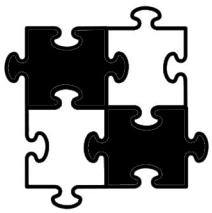
CREATIVITY IN GAME DEVELOPMENT

IDEATION



PROBLEM-SOLVING

& DECISION-MAKING

Tobias Iskov Thomsen
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Vejleder: Ole Ertløv Hansen

Creativity in Game Development:

Ideation, problem-solving and decision-making

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Abstract

Formålet med dette speciale er at undersøge hvordan udviklingen af computerspil kan forbedres som proces. Dette er tilfældet, fordi spildesign og de valg der foretages i forhold spillets form og indhold ofte forekommer at være ad hoc, snarere end at være en struktureret kreativ arbejdsmetode. Hvis dette kan ændres, så spiludviklere får adgang til værktøjer, der kan hjælpe dem udføre spildesign i praksis til hverdag, kan det muligvis gøre hele processen mindre frustrerende of mere effektiv.

Problemet er således, hvordan sådanne værktøjer kan anvendes i forhold til spiludvikling og dennes tilgang til idégenerering, problemløsning og beslutningstagen og om de overhovedet kan gøre en forskel.

Dette vil blive undersøgt ved at indsamle den nødvendige viden om de relevante værktøjer og derefter i en spiludviklingsproces teste disse metoder på egentlige spiludviklere, der har erfaringen med og kompetencerne til at kreere computerspil.

Resultatet af disse sessioner viser at der findes nyttige metoder, spiludviklere kan gøre brug af både til at generere nyt indhold, løse eksisterende problemer og træffe beslutninger. Dette gøres ved at opdele forskellige måder at tænke på til at finde sted i deres egen seperate fase, så diskursen ikke blandes sammen på kryds og tværs og gør tænkningen mere indviklet end nødvendigt. Dernæst er det vigtigt at skabe ryk i udviklernes eksisterende tankemønstre for at skabe en fremadskabende effekt, der kan stimulere kreativitet og frembringe nye løsninger. Dette kan opnås ved hjælp af en bred vifte af redskaber, hvoraf nogle kan bruges på generelle problemstillinger og udviklingen af helt nyt indhold, mens andre er mere anvendelige på eksisterende komplekse problemer. Fordi spil er formelle systemer med bestemte karakteristika er det nødvendigt at dokumentere detaljeret inden ideen udvikles, ligesom det også er vigtigt at involvere spillets målgruppe i spiltests, fordi det er dem der i sidste ende skal spille spillet og få en bestemt oplevelse ud af det.

Hvis disse metoder kan inkorporeres i spiludviklingsprocessen kan den kreative proces struktureres og blive mere effektiv og samtidig hjælpe til at løse problemer på en helt ny måde, der i sidste ende kan højne spillets kvalitet.

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Introduction

In the realm of game development the process can be turmoil of confusion, frustration and wonderful excitement. For the game designer his role consists of, among many other things, decision-making, problem-solving and ideation. However, during my experience with game design in both theory and practice a disquieting issue has presented itself. Being an industry that emphasizes creativity and innovation, I have noticed a lack of actual tools the designer (and other competences in the company for that matter) uses to accomplish these states. The process of designing and implementing games is many times done ad hoc and thus becomes unstructured, disorienting and prolonged in a way that is ineffective. It would seem as if a conduit between the desire to create the game which exists in the beginning of the process and the expected end result is missing, so as to optimize the game design process and in the end both saving money on production costs, creating a better game, and making the entire process more uncomplicated and fun.

This problem first came to my attention when being taught about game design as well as reading different available literature on the subject in preparation to attending The National Academy for Digital, Interactive Entertainment (DADIU) and my internship as a game designer, both being a part of my education and preparing me for the eventual job as game developer in the games industry. I was educated in games themselves as a medium and being certain systems with their own properties and possibilities, and some light was shed on the process of making a game; the creation of the formal elements of a game and what to look out for. But rarely, if at all, was it mentioned *how* to come up with good ideas, *what* to do with these ideas once conceived, or *how* to solve the problems which present themselves.

This presents the idea behind and relevance of this thesis. Further investigation into the importance of these tools will be done as a part of developing a solution to the problem. Before beginning to actually seek out the tools that could be used, I decided to substantiate my own experience in regards to this problem by seeking out and asking professional game developers for their thoughts on this subject. Do they use such tools and do they have a need for them? Those and a range of other questions were asked and the results strengthened my initial stance on the topic. The full results of this questionnaire can be seen in appendices A to D.

In this thesis I will give a short exposition of existing game theory and attempt to relate it to the creative methods concerning ideation, problem-solving and decision-making I will subsequently examine in depth. This will be done in order to focus on *game* development in particular instead of any creative industry in which the techniques can be applied. Having elaborated these subjects, I will attempt to test how these work methods function in practice by having actual game developers solve problems, make decisions and generate ideas with these specific tools. The conclusion on the results from these empirical data will help shape a new understanding of the process of game design and possibly help create a more streamlined way of thinking creatively in the games industry.

A question that needs exploring is what makes these creativity techniques and tools different for game development in particular as opposed to other industries? The short answer is 'nothing', as the tools can be used for any kind of activity where ideation, problem-solving and/or decision-making is an objective. However, there are certain criteria and circumstances about games, which shape the purpose and function of these tools. First and foremost it is a fact that games are made for users, we refer to as 'players' or 'gamers'. These words mean that there will be a person or a group of people who will interact with the game in order to achieve a certain experience (Fullerton et al: 2004, p. 43). Simply by stating the word 'experience' means that the game will attempt to invoke emotions in the player, be it a casual distraction from a busy world or an immersive journey through an entire digital world (Schnell: 2008, p. 10). Therefore we always need to be taking the player and both his desired and actual experience into account, when using these tools.

Another thing that makes game development unique is the fact that a 'game' is created. Games have certain properties and attributes in common, regardless of whether it is a 4,000 year old Chinese board game or the latest generation first person shooter or even a simple hopscotch game on a children's playground. Some exceptions occur for this, such as the Sims in which the game does not directly give the player an objective. Generally, though, games can be considered as formal systems which have certain compositions (Fullerton et al: 2004, p. 43). This means there are different variables and properties in these systems that need to be considered.

Lastly, there is something which defines video games in particular. They are mediated by a digital interface and require certain player input to play the game. In addition, it is a general concern to take the experience as a mediated one into account, which means that more often than not the player will be alone with the game as a digital consumer product with all which this entails (e.g. different computer setups, platforms, internet access, control schemes and so on). Basically, there is a medium that acts as a middle man between the developers and the end user, which has its own properties, heuristics and ways of working.

The above-mentioned leads me to an actual problem statement, which this paper will attempt to examine:

How can tools that seek to improve ideation, problem-solving and decision-making impact the game development process?

Theory of science

In this paragraph I will describe the general scientific methodology I will utilize in my efforts to provide an answer for my problem formulation presented on page 10.

The scientific approach will be based on the concept of hermeneutics; the study of interpretation. This is the case because I will conduct an empirical study in which participants with previous game development experience attempt to make use of creativity tools that revolve around generating ideas, solving problems and making decisions to develop game design ideas. This particular field work requires interpretation.

