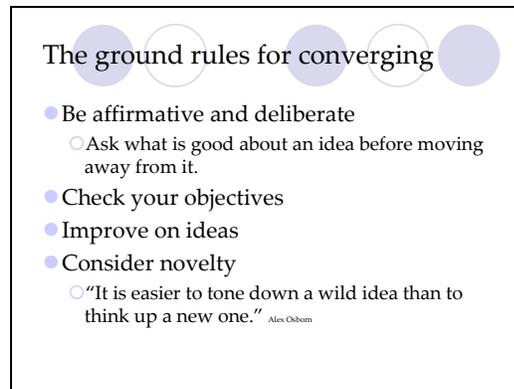


Figure 7 – Rules for convergent thinking.

Refining the ideas that are selected as potential solutions is an important part of the process that I focus on at this point in the presentation. I elaborate on the dot-voting tool to show how it can do more than just narrow the playing field of ideas. Dot-voting consists of selecting (placing dots) on the solutions that have the most potential to solve the problem. This tool is most effective when completing the process with clustering. Clustering “is about expanding knowledge, about connecting ideas, and connecting ideas to problem statements, functionalities, and values and consequences” (Tassoul and Buijs, 2007, p.16). When clustering, the ideas that are selected in dot-voting are now rearranged to create groups (or clusters) of ideas that are somehow related. “This can be done individually, but...often...people do this in groups. In that sense the process is also influenced by group dynamics” (Tassoul and Buijs, 2007, p. 21). Restating a group of ideas in order to capture the essence of the attribute of an idea (or group of ideas) is a way to ensure that none of the ideas formed in stage 2 as potential solutions are lost.

The two additional convergent techniques that I include in this presentation are PPC and the Evaluation Matrix. First, I outline the way that PPC is used and define each part of the tool: Pluses are the positive aspects of the idea as a solution, Potentials are the outcomes that might happen as a result of the solution, and Concerns are those attributes

of an idea that may present a new problem. Then I show how it is important to ideate in order to overcome those concerns that could stand in the way of the solution. For example, if the chosen product solution may be too expensive, then I would ask “How can this product be less expensive?” This problem could be overcome by changing the material to manufacture the product, reducing the size, or removing a feature.

Second, I distribute and demonstrate the Evaluation Matrix worksheet as an alternate tool when using convergent thinking. A sample of an Evaluation Matrix is available in Appendix C. In order to benefit most from this tool, I explain to the participants that this should be used with the original criteria for the problem, and then each potential solution receives a rating as to how well the idea meets each point. It is also helpful to emphasize that some criteria may be more important than others, so ratings should not simply be added cumulatively, but instead should be considered as part of the whole solution.

Each of these convergent thinking tools can be used individually or as part of a creative problem solving session group, and therefore meet the needs of this presentation. Finally, I challenge the group to try these tools outside of this setting and invite the participants to ask me for any assistance that may be needed.

Each participant of this presentation session has been or will be a client for a creative problem solving session. However, knowing what a client is and what can be done to benefit most from a creative problem solving session is an important skill set that is accessible to this target audience.

I propose four steps that will guide each participant to become a more effective client. These steps are: (a) get assistance from a facilitator, (b) talk to a facilitator before

the creative problem solving group session, (c) be at the creative problem solving session, and (d) be a “rule role model” at the session. I elaborate upon each of these steps on the following slides. The client has responsibilities that extend before a creative problem solving session begins and after the session is complete. Without this follow-through, a client may find that the potential solutions are not complete, or do not meet the needs of the product development process.

First, when a client elects to receive assistance from a facilitator, it diverts the client’s focus from the timing and flow of the session to the problem and its criteria. The facilitator’s role is to focus on the creative problem solving process, and the client is free to contribute to the potential ideas and solutions.

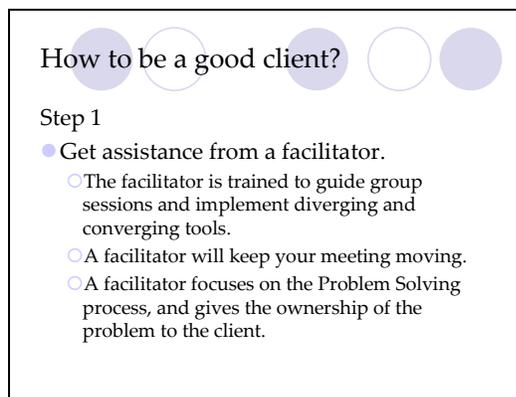


Figure 8 – Suggestions for being a good client – part one.

The second step to guide a client is to talk to the facilitator before the problem solving session. This is a common problem in our product development process, as a facilitator may often be requested at the last minute, which prevents the opportunity for an informed agenda that includes the most appropriate tools for a specific problem. A facilitator is also able to help the client refine the problem statement to ensure that the correct problem is being solved. Occasionally, it may not be the appropriate time for a

group session, and it would be better to wait until background information is gathered or the problem's criteria are better defined.

Although it may seem obvious, the next recommended step to being a good client is to make sure that the client attends the problem solving session. The facilitator will rely upon input from the client throughout the session to ensure that the ideas or solutions are moving in the right direction for the problem's criteria, or to verify if enough time is being spent on a specific aspect of the problem. Additionally, if there are other stakeholders that will influence the final decision of the potential solution, it is helpful to have them be included in the group session and contribute ideas.

In step four, I propose that the client should be a good "rule role model" when participating in the creative problem solving session (see Figure 9). Potentially, the resource group will present ideas that have already been considered by the client. This is a key opportunity to defer judgment! A facilitator can review these divergent and convergent thinking tools with the client prior to the session to make sure that the client is ready to lead the group to solutions.

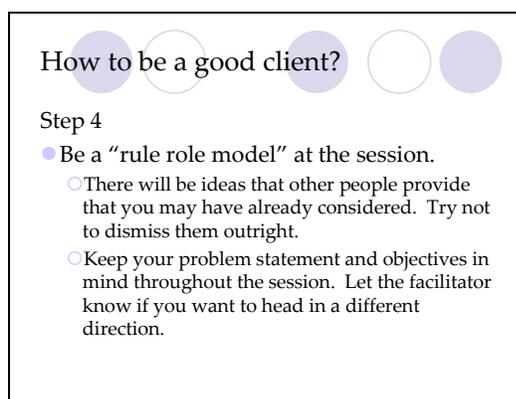


Figure 9 – Suggestions for being a good client – part four.

The presentation concludes with suggestions to use any of these tools when facing a new challenge or problem in product development. I provide the participants with a

sample of the brainwriting and evaluation matrix worksheets. I also extend an invitation to talk with me about any topics discussed in the presentation. Finally, I let the group know of facilitators that may be available to assist in any upcoming creative problem solving sessions.

I conclude the session with a simple evaluation form (see Appendix D). In this form, I ask the participants questions to gather information about the effectiveness of the presentation. I focus on discovering what concepts are most likely to be used when facing future problems in the current process, and if this program would be beneficial to other product development teams.

Summary and Reflection

I presented this project on Wednesday, November 14, 2007 to my manager and team of four co-workers. I found the group to be responsive, and was able to complete the presentation in about one hour. Overall, I was encouraged by the reactions of the group and the discussions that took place both during and after the presentation.

Due to time constraints, I chose to dive deeper into one tool, brainwriting, and then discuss two other tools, forced connections and visual connections. Prior to meeting, I had asked the group to bring any problems for which solutions were needed. I had planned on a few “backup problems” that could be used, but knew that the team was struggling on some new product ideas. I wanted to show my team not only how other tools worked, but that they did work.

We took about 15 minutes for brainwriting, which allowed me to explain how to use the brainwriting tool and then the group tried it. I asked for a product-related problem – as a few people had brought issues that could be worked on, the team agreed on which problem to address. At that point, we rephrased the problem in the form of a question. The group's response to this process showed me that I could have more effectively demonstrated this technique earlier in the presentation, when discussing problems and how to write them as a question to assist in problem solving.

I allowed the team to use the technique, but did not give them the full amount of time to complete the process, simply due to timing. It was immediately clear by the group's reaction that they were surprised by the number of ideas in the short time that we had been working on the problem. I had hoped that this would be the result; however, the discussion that followed was unexpected.

The group saw this tool as an opportunity to get more ideas for day-to-day problems that would not require a complete problem solving session. A suggestion was put forward to create a space in our team area that would act as an idea station, where we could keep brainwriting forms available for team input at any time. If a co-worker had a problem and was looking for more ideas to solve it, then they could post a brainwriting form, and anyone in our area could contribute ideas. It would not take a lot of time, and could include not only our immediate team, but others employees with whom we work. What a great opportunity to blend this divergent technique into our daily product development process! I am excited about putting this in place in the weeks to come.