The basic concept of hermeneutics is to present an assumption or pre-understanding of a subject and as more and more data is collected and analyzed, the previous assumption is challenged and revised according to the findings, resulting in a deeper understanding of the subject. This reciprocal action is the core idea of hermeneutics and it has given rise to the term 'the hermeneutic circle', developed by German philosopher and theologian Friedrich Ast in 1808 (Føllesdal et al: 1990, p. 96). The circle *"...refers to the idea that one's understanding of a text as a whole is established by reference to the individual parts and one's understanding of each individual part by reference to the whole."* (ibid, p. 96). This view is a modern take on the hermeneutic circle and came from philosopher Hans-Georg Gadamer in 1975. In this case the 'text' is the subject at hand stated in the introduction of the thesis. The following model displays the circle and its reciprocal features as a spiral:

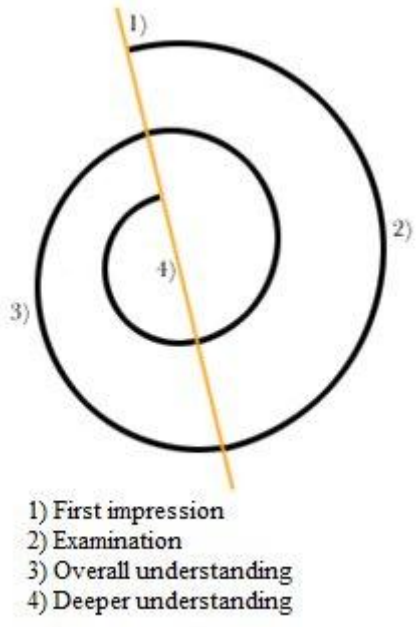


Figure 1 – the hermeneutic circle

In this thesis the first impression is my own understanding of the issue combined with the survey I executed; that people working in the game development industry make use of ad hoc work methods instead of taking a structured approach to the subject, including a variety of creativity tools for ideation, problem-solving and decision-making. The second point, examination, is the collecting of knowledge about such tools and how they work by testing on real game developers. The third stage is the interpretation of these data in relation to my assumptions stated in the beginning and finally the conclusion on the entire problem formulation rests in section four of the circle leading to a deeper understanding of the subject. The use of empirical data is part of a phenomenological approach, which is a scientific term that emphasizes study of conscious experience in a reflective manner (ibid, p. 98). The concept derives from the Greek word *phainómenon*, which literally means 'that which appears'[1] and in this case is an analysis and reflection of the empirical results gained through sessions with game developers.

The thesis will first describe the variety of tools available for creative thinking and how this correlates to game development in particular. Some of these have different fundamental basis of viewing the topic; some focus on a cognitive approach, while others take a strictly formal approach. Subsequently, an in-depth analysis of how the tools presented in the thesis work in practice will be undertaken based on empirical field studies with real game developers.

[1] http://en.wikipedia.org/wiki/Phenomenology_(philosophy)

Creativity on demand

In this paragraph I set out to discover and map different kinds of tools to aid in ideation, problem-solving and decision-making. They all share a common element: they deal with thinking within one or all of these three areas in one way or another and usually how to do it creatively in a methodological way, that is to say: a structured approach that is not based on seemingly whimsical work methods. As such I have named this paragraph 'Creativity on demand'. For a description of the tools I have examined, but decided not to make use of after all, see appendix G.

The ideas and theories presented in this section of the thesis may seem very pragmatic, simple and less 'academic' than others – this is a conscious choice, because the purpose of this thesis is to test creativity tools to be used in the actual game development industry, and not to introduce heavy system theorists or the like who are perhaps more favored in the academic world. While they certainly have their uses academically, I believe they are of lesser pragmatic use in actual game development when it comes to creating creativity on demand. Additionally, the methods I will introduce have a foundation in academic research and are the conclusive fruits of these efforts. Some of them have perhaps been 'dumbed down' to a degree where they become less scientific at the expense of becoming more accessible for the more pragmatic users. My intention is not to dig a trench between advanced academic theories and easily accessible hands-on tools, but rather to build a bridge between them. My thought on the tools that are presented in an unsophisticated way, is that they have been simplified so as to not lose potential practitioners of the methods, who could have much benefit of the methods because the techniques were too hard to understand.

I would have liked to have given a detailed account of the scientific research that is the underlying framework for the tools presented in this thesis, but this would have taken up far too much space and due to the importance of describing the actual methods that will be used in this thesis, it cannot be the case. Instead I will shortly present some of the contributors to the academic field of creativity in the following paragraph.

Dr. Edward de Bono created the very concept of lateral thinking; an indirect way and creative way of solving problems and also invented the six thinking hats method, which will be used in this thesis (de Bono: 1970, p. 11). He is considered a pioneer in the field and his research into lateral thinking also includes the following ways of thinking: challenging assumptions, suspending judgment, reverse thinking, brainstorming, using analogies and random stimulation (de Bono: 1970, chapters 8, 10, 14, 15, 16 and 18) Many of these ways of thinking are the basis for concrete tools presented later in the thesis; as such he has thoroughly described the background for these techniques. Jeff DeDraff, Clinical Professor of Management and Organizations at the University of Michigan, elaborately describes creativity and innovation and their application in the corporate world in his works 'Innovation You: The Book' and 'Creativity at Work'. Howard E. Gruber, an American

psychologist and co-founder of the Institute of Cognitive Studies at Rutgers[2] places an emphasis on psychological and philosophical study of creativity, the results of which can be explored in his book 'Creativity, Psychology and the History of Science'. For a detailed view on design computing, cognition and decision-making the volume containing the collaborative works of many academics 'Design Computing and Cognition '10', edited by John S. Gero, can be recommended. Another collection of texts that focuses on creativity seen from a psychological, social as well as spiritual perspective can be read in 'Everyday Creativity and New Views of Human Nature', edited by Ruth Richards. A dissertation that argues that ideation is not a random process and investigates the background to it is 'Idea Generation in Engineering Deisgn: Application of a Memory Search Perspective and Some Experimental Studies' by Matti Kalevi Perttula. Lastly, author and programmer Matthew MacDonald takes a more biological approach to way the brain works and thinks, both critically and creatively in his book 'Your Brain: The Missing Manual'. The abovementioned works are merely fragments of the academic research that goes behind creativity and show that the tools presented in this thesis have merit, because they are based on such thoughts.

The game design angle

The tools mentioned later are methods that can be used generally in all creative industries, which begs the question; how do these techniques fit in particularly with game development? I have mentioned this matter in the introduction and will now elaborate. To answer the question, I will briefly investigate what makes games what they are, what characterizes them and what this means for the tools presented later.

What separates games from other media like movies or books is first and foremost the fact that they are interactive; they are meant to be played and without an active participation from one or more players it cannot be classified as a game (Crawford: 2003, chapter 1). The fact that they are also mediated means that the developers of the game need to take the medium into account, such as hardware and software requirements as well as control schemes for different platforms.

Games are also formal systems with certain characteristics. There are certain nuts and bolts that combined create a game. These are things like objectives, procedures, rules, players, conflict, outcomes and boundaries (Fullerton et al: 2004, p. 24-30). Not all games fall into this category, e.g. 'The Sims' which does not state an explicit objective for the player, but overall these are the characteristics of what we call games.

According to Jesse Schnell, author of 'The Art of Game Design', games are above all an experience. They seek to create an emotion, be it the fear in horror games or the superiority in defeating opponents in first person shooters, and the 'game' part of the game is merely a vessel that conveys the experience through interaction (Schnell: 2008, p. 10).

[2] http://en.wikipedia.org/wiki/Howard_Gruber

So what does this mean for the creativity tools I will present? Because the game relies so heavily on one or more *players* and how they *experience* the game, it is imperative to make sure the vision for the game matches the expectations of these players – otherwise the game will not fulfill its purpose. Therefore the players should be questioned, probed, asked to play the game and generally be involved with the creation of the game. How else will the game developers know that they are creating a product that will satisfy their customers? This is usually done by playtesting the gameplay before its release by creating sessions, usually by presenting playable prototypes to the target audience and evaluating the results. This is also something which is heavily emphasized in many books about game design (Fullerton et al: 2004, p. 196; Schnell: 2008, p. 391; Rouse: 2001, p. 473; Salen and Zimmerman: 2004, chapter 2, p. 1).

Prototyping and playtesting is, in my opinion, very likely the reason that ad hoc is the primary method when it comes to ideation, problem-solving and decision-making in the game development industry; build it, present it to the players; if it works, it works. If not, then re-make it. So, in addition to using the problem-solving and decision-making tools presented in this book, it is important to use the opinion of the players to settle arguments as well. Unfortunately, in this thesis I will not be able to ask the people from the industry to prototype and playtest the ideas they get under our sessions, because it is a resource heavy endeavor to program the ideas into actual software.