Next, I demonstrated how to use forced connections and visual connections to push further for ideas by using our environment. When describing forced connections,

one team member indicated a parallel to a design technique called mathematical form exploration. After further discussion, John Behringer, a longtime design professor at the Rhode Island School of Design, incorporated this technique into a class called “Draw and See,” where students would force exploration of a product form by drawing all possibilities within some set of mathematical rules. D. Stucke explains one example of this technique:

“Consider a camera as a rectangular block. If you change the orientation of how you hold the block, you can imagine it as different types of cameras: a typical point-and-shoot camera, a video camera, a 110 format camera. Now, take this same process and apply it not only the overall form, but to any sub-form or specific detail on a product and one can develop a huge range of possibilities.” (personal communication, December 3, 2007)

This process of forcing mathematical details onto a product form is most useful when “it seems like all of the obvious solutions have been done. It is sort of an organized way of getting to something new” (Stucke, 2007).

To wrap up the presentation of divergent thinking and techniques, I showed the team my visual connections book, and demonstrated how the images can be used to inspire new ideas. This tool triggered a second discussion of how to use this tool outside of problem solving sessions – create a book of images that each of us finds inspiring, and make it available to the team in the idea station, where images can be added at any time. We often use images to inspire our work, so this is easily an extension of tools that we already use in product development.

As converging techniques are less familiar to the team and we did not have a set of ideas to converge, I chose to spend more time explaining and demonstrating them rather than having the team try the tools out directly.

The team often uses group dot-voting to select the favorite ideas. Unfortunately, after ideas are selected with dots, a group has not clustered and summarized the favorite ideas, in order to strengthen the favorite ideas with the reasoning behind the choices. Therefore, I gave a brief description of what it means to converge in order to improve upon an idea. I also introduced PPC and the Evaluation Matrix as tools as ways to further strengthen ideas. I would have liked to spend more time on these tools in order to ensure that the team understood how to use them by practicing them.

The overview of the tips on being a good client was well received, and initiated some discussion on the difficulties of being a client after already attempting to solve a problem. The biggest problem is avoiding judgment on ideas that have already been tried. It was understood how important it is to allow resource group members to make the same journey through problem solving in the interest of identifying new and different solutions.

Overall, the comments that I received on my team's evaluation forms were very positive. One co-worker wrote that other teams would benefit from this program because it gives "more focus, planning, and well-defined problem statements." Another participant stated that the thing he liked least about the program was that he "wanted to go deeper into techniques."

I definitely intend to refine this presentation, based on how the group reacted to some activities, and to accommodate the comments received on the evaluation forms. I

have already received a request from one additional team that is interested in my giving this presentation.

One opportunity for improvement is to incorporate more background for creative problem solving. I did speak to the history of the process and the field. However, I feel that the PowerPoint presentation did not sufficiently support this aspect. This portion of the presentation could be modified based on the group – some teams are more interested in the background behind the tools, whereas other teams will be more focused on the practical techniques and how to use them.

A second improvement I would like to make to the presentation is to include more examples of the techniques being used. Refining problem statements and demonstrating the converging techniques should be shown with specific examples that are relevant to our product development. I plan to demonstrate ways that I have actually used these techniques. Also, after the next problem solving session that I facilitate, I could show the results based on the tools that we have included as examples of diverging or converging tools. Because I may not always be able to allow the group to use the diverging techniques on an actual problem, I will need to show more examples of using the Brainwriting tool.

Additional ways to improve this presentation are the inclusion of other techniques, such as the SCAMPER tool for divergent thinking and a convergent thinking tool that considers product competition. SCAMPER is an anagram that uses various words to apply to an idea in order to further develop it. SCAMPER stands for substitute, combine, adapt, magnify, place, eliminate, and reverse. In order to further develop an idea, these words can be used to ask the problem solver to look at the idea in different

way. When converging on ideas, asking “Which ideas have you not chosen that the competition would choose and why?” or “Which ideas would you not want the competition to know about?” These two convergent thinking questions can help a group to consider alternative products to pursue.

As our team extends these techniques by adapting the diverging tools to be used in day-to-day product development, such as the idea station, I plan to incorporate these tools into the presentation. Due to the differences in product development cycles and practices, each team may uncover new opportunities to include diverging and/or converging techniques from this presentation. Therefore, I see benefits to share any best practices in the hopes of adapting tools to help a team become more productive.

Future presentations of this program would benefit from further research using creative problem solving in order to name products and incorporating this into the product development. Defining, choosing, and legally clearing a product name is a very difficult process, and often can prevent the team from moving forward in product development. Identifying the product name early can unify the message of the product, and is a very important criterion when prioritizing problem solving solutions.

In the end, I see this project as the basis for the growth of the creative problem solving skills of not only my team of co-workers, but reaching out into other product development teams as well. The current state of divergent and convergent thinking skills is not equal throughout the design team employees. Further research may prove this to be true in other departments. However, this presentation can potentially improve the foundation of our collective ability to design new and innovative products. Incorporating and elaborating upon creative thinking tools further into our product development is an

opportunity that can benefit not only the abilities of our employees to solve problems, but ultimately enable us to create the best toys ever.

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Appendix A
Concept Paper

The Benefits of CPS in Product Development

Name: Rachel Wiatrowski
2007

Date Submitted: September 20,

Project Type (Develop a Skill/Talent or Use a Skill/Talent to Improve the Quality of Life for Others)

Develop a Skill/Talent

What Is This Project About?

This project consists of the creation and implementation of one CPS basics class for co-workers that will look at the specifics of applying CPS to our current product development process. The focus of the class will be on the importance of converging vs. diverging, applying CPS tools to product naming, and the qualities of a good client.

Rationale for Choice

Currently, the focus in product development is on “brainstorming” – coming up with lots of new ideas. However, there is a point in the process where converging skills are just as important, if not more so. Often, we do not allot the same importance to choosing the best direction in which to move – this is sometimes left to decision makers, who may not have participated in the diverging phase, and have little frame of reference for the long list of ideas that have been generated. Second, new employees often do not have a background or understanding of CPS basic tools, and this class would be an opportunity to provide a foundation for our use of these tools. Third, employees who request facilitations do not always understand his/her role as a client, and there is a general need for some guidelines to assist in the success of the CPS sessions. Finally, we often use brainstorming to develop product names – “namestorms” – which is an essential task to the identity and success of a product. This class would also be an opportunity to show how CPS tools can be applied in this way.

What will be the Tangible Product(s) or Outcomes?

As a result of this work, I will create a one-hour class that teaches and discusses the topics above and facilitate this class to my team of co-workers. This will include a PowerPoint presentation and a handout summary for reference.

What Criteria will you Use to Measure the Effectiveness of your Achievement?

I will know that the class is appropriately designed when I have included my intended content and it can be presented within the time allotted (one hour). I will need to plan in advance in order to have the team available for the class, so I will have a hard date that must be met.

Who Will Be Involved or Influenced; what will your Role Be?

My team of co-workers will be involved, including people from design, engineering, and marketing. I will lead the class and act as a resource for the team moving forward, both as a facilitator and for more information on how to use CPS tools in our product development process.

When Will This Project Take Place?

This project will take place over the months of September, October, and November of 2007. The class itself will be held in late October or early November. If it is found to be beneficial, further classes would be held in spring 2008 with other teams.

Where Will This Project Occur?

This project will take place on the Fisher-Price campus in East Aurora, NY.

Why Is It Important to Do This?

Because we are already using parts of the CPS process and divergent tools in our product development process, it is important to give team members a foundation for using these tools. Also, because we face the repeated tasks of choosing and naming products that we develop, this is an opportunity to show how CPS can help successfully move the team forward in development.

Personal Learning Goals

- To become a better and more confident facilitator
- To improve the product development process on my own projects
- To become a better known resource for facilitation and CPS for my team and other teams on campus

- To show how CPS is more than just divergent thinking and making it more accessible to co-workers who prefer convergent thinking and implementation

How Do You Plan to Achieve Your Goals and Outcomes?

I plan on achieving my goals by creating a presentation that builds on the tasks and CPS tools that are already familiar to my team of co-workers, and introduce new topics in a practical way, intertwining the current product development process with the appropriate diverging and converging tools. I will also include in the class an opportunity to practice select CPS tools, identifying the potential uses of each tool.

Evaluation

I will provide evaluation forms for the co-workers that participate in the class to understand what worked best and what improvements can be made. I will also review the curriculum prior to the class with a co-worker that is also a facilitator to improve the presentation. Finally, I will complete a self-evaluation to identify any opportunities to apply in what future presentations of the class.