In relation to ideation, the terminology of games becomes important. The properties and compositions of games, the very mechanics of them, can be used in the ideation tools that mix and match concepts. Methods that involve random input may inspire to change some of these characteristics in a game and make it innovative and unique. The tools may be altered to focus heavily on player types or to only deal with the procedures the players perform in order to play the game.

It should be noted that part of this thesis also revolves around figuring out what makes game development special and that this will be an ongoing examination to be uncovered, i.e. it is not possible to highlight the problems or requirements that are needed to be dealt with in terms of game development until they present themselves during my analysis of the empirical data.

The tools

Six thinking hats

Six thinking hats is a tool developed for viewing an issue from different angles, but also to make a group of people think in parallel. The reason for this is that we, in Western civilization, usually think in adversarial, i.e. one person presents a point of view and another person criticizes it to test the strength of the idea. This can for instance be seen in a court room between prosecutor and defense lawyer or in politics between

different parties. However, this way of thinking can cause us to become narrow-minded and stand by our beliefs no matter the arguments or evidence presented to us.

Edward de Bono created the method Six Thinking Hats to be used as a tool for evaluating problems and ideas, as a means for groups to think together more effectively, and a means to plan thinking processes in a detailed and cohesive way. In other words it is about having a group think like a 'hive mind' collaborating to reach a common goal. It also aims to remove people's ego from the equation, which can often cause us to prevent effective thinking (de Bono: 1999, p. 11). Additionally, there is the matter of looking at the problem one way at a time, because thinking about all of them at the same time is nearly impossible and is an ineffective way of solving a problem. Because the brain is sensitized to look for dangers and seeking benefits through a different chemical setting, doing both at the same time is hard (ibid, p. 12). As an example of sensitization, de Bono states: *"Aeroplanes coming in to land often fly over car parks. If you tell yourself to notice yellow cars, then suddenly the yellow cars stand out and make themselves visible. That is an example of sensitization."* (ibid, p. 12). This is a perfect example of why separating one's thinking is so effective; handling one thing at a time is much easier than everything at once.

The six hats are color-coded and each represents a different way of thinking. The hats should always be referred to by their color, because that makes it easier to talk honestly about that way of thinking (instead of e.g. being asked about your emotions about a subject). The colors are neutral and may be used without embarrassment. Here is a short introduction to each of the hats:

- *"White hat: White is neutral and objective. The white hat is concerned with objective facts and figures.*
- *Red hat: Red suggests anger (seeing red), rage and emotions. The red hat gives the emotional view.*
- *Black hat: Black is somber and serious. The black hat is cautious and careful. It points out the weaknesses in an idea.*
- *Yellow hat: Yellow is sunny and positive. The yellow hat is optimistic and covers hope and positive thinking.*
- *Green hat: Green is grass, vegetation and abundant, fertile growth. The green hat indicates creativity and new ideas.*
- *Blue hat: Blue is cool, and it is also the colour of the sky, which is above everything else. The blue hat is concerned with control, the organization of the thinking process and the use of the other hats."* (ibid, p. 13-14).

In regards to how much time should be spent 'wearing' each hat, de Bono suggests one minute per person per hat. For instance, if five people are present, then five minute under each hat should be used. However, if there are still valid points being made at the end of the set period of time, the session can be extended. The

main concern is that the conversation keeps being constructive and healthy and does not wander off in the wrong direction. There is an exception to the 'one minute per person' rule; the red hat, which deals with expressing emotions on subjects, by which people should not present explanations or justifications. Therefore, de Bono suggests one minute for the red hat in total.

I will now present each of the hats; the type of thinking they embody, how they can be used and what to be aware of when using each hat.

The white hat

The white hat deals with facts. That is to say, pure information with no interpretation at all attached. Distinguishing pure, neutral information from interpreted information can sometimes be somewhat of a challenge, causing de Bono to classify the white hat as the one that *"... requires most skill"* (ibid, p. 31). Whenever you report your own feeling on a subject, that is red hat thinking, but when you convey how someone else feels about a subject (e.g. a focus group), that is a white hat approach. The participants need to ask themselves:

- *"What information do we have?*
- *What information do we need?*
- *What information is missing?*
- *What questions do we need to ask?*
- *How are we going to get the information we need?"* (ibid, p. 25)

The white hat helps figure out what the next step in dealing with the subject should be, taking all the information presented into consideration, as well as figuring out what information needs to be acquired. Using the white hat is much like thinking as a computer; without emotion, interpretation or argument. A great challenge when using the white hat is not to embed the facts presented in an argument to support your belief. This kind of thinking can be unconstructive and considered manipulative. By using the white hat, the evidence is laid out first as a kind of map and only after all the information has been presented, will a decision be made. When using the white hat it can be important to frame your questions in a focused manner to avoid so broad a question, that the information needed to be gathered is far too cumbersome and unnecessary, effectively drowning the case at hand.

De Bono admits that *"... it is not possible to check out everything with the rigour demanded of a scientific experiment."* (ibid, p. 33), which causes him to establish a two-tier system under the white hat: *believed facts* and *checked facts*. This means the participants are allowed to present 'believed facts' (what they think is true) under the white hat, but that it must be absolutely clear that the presented data are 'second-class facts'. Paradoxically, this makes it possible to present virtually any statement as 'a fact'. Therefore, if a decision is

to made from something which is currently labeled as a believed fact, then it *must* have its status changed to 'checked fact' first, requiring a determination process that makes sure the information is, in fact, true.

It should be noted that not everything can be labeled as 'absolute truths' or 'checked facts'. There will always be exceptions and statistics that sway one or the other. However, white hat thinking is simply concerned with usable information, and therefore statements such as 'generally true' or 'occasionally true' are also valid. The way the information is framed is the essential part, e.g. *"When irritated this breed of dog* has been known *to snap at children."* (ibid, p. 41) is useful information and the importance of the information relies on the importance of framing the question correctly and assessing the purpose of the data.

The red hat

Under the red hat the participants report their emotions on a subject, be it their intuition, opinion or feeling towards the issue at hand without any need to explain or justify these emotions. The reason for this being that otherwise people would only present feelings that can be validated, thus leaving opinions unsaid, possibly resulting in disaster at a later point in time. The largest difficulty in wearing the red hat comes with resisting justifying your emotion. It is important that the red hat thinking be applied to a specific question or situation to avoid confusion. Red hat thinking is reported on an individual basis and it is not permissible to say 'pass' when asked for their red hat thinking; they may use terms such as *"neutral, undecided, confused, doubtful or mixed"* (ibid, p. 49). If answering 'mixed', they may be asked what goes into the mix.

The red hat is essentially the opposite of the white hat – not neutral, not based on facts or information, only emotions and opinions. According to de Bono, if these feelings are not addressed or put forward *"... they will lurk in the background and affect all the thinking in a hidden way."* (ibid, p. 51). Traditionally, emotions are seen as hindering for making good decisions, because they 'cloud your judgment', when you should act from the facts alone. De Bono argues against this perception and deems emotions not only important, but also necessary. Emotions give relevance to our thinking and fit that thinking to our needs and the context of the moment, thus making them valuable assets.

De Bono states that there are three ways emotions can affect our thinking. The first being that there may exist a strong background reaction such as fear, anger, hatred, jealousy or love (ibid, p. 53). Effectively, these background emotions color our perception and the red hat makes this coloring visible, so the effects of this influence can be observed and dealt with. The second kind of emotion is the one which is triggered by the initial perception – a gut reaction to something or someone, which subsequently forms an emotion correlating to everything about that person or situation called 'snap judgment', and the red hat makes it possible to bring these emotions to light as they arise (although it should be stated politely and not become destructive bickering). Finally, the third instance of emotions is after the 'map' of the situation has been

created. Emotions are brought in to the argument in order to choose the route, i.e. making a decision. These emotions are often based on values and our relationship to them (ibid, p. 55).

The artificiality of the red hat makes emotional statements less personal and by switching in and out of 'red hat mode' remarks become less crude and destructive (ibid, p. 61-62). One may also simply ask for a red hat opinion, feeling or intuition of another person. However, the red hat idiom should not be exaggerated or overused to the point of absurdity; it *"... is used only when a feeling is expressed or asked for in a defined and formal matter"* (ibid, p. 63).

Once emotions have been presented under the red hat, an attempt can be made to explore or change them, yet this is not actually part of the red hat idiom. This is done via perception, not logic: *"If we see something differently, our emotions may alter with the altered perception"* (ibid, p. 64). A classic example is not looking at a failed venture as a defeat or an error in judgment, but rather as an essential learning experience or a way find out weaknesses and strengths. It is not always possible to make this change, but de Bono states it is always worth a try.

The black hat

The black hat is the hat of caution, avoiding mistakes and spotting dangers. The black hat is the basis of critical thinking; a term that describes excessive logical reasoning in an attempt to prove an argument true or false, which stems from the Ancient Greeks' philosophical views and ways of discovering 'the truth' in all aspects of life. Black hat thinking is the typical way of thinking in the Western hemisphere; trying to find 'the one right answer'. It revolves around bolstering your current opinion and only trying to find evidence that supports what you already believe. If this is the only type of thinking we make use of as thinkers, we may "*…become limited, constrained and sometimes even destructive in our thinking."* (Sloane: 2010, p. 5). Therefore it is an individual stage under de Bono's six thinking hats, making room for other kinds of thinking as well, while still including the traditional Western way of thinking critically.

Using the black hat is important and it is used extensively, but it can also be overused, misused or abused. Thankfully, this is where wearing the six hats becomes useful: there is an allotted time for each hat, and when the black hat is not worn, it is not permitted to be critical of everything. The black hat is the basis for the conventional Western thinking, which seeks to *"... point out what is wrong, what does not fit, and what will not work."* (de Bono: 1999, p. 75). Under the black hat logic is always applied, because there must always be a logical basis for criticism (ibid, p. 75).

The overarching focus of the black hat is to point out why things may *not* work, not why they *may* work – that is yellow hat thinking. The participants do not need to see both sides of the spectrum under the black hat, because it is not effective to be both looking for danger and seeking benefits at the same time. In an assessment role the black hat helps decide whether or not to continue with an idea, with the final decision

being based on a combination of facts (white hat), benefits (yellow hat), caution (black hat), and intuition (red hat). In a design role the black hat can find weaknesses in an idea so that the weaknesses may be fortified and not come up as problems in a later stage (ibid, p. 76-78).

The black hat can be used to point out mistakes in arguments, both in process and content, but only while under that black hat. If a person presents false information under e.g. the white hat, then that error must not be pointed out until the black hat is worn. The participants should write down all these cautions or mistakes into a compilation and present them as a whole during the black hat. While logical deduction insists on certainty it is very difficult to say that something is one way or the other in the real world, causing the thinkers to rely on likelihood instead. Using the black hat is not a tool to go back to arguing (as in traditional Western thinking): caution and danger must be laid out in parallel and these may express different views. This is done to create a complete map of all the dangers and possible problems. Trying to overcome these issues is done later under the green hat.

According to de Bono it is easier to be critical than to be constructive (ibid, p. 86). This is why some people are overly critical and tend to wear the black hat all the time – there is always something to criticize. Overusing the black hat is not helpful and sometimes it can be totally ego-driven in an attempt to be noticed and wear others down. This is why directing criticism and uncovering dangers is done only under the black hat, and at the same time it gives the people who are always critical a chance to think positively and creatively under the yellow and green hat, respectively (ibid, p. 87). Ultimately, this is constructive as it forces the participants to break their usual behavior patterns and contribute to all aspects of the thinking process.

The yellow hat

Getting a positive perspective on the topic at hand is done under the yellow hat. It is the diametric opposite of the black hat, focusing on benefits, optimism and constructivism. Emphasis is also placed on seeing on how it may be possible to implement the idea in practice. It is about finding value in your idea and it is important for the participants to 'sensitize' themselves to value and benefits, as they sensitize themselves to noticing dangers. It is harder to do this with the positive elements rather than the dangers, due to our traditional black hat thinking revolving around arguments in the Western world (ibid, p. 91). However, it is absolutely essential, because you can come up with creative and innovative ideas, but if you do not believe in them or have everyone see the value in the idea, it will not grow and be put in to practice. Similar to the black hat, the thinking performed under the yellow hat is based on logic (ibid, p. 91).

The search for benefits and value is *"...a mixture of curiosity, pleasure, greed and the desire to 'make things happen'."* (ibid, p. 93). De Bono also refers to the yellow hat as 'speculative-positive', meaning that in order to 'make things happen' it is necessary to speculate about what might happen in the future on a positive

level, i.e. achieving value (ibid, p. 93). The purpose of the yellow hat is above all to be positive; therefore it is a mindset the thinkers adopt deliberately as a kind of requirement. However, the search for benefits is not always fruitful; occasionally the value is simply not there, too little or the dangers (black hat thinking) outweigh the benefits. Even so, it is important to rack your brain for benefits, because some of the *"…very powerful positive points […] are not at all obvious at first sight."* (ibid, p. 96). In that sense, value and benefits are not always obvious, underlining the importance of the yellow hat.

A challenge is presented under the yellow hat, due to the fact that optimism may sometimes be borderline foolishness and have zero hopes for the future. This positive spectrum ranges from over-optimistic to logical-practical. However, it is not a good idea to always rely on the benefits that are sound and well known, because otherwise there will be little progress (ibid, p. 97-98). The participants should take note of the *action* that follows the optimism; if the action is no more than narrow hope that resembles the winning the lottery, the optimism may be misplaced. Some exceptions occur, because sometimes the unlikely does happen. Whether or not we choose to follow these 'long shots' is up to the users, but the benefit always needs to be put on the map, when uncovering yellow hat optimism. Then we can choose to improve the odds, go with it as is or abandon the idea. As with the white hat, likelihood comes into play and ideas should be labeled with their estimated chance of success. De Bono presents the following likelihood classification: *"Proven, very likely (based on experience and what we know), good chance – through a combination of different things, even chance, no better than possible, remote or long shot."* (ibid, p. 99).

It is important that the optimism is founded on something concrete such as experience, available information, logical deduction and trends (ibid, p. 100), otherwise the good feeling is just a red hat emotion coming to light. The participants should attempt to support their judgment, although de Bono stresses that yellow hat thinking does not need to be restricted to those points that can be fully justified (ibid, p. 100). This means that a thorough effort should be given to justify the optimism, but if this cannot be done, the point can still be presented as speculation. The justification is an attempt to give merit to the suggestion, thus strengthening it.

The green hat

When the situation calls for creativity it is time to put on the green hat. Under the green hat new ideas are presented, options are laid out and alternatives discovered. Existing ideas can be improved and modified as well. Usually specific people are meant to be the creative people, but in the case of the green hat everyone is forced to think creatively (or otherwise be quiet!) (ibid, p. 115).

Thinking in terms of possibilities is another force of the green hat, constantly seeking out new courses of action. What do we actually *do*? This also means overcoming the difficulties that have surfaced under the black hat; possibly suggesting modifications to an idea or the need for an additional feature. If too many ideas are presented under the green hat, it can be useful to pick out the ideas that fit a particular frame under

the red hat. Examples of frames could be ‘low-cost ideas’ or ‘ideas that are easy to test’ (ibid, p. 116). The other ideas can be saved for later and the energy of the green hat is used practically and without using too much time.

The green hat is concerned with change and novelty; breaking the existing thought patterns and taking a fresh approach to the subject. When you are stuck on a particular matter or feel it could be done better, you put on the green hat. It is possible that no new ideas will surface when wearing the green hat, but making an effort counts and the more practice you get with wearing the green hat, the more results are yielded (ibid, p. 117-119). The green hat involves a degree of uncertainty due to the nature of producing creative ideas; it *“…involves provocation, exploration and risk taking. Creativity involves ‘thought experiments’.*” (ibid, p. 119). This is de Bono’s definition of working creatively. This can be uncomfortable for people who are used to think critically, having to ‘go out on a limb’. Nevertheless it is important to set aside a specific time to search for new ideas and possibilities, functioning as a kind of artificial motivation. As opposed to the white, red, black and yellow hat it is not possible to demand an actual input due to the nature of creativity – but an effort *can* be demanded. That is one of the key features of the green hat (ibid, p. 120).