Prepare Project Timeline

Week of September 3rd

- Identify and refine planned topics for class
- Complete 1st draft of Concept Paper

Week of September 10th

- Identify potential resources on curriculum topics
- Create 1st draft of class design – timing and topic flow

Week of September 17th and 24th

- Review resources for appropriateness to class
- Complete final draft of Concept Paper

Week of October 1st

- Begin design of presentation and PowerPoint for class
- Complete draft of class design

Week of October 8th

- Begin writing Introduction and Literature Review for final project paper

Week of October 15th

- Complete 1st draft of presentation and PowerPoint for class
- Schedule class date with Team for presentation

Week of October 22nd

- Complete 1st draft of Introduction and Literature Review
- Review presentation and PowerPoint with co-worker/fellow facilitator
- Create Evaluation form for class participants

Week of October 29th

- Refine and complete final presentation and PowerPoint
- Begin writing Methodology/Purpose for final project paper

Week of November 5th

- Present final presentation and PowerPoint to co-workers
- Complete 1st draft of Methodology/Purpose
- Begin writing Results and Summary for final project paper

Week of November 12th

- Complete 1st draft of Results and Summary

Week of November 19th

- Review complete draft of final project paper for continuity, format, revisions

Week of November 26th

- Complete final revisions for final project paper

Week of December 3rd

- Create presentation for CRS 690 class

Identify Pertinent Literature or Resources

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Appendix B

PowerPoint Presentation:

Tools for the Creative Process

Slide 1

A decorative graphic consisting of six circles arranged in two rows of three. The top row has a white circle with a purple outline on the left, a solid purple circle in the middle, and a white circle with a purple outline on the right. The bottom row has a solid purple circle on the left, a white circle with a purple outline in the middle, and a solid purple circle on the right.

Tools for the Creative Process
and how to make them work in
your product development

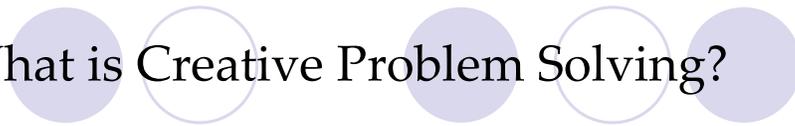
Slide 2

A decorative graphic consisting of six circles arranged in a single row. From left to right: a solid purple circle, a white circle with a purple outline, a solid purple circle, a white circle with a purple outline, and a solid purple circle.

Overview

- What is Creative Problem Solving?
- Get more from diverging
- Get a lot more from converging
- Am I a good client? How being a better client can produce better results

Slide 3



What is Creative Problem Solving?

- “A deliberate process [that] takes intuitive responses to open ended problems and moves them from trial and error to targeted strategies.” Puccio, Murdock & Mance (2007)

Slide 4



A few tips...

- Understanding and refining your problem before a Problem Solving session can assist in better solutions.
- Working with a trained facilitator allows you to focus on your product.
- Not every problem needs a group Problem Solving session.
 - You can use most tools on your own.

Slide 5



Stage 1 – You've got problems

- Play patterns
- Cost
- Technology
- Curriculum
- Content size and complexity

Slide 6



And where do they come from?

- Consumers – both children and parents
- External Competition
- Market Trends
- Account Needs
- Inventor Concepts

Slide 7



How we work with problems

- Products that we develop are often a means to solve a problem.
- Meeting all of the needs of both external and internal clients' expectations are challenges.
- As a product development team, we have many procedures in place to identify the problems that our products solve.

Slide 8



How to refine your problem?

- Try phrasing it in the form of a question.
 - People like to answer questions.
 - How to...?
 - What might be all the...?
- Check that you are solving the right problem.
 - Do you want to reduce cost, differentiate your product from the competition, or meet an account's needs? What is most important?

Slide 9



Stage 2 – First, we've got ideas

- Diverging is where all of us spend much of our time.
 - It is not just designers, but producers, engineers, artists, and marketers that are coming up with ideas to solve their problems.
- We, as a company, see value in group divergence.
 - This is one reason why we participate in so many brainstorms.