Traditional thinking makes use of judgment, i.e. comparing the subject with what we already know (involved in black and yellow hat thinking). This is not the case with green hat thinking, where the idiom instead of judgment is *movement*, a term coined by de Bono (ibid, p. 123). To get movement from an idea, the goal is to extract the principle and focus on the difference for a so-called *forward effect*. The idea is used to see what it will lead to. Provocation is a way to achieve this by making statements that may seem peculiar or outrageous. An example presented by de Bono is the ‘provocative’ statement of “what if everyone was a police man?” which eventually led to the foundation of ‘neighborhood watch’ in which civilians in communities patrol areas and look out for each other. A system now used in twenty thousand communities in the United States (ibid, p. 124). The main concept is to move *forward* with an idea. De Bono calls this kind of thinking *lateral thinking* (de Bono: 1970, p. 2).

It is important to ask and answer questions about these ideas in terms of what kind of movement it will create, such as: *“What is interesting or different in this idea?”* (de Bono: 1999, p. 127). It can be an absolutely ‘crazy’ and impossible idea with no basis in reality, just for the sake of stimulating thinking and breaking established patterns. De Bono suggests using his own made up word ‘po’ when exclaiming such statements. Po standing for *provocative operation* and used *“… as a symbolic indicator of an idea that was being put forward* as a provocation and for its movement value*.”* (ibid, p. 129). An example of its use could be the following: ‘Po all people should carry a gun.’

After such provocative statements, one of three things may happen: no movement at all, drifting back to the old pattern or switching to a new pattern. Deliberate techniques exist to force po and they are described later in this thesis on pages 29, 29, 34, 34, 35, 36, and 37.

Under the green hat, the thinkers should not use the first solution to a problem that surfaces, because it is not necessarily the best one. Even though it may seem satisfactory, it should be acknowledged and then alternative solutions should be explored. When a number of alternatives have been produced, the participants can choose the best by seeing which one fits their needs and their resources. In this sense there is the adequate solution and the better solution. To fully utilize the power of the green hat, the thinkers must acknowledge the premise that there are many different ways of looking at things, and that the search for alternatives is a fundamental part of creative thinking (ibid, p. 134). This does not only include looking beyond the first obvious solution, but also looking beyond all the known solutions and to search for the unknown solutions that have not been tested to be tried and true.

Under the green hat ideas are molded *"…so that they get closer to filling two sets of needs. The first need is that of situation. […] The second set of needs that must be met are those of the people who are going to have to act upon the idea."* (ibid, p. 142-143). In terms of the first need, the thinkers must fashion the idea into something usable by bringing in constraints as tools to shape the idea. If an idea is not realizable due to technical, legal, economical or any other kind of constraints, then the idea is attempted shaped so that it does not violate these conditions. As for the second need, this is done because it is sometimes a necessity to shape the idea so it fits the need profile of those who are going to 'buy' the product (ibid, p. 143). If the 'buyers' are only interested in saving money, the green hat thinking tries to form the idea so it fits this need.

In 'Six Thinking Hats' de Bono only presents the random word method as a movement tool for the green hat. Because of the many ways to enforce movement, he has written an entire other book, 'Lateral Thinking', where he introduces many different ways of provoking movement. Many of the tools presented in this thesis are based on his work in this book as described on page 13. The techniques described later can be incorporated into the green hat because of this.

The blue hat

Structuring the thinking process involved with using the six hats is done with the blue hat. As such, the blue hat becomes the hat for thinking about thinking, making getting an overview of the process easier for the participants. A six hats session should always start and end with a blue hat. When worn in the start of the meeting, the purpose of the blue hat is to seek alternative definitions of the problem, lay out the purpose of the thinking and lay out what is to be achieved (ibid, p. 147). This also means organizing the thinking of the meeting and the sequence of hats to be utilized.

It sets a kind of strategy and agenda for the meeting, and also makes sure that discipline is kept; i.e. that people keep to the relevant hat and do not violate the rules of the six hats method. This also means announcing when a change of hats occur, which is why one person is appointed facilitator, chairman or leader of the session to permanently fulfill this role. At the end of a blue hat session the facilitator asks for a kind of outcome, be it a conclusion, a summary, a decision, a solution or similar – or possibly simply acknowledge that only little progress was made during the session. Under the blue hat that ends the six hats session, the further steps to be taken are laid out, whether it is definite action, more thinking or similar (ibid, p. 147-148).

The blue hat differentiates itself from the other hats in the way that when wearing it the users do not directly think about the subject at hand, but rather think about the thinking required to explore the subject. Instead of a free-flowing (and often confusing) discussion, the process becomes formally organized. It helps explore the complete 'map' of the subject from which a course and eventually a decision is to be made – as opposed to traditional Western thinking, in which the conclusion is usually presented first and support to substantiate the claim is looked for. The blue hat is not only for organizing the use of the other hats; it can also be used to organize other aspects of thinking, for instance the listing of constraints or assessment of priorities (ibid, p. 151-153).

The blue hat needs to bring a certain focus to the subject: what exactly should the thinking be about? The focus may be broad or narrow as long as it is *"…spelled out in a definite matter."* (ibid, p. 155). This also means the monitoring of any drifting from this focus, so that any missteps can be corrected to bring the process back to its rightfully planned course.

The hats can be used singularly or in sequence. Any hat can be used as often as preferred, any number of hats can be used and there is no reason to always use every hat. When it comes to determining what sequence of hats to use, it is important to know what the purpose of the six hats session is and take this into account. The blue hat can also be used as a thinking hat within the session itself to organize proposals to create a formal list in which the proposals can be categorized and decided how to handle from there on. De Bono argues, that while it may seem complex and confusing to figure out which hat to use when, in reality it works much like changing the gears of a car; flowing naturally from one stage into the next (ibid, p. 162-163).

De Bono argues, that unless you are very experienced in using the six hats method, you should use a preset order of hats instead of an evolving one, because people may spend a lot of time arguing about which color hat to use next, and because the facilitator of the meeting may be seen to try and manipulate the meeting in a certain direction if he chooses the colors.

A red hat can be used in the beginning if the participants already have strong opinions and feelings on the discussed topic. In contrast, it is a bad idea to use the red hat when there are no pre-existing feelings; there

are no reasons to force people to take a stand early before having been presented with the outcomes of the other hats. In situations where an assessment is needed, it can be a good idea to use the yellow hat early to find benefits. If no or only very few benefits can be found, there is no reason to continue with the idea. However, if lots of benefits *are* found, it becomes more useful to use the black hat to try and test the benefits conceived under the yellow hat – the motivation being that you have already seen the benefits and want to find a solution to overcoming the obstacles.

It can also be a good idea to give the participants a short amount of time to think on their own under a certain hat, due to the fact that a lot of time is spent listening to others. So, a couple of minutes of thinking to oneself before presenting it to the group can make the thinking under that particular hat more streamlined. This process is most useful under the black, yellow and green hat due to the nature of the hats requiring more elaborate thinking.

After the ideation phase under the green hat, the ideas are evaluated under the yellow, black and red hat and in that particular order. Yellow first, because it does not make sense to continue developing an idea if no benefits can be found. Black second, to emphasize the dangers of the idea and to see if the negatives outweigh the positives (and later on eliminating these negatives under the green hat again). The white hat may be called upon to supply data and facts if these are needed to evaluate whether the idea will work or will be valuable even if it does not work. Finally the red hat is used: do the participants like the idea? If there is no enthusiasm for an idea, it is unlikely to succeed, no matter how good it may be, de Bono states (ibid, p. 144-145).

Analyse problems

This paragraph serves as a short intermezzo, describing the importance of analyzing problems when it comes to identifying and tackling problems, according to author Sloane. He states:

- *"It stops you making premature judgements and jumping to the wrong conclusions.*
- *It challenges your assumptions.*
- *It gives you fresh insights into the real causes of the problem.*
- *It helps you to see connections between underlying causes.*
- *It can give you a sequence of items to tackle – a road map for solving the problem*
- *It helps prioritize where you should put your efforts."* (Sloane: 2010, p. 15-16)

It should be stated that the problem analysis techniques do not set out to solve the problem; they merely attempt to help the user understand the underlying causes before attempting to find solutions for all the above-mentioned reasons. Because of the above-mentioned reasons presented by Sloane, analyzing problems is an important part of ideation, problem-solving and decision-making.

I will now continue with my presentation of an array of tools used for creative thinking, starting out with tools specifically designed for analyzing problems.

The path to the ideal

One way of analyzing problems is a technique called 'the path to the ideal', where the thinker takes three blank pieces of paper and lists the current state of affairs with all the flaws, problems and difficulties currently being faced on the first sheet of paper. On the third sheet of paper the ideal state of the situation is stated, with all problems solved and everything working as intended. Then the person doing the exercise writes 'The Path' on the top of the middle piece of paper. On this particular piece of paper, it should be defined which steps you need to take in order to get from the current state to the 'ideal' state. It should be noted that The Path does not list detailed solutions; rather it helps define the problem and the key elements that needs to be addressed in order to progress. Each step on The Path can then be analyzed further and attempt solved using ideation techniques (ibid, p. 18).

Why, why?

In this tool for problem analysis called 'why, why?', a diagram is created in which a problem is stated, after which you ask yourself the simple question 'why?' this is. First you list the major reasons for the problem, and then proceed to ask why this is for each of the major reasons. This way you can create a flowchart diagram of the overall problem, branch out to the major reasons for the overall problem and then continue to branch out for every step that relates to a problem. The process can be extended to as many levels as the practitioner deems necessary (ibid, p. 20). The technique was invented by Toyota in the 1950's, but a specific author is not listed[3]. The following model is a 'Why, why?' diagram of a video recording with various problems I created to exemplify the visual aspect of the diagram:

[3] http://syque.com/quality_tools/tools/Tools24.htm

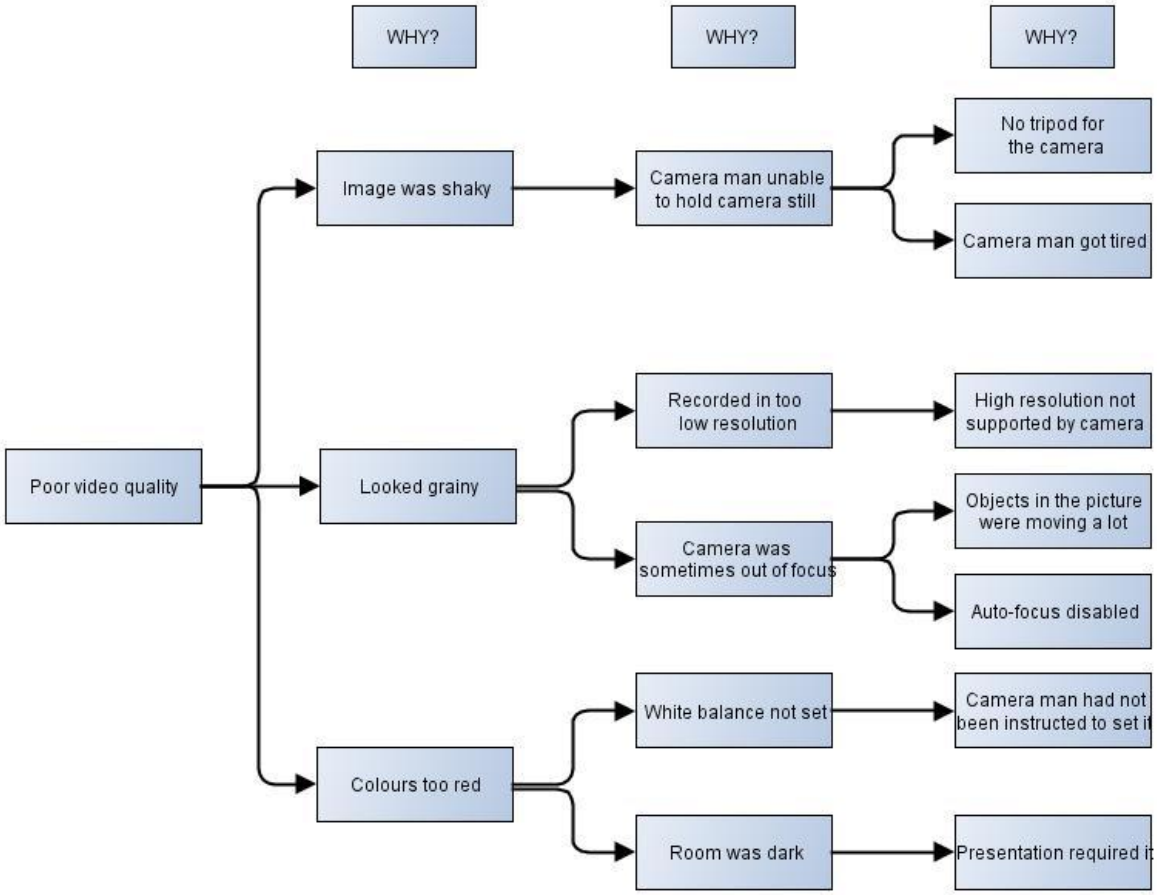


Figure 2 – why, why diagram

Six serving men

This is another problem analysis tool named after a poem by Rudyard Kipling: *"I keep six honest men, they taught me all I knew, Their names are What and Why and When and How and Where and Who."*[4] Basically, the six words 'what', 'why', 'when', 'how', 'where' and 'who' are used to examine the issue, each in both a positive and negative context, creating 12 questions to be addressed. In terms of games development you could ask these questions about almost anything. For an example on how this works, see appendix E.

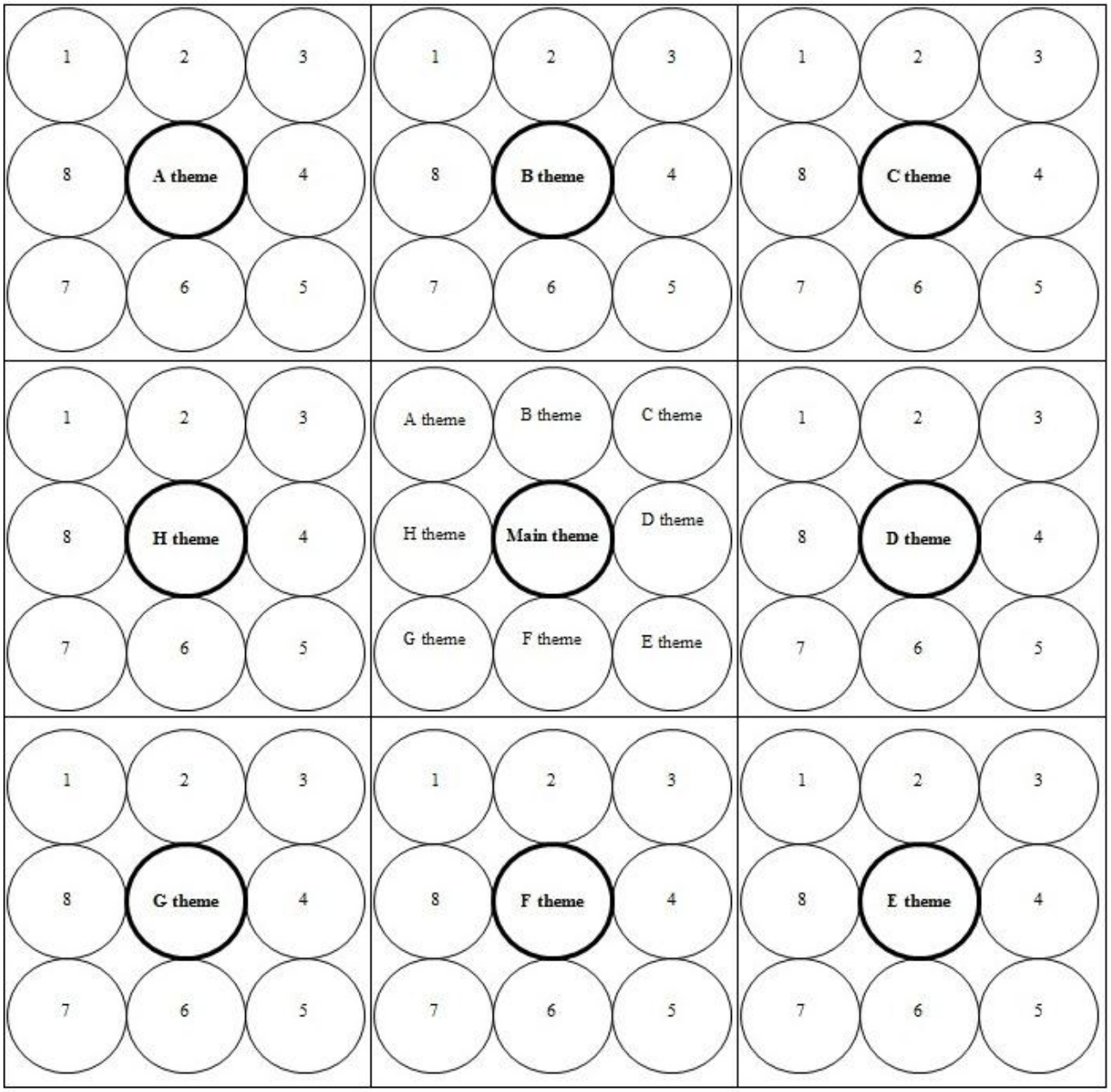
The point of the exercise is to ask each question quite literally, so the different questions make us see the problem from different angles. The technique can be used individually or in groups, and possibly with groups within the group considering a smaller number of the questions.