Slide 10



The ground rules for diverging

- Defer judgment
- Strive for quantity
- Seek novelty – the wilder, the better
- Build on other ideas
 - (And duplicate ideas are GOOD)

Slide 11



More than just Post-Its®

- Brainstorming with Post-Its® is good.
- However, brainstorming was first defined as a divergent thinking technique by Alex Osborn around 1939 – 35 years before those sticky pads of paper were invented.
- Let's try a few other tools:
 - Brainwriting
 - Forced Connections
 - Using Visual Connections

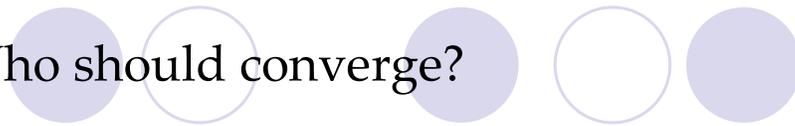
Slide 12



Stage 3 – Now, we need solutions

- Converge is “to come together and unite in a common interest or focus.”
- Ideally, converging should push for the best ideas.
 - It is not just about finding a quick solution to the problem.
 - If you rush to choose an idea that is most comfortable or attainable, then you may lose the novelty of the idea.

Slide 13



Who should converge?

- We do not always converge as a team, but maybe we should do it more often.
 - When you have lots of ideas, not all of them will be good ones. Converging is a way to identify those ideas that best fit the product and problem criteria.
- Dot-voting ≠ Convergence
 - Asking a group to dot-vote does not often provide enough information for a solution.

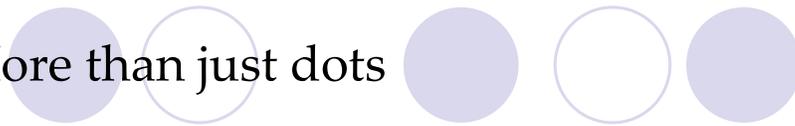
Slide 14



The ground rules for converging

- Be affirmative and deliberate
 - Ask what is good about an idea before moving away from it.
- Check your objectives
- Improve on ideas
- Consider novelty
 - "It is easier to tone down a wild idea than to think up a new one." Alex Osborn

Slide 15



More than just dots

- After dot-voting, complete the process
 - Grouping the ideas and restating the concept as a cluster can often capture the essence that led individual group members to dot the idea in the first place.

Slide 16



Additional converging techniques

(AKA...What to do after the dots)

- PPCo
 - Pluses, Potentials, Concerns, Overcoming Concerns
- Evaluation Matrix

Slide 17

Roles in the Problem Solving group

- Client
 - Not just the person who sets up a brainstorm
- Facilitator
 - Try not to always facilitate your own sessions
- Resource Group
 - Everyone else

Slide 18

How to be a good client?

Step 1

- Get assistance from a facilitator.
 - The facilitator is trained to guide group sessions and implement diverging and converging tools.
 - A facilitator will keep your meeting moving.
 - A facilitator focuses on the Problem Solving process, and gives the ownership of the problem to the client.

Slide 19



How to be a good client?

Step 2

- Talk to the facilitator before the session.
 - (Preferably more than an hour before...)
 - A facilitator can help clarify your problem statement.
 - A facilitator can choose tools that will get the most out of your session time.
 - You may determine that you do not need a facilitator or even a session.

Slide 20



How to be a good client?

Step 3

- Be at your Problem Solving session.
 - If you cannot, then assign someone familiar with the problem to act as the client.
 - If there are other people that will influence the decisions made based on your session, try to ensure that they can also attend.

Slide 21



How to be a good client?

Step 4

- Be a “rule role model” at the session.
 - There will be ideas that other people provide that you may have already considered. Try not to dismiss them outright.
 - Keep your problem statement and objectives in mind throughout the session. Let the facilitator know if you want to head in a different direction.

Slide 22



What's next?

- Try a problem solving tool on your own.
 - If you'd like assistance on using these diverging and converging tools, please ask!
- Consider talking to a facilitator before your next brainstorm session.
 - There are more around the company – talk to HR for more information.

Appendix C

Creativity Tool Worksheets:

Brainwriting and Evaluation Matrix

Brainwriting Worksheet

Row 1		
Row 2		
Row 3		

Evaluation Matrix Worksheet

Rating scale: Excellent Okay Poor
 A B C D E

Options	Criteria						

Sidney Parnes uses the evaluation matrix in his Creative Behavior Guidebook and Creative Behavior Workbook.

Appendix D

Program Evaluation Worksheet:

Tools for the Creative Process