Lotus blossom

The lotus blossom technique is an extensive problem analysis tool in which the issue is written inside a circle in the middle of a large piece of paper, after which the eight main causes of the problem are written in circles

[4] http://www.kipling.org.uk/poems_serving.htm

around the central circle[5]. If there are more than eight causes, you should prioritize until you find the eight most important issues. Each of these eight causes becomes a theme of its own and the practitioner needs to define eight attributes, issues or causes for each of these themes. This creates 64 issues of which many are interrelated. It is an elaborate method of problem analysis, which digs deep and therefore can potentially shed light on issues that were previously undiscovered. The technique was originally created by the director of the Japanese company Clover Management Research, Yasuo Matsumura[6], although his work on the tool has never been directly translated. The following model is a template of a lotus blossom diagram I created:



[5] http://www.innovationtools.com/Articles/ArticleDetails.asp?a=160
[6] http://www.diegm.uniud.it/create/Handbook/techniques/List/Lotus.php

Figure 3 – template for the lotus blossom technique

Game storyboarding

Moving on from the tools that are only concerned with problem analysis, I will now describe the technique of game storyboarding, which is used for documenting how a specific gameplay situation will function in the game.

Game storyboarding derives from the principles of traditional storyboarding from the movie genre. It shows situations as they are intended to work before actually being implemented, so that everyone knows what to do in order to get the specific gameplay situation to work (such as sounds, animations, level design, programming etc.)[7] [8] [9]. As such, it can be used as a reference point for everyone involved with the production of the game to clarify the design and the mechanics behind the gameplay. The tool is used by drawing or sketching each step of the situation and accompanying each picture with a description of what goes on and what triggers the events taking place (i.e. the interaction of the player). Some use numerous columns specifically for each area involved with a certain picture, e.g. one column for all audio in the situation, one for all the programming, and one for all the animations. One of the advantages of game storyboarding is that questions that need to be addressed arise naturally; if the situation is described in detail, each competence that views it will gain knowledge of what needs to be done and if something cannot be done technically or needs another way of being handled it will become apparent and subsequently dealt with by the team. As such, it can be described as a pre-emptive problem-solving tool, which is extremely useful because the problem(s) will be visible to all before the actual programming, artwork etc. for the gameplay has been created: *"Story-Boards give total immersion in a problem as you can see how everything fits together."*[10]

I have included a full-fledged sample game storyboard that was used under the development of the 1916 game in appendix F.

DO IT

The DO IT method is an ideation, problem-solving and decision-making tool created by Robert W. Olson in 1980[11] [12] [13] [14]. It stands for 'Define' (the problem), 'Open' (yourself to the many possible solutions), 'Identify' (the best solution) and 'Transform' (the solution into action effectively), each being a phase the user must make use of when performing the technique. Within these areas Olson presents ten DO IT 'catalysts' the user should utilize in order to *"...accelerate and strengthen the thinker's natural creative*

[7] http://www.finegamedesign.com/script/index.html
[8] http://www.ehow.com/how_5184299_design-game-storyboard.html
[9] http://www.dummies.com/how-to/content/designing-video-games.html under "Storyboarding"
[10] http://eng50411.tripod.com/psolving.htm#4
[11] http://eng50411.tripod.com/psolving.htm#11
[12] http://www.mycoted.com/DO_IT
[13] http://www.mindtools.com/pages/article/newCT_09.htm
[14] http://members.optusnet.com.au/charles57/Creative/Techniques/do_it.htm

problem-solving." (ibid). Before diving into the process, the thinker should first write down a statement of the problem.

Under Define there are three catalysts named 'Mind focus', 'Mind grip' and 'Mind stretch'. Mind focus consists of first asking why the problem exists, possibly leading to a broader statement of the problem. After this the thinker should try to divide the problem into smaller problems, thus leading to a narrower restatement of the problem. In the mind grip catalyst, the practitioner writes down at least three two-word statements of the problem objective, after which he should select the combination of words which best represents the precise issue needed to be solved. This is done in order to create a new and more effective restatement of the problem. When using the mind stretch catalyst the user lists the goals, objectives and/or criteria which the solution of the problem is attempting to satisfy – what needs to be done in order for the problem to be handled? Generally, the Define aspect of DO IT resembles the other problem analysis tools I have also mentioned in this thesis on page 26 and 27 , with the difference that it seeks to work together with the other aspects of the DO IT tool (ibid).

The purpose of the Open part of DO IT is to consider many possible and diverse solutions, effectively being an ideation tool. Most importantly, judgment should be delayed on these new ideas, because this is done under the Identify step of DO IT. There are four catalysts under Open called 'Mind prompt', 'Mind surprise', 'Mind free' and 'Mind synthesize'. With mind prompt the thinker asks other people with diverse competences and knowledge for solutions to the problem, which in turn is used to stimulate the practitioner's own ideas. In mind surprise the user lists ridiculous and laughable ideas in order to trigger more reasonable and possibly usable solutions to the issue at hand. This can be seen as the DO IT equivalent of Edward de Bono's po concept, which I have covered on page 22. Mind free seeks to stimulate fresh ideas by forcing similarities between the issue and things that are not logically related to it. This is done by writing down the name of a physical object, picture, plant or animal, listing its characteristics in detail and subsequently using the listed characteristics to stimulate new insights and ideas for a possible solution. It is essentially the same as the random word method described on page 29. With mind synthesize the best ideas generated under the Define and Open steps are circled and modified until they are ready to be transformed into action (ibid).

The final three catalysts belong under the Identify step and are called 'Mind integrate', 'Mind strengthen' and 'Mind energize'. In mind integrate the practitioner reviews his goals, objectives and criteria previously listed under the catalyst mind stretch. After this the thinker should rely on his own intuition or 'gut feeling' to select the best idea from the already circled ideas. In mind strengthen the user lists the negative aspects of the idea and attempts to modify them to reduce dangers. Mind energize is about exaggerating the worst and best potential consequences from implementing a solution. The thinker must then attempt to modify the solution to minimize potential risks and maximizing the benefits. Because the Identify step relies on

judgment and personal preference, it compares to the six thinking hats equivalents black, yellow and red hat, representing negative, positive and emotional thinking, respectively.

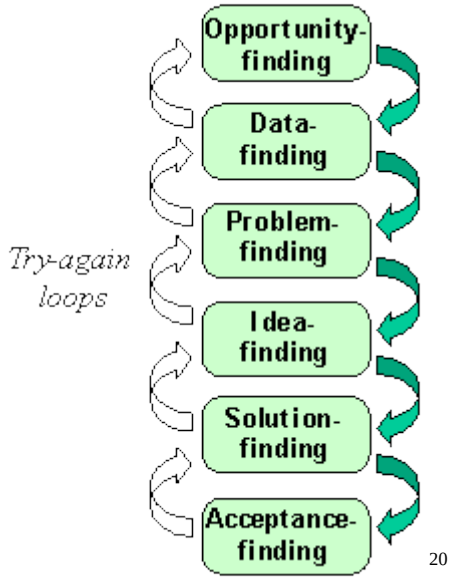
After the Define, Open and Identify steps, the practitioner should carefully write down a statement of the final solution idea and then proceed to the 'Transform' part of DO IT in order to implement the solution. The first step for transforming should be making a plan of action; identifying what needs to be done, then analyzing the tasks in detail and delegating them to the appropriate people[15]. It can be followed up by a business or marketing plan if this is relevant[16].

The DO IT tool represents a fully fletched tool with a step-by-step process to generating ideas, solving problems and making decisions, but some of the catalysts are merely heuristics to be followed by the practitioner and are, in my opinion, not elaborate enough to handle complex problems. Therefore I suggest fortifying the four steps of the method with other tools for ideation, problem-solving and decision-making, such as the other ones I have mentioned in this thesis. This will effectively mean incorporating more tools under this overarching method, making it more advanced and thorough. My idea of strengthening the tool is also substantiated by others who have made use of the tool (ibid). One does not necessarily have to follow the DO IT method slavishly from start to end; it is possible to handpick the catalysts the thinker believes to be useful for solving the current problem.

Creative Problem Solving (CPS) framework

CPS was instigated in the 1950's by advertising executive Alex Osborn, who also created the widely recognized 'brainstorming' technique, and was further developed by college professor Sidney Barnes who applied academic scrutiny to the method to test its merit; the research showed that the method works and that the way of thinking can be taught[17]. Parts of the method are also rooted in the brainstorming process[18]. Because of the collaboration between Osborn and Parnes it has also been called the Osborn-Parnes process (ibid)[19]. CPS is a step-by-step model by which the practitioners can solve problems that have no clear solution and are relatively unexplored. It has been refined in many ways since then and some have come up with their own versions of the tool. The basic model of CPS is as follows:

[15] http://www.mindtools.com/pages/article/newHTE_04.htm
[16] http://www.mindtools.com/pages/article/newCT_09.htm
[17] http://creativeproblemsolving.com/
[18] http://www.mycoted.com/Creative_Problem_Solving_-_CPS
[19] http://en.wikipedia.org/wiki/Creative_Problem_Solving_Process



[20]

Figure 4 – Creative Problem Solving

The first step in the model is opportunity-finding, a step occasionally omitted if the issue at hand is a known problem, where the thinker explores the broad environment in which there may be opportunities to be creative (ibid). At times called 'visionising', it means looking at the scope of the subject and finding out if there is room to be creative in any of the areas revolving around the problem.

Second stage of the framework is data-finding, where the thinkers collect all kinds of data about the problem to get the facts straight. This is comparable to de Bono's white hat, where the sole focus is also on information. The reason for doing it is so that the actors can proceed having the correct information to reference to and make use of, when needed.

Problem-finding is the third step and concerns identifying the problems to be solved. Although it may seem simple to do so, this is not the case: *"A major cause of creative and problem-solving failure is the failure up-front to clearly define the real problem to solve."* (ibid). The reason for the meticulous analysis of the problem is that the thinkers may be so caught up in the problem that they have difficulty separating the aspects of the problem from each other. This is where the previous step of data-finding becomes useful, due to being able to present clearly stipulated facts about the issue which helps to better define the real problem. The problem-finding step is in line with Sloane's focus on the importance of thoroughly analyzing and defining the problem at hand (see page 25) as well as the DO IT tool, which needs a clear statement of the problem before the practitioner can continue (see page 29). Precisely because this stage is about problem analysis, different specific tools can be used for this endeavor like the ones I have presented on pages 26, 26, and 27.

[20] http://creatingminds.org/articles/cps_framework.htm

The next step is idea-finding, where the concrete methods of generating new ideas are used. What is important to note is that this step only probes the new ideas initially and does not attempt to create a full-fledged solution from the get-go. This is the case because *"…if you try to jump to a complete solution in one go, you may find something that works, but you may also have left behind better and more creative solutions."* (ibid). Therefore, many different ideas should be explored and then the outweighing of pros and cons comes in the next step. Idea-finding is the CPS equivalent of de Bono's green hat, where new creative ideas are brought to light (see p. 21) as well as DO IT's Open stage (see p. 30). Specific idea generating tools can be used for this task, such as e.g. the random word method (see p. 33) and reverse brainstorming (see p. 35).

The fifth step of the framework is solution-finding, where the thinker develops the idea(s) from the previous stage into something that will solve the problem. As a result of this, the practitioner must think in ways of actual implementation for 'the real world', i.e. practically and not just theoretically. This stage can have much iteration and if the results are poor, the thinker can return to the previous step of idea-finding. Solution-finding is a combination of de Bono's yellow, black and blue hat thinking (see page 20, 19 and 23), because the user must think in terms of judgment, both positively and negatively to figure out how to implement a solution properly as well as making a plan of action. The step also suggests that the CPS tool is used by people in a management level of production due to the reference to 'distributing the work'. However, I argue that it can be used by both management and the workers in the project, because even small companies with no hierarchy have to distribute the work at some point. This could also even be a step in larger companies where the creative department works more or less independently.

The final step is called acceptance-finding and is involved with persuading all parts that have a stake in the problem that the idea is worth supporting. This can be other competences, investors, managers, customers or the like. If these are not persuaded by the idea, they may reject it and the thinker returns to the status quo and the work performed is ultimately wasted.

In a sense the CPS model has similarities with six thinking hats and DO IT, because it attempts to break down several ways of thinking so that these are done in separate phases and not all at once in one cluttered process. This substantiates the fact that it is a good idea to perform this sort of shattering of the procedures in order to think clearly and more effectively when attempting to solve creative problems.

Random word method

A way to create new ideas is the random word method, a tool created by Edward de Bono as an instrument to be used under the green hat of creativity in order to induce po (see p. 22). In essence, the thinker finds a word at random – de Bono suggests looking up a random word in a dictionary – and then uses inspiration taken from that word and applies it to the subject at hand. Characteristics of and associations with the selected

word are usually what creates the inspiration and because the word was chosen at random, the result is usually quite novel because it leads the practitioner to think in a way that he would almost certainly not have thought in without this random worth (whether positive or negative). It is used to provoke the current thought patterns and bring out interesting effects. Although some may doubt the procedure (due to the haphazard nature of selecting random words), de Bono explains why it works: *"It provides a different starting point. As we trace our way back from that new starting point, we increase the chance of arriving back along a track we would never have taken when thinking about the subject directly.* (de Bono, 1999: p. 132). What occurs is the thinking phenomenon de Bono has dubbed movement (see p. 22) by breaking the established thought patterns. Nouns are usually best for performing this method, when choosing a word. Other inputs can be used as well, such as music, images or even games. During my search for creative work methods I also found the tool called 'forced analogy', which has many similarities with the random word method, but is slightly different. Due to the overlapping between the two I decided to only include the random word method, but my efforts in examining forced analogy as a tool can be seen in appendix G.

Morphological analysis

Also called 'morphological forced connections', astrophysicist Fritz Zwicky developed this tool in 1969 as a problem-structuring and problem-solving technique for multi-dimensional and non-quantifiable (i.e. not numerical) problems[21] [22] [23]. When exercised, the thinker identifies and investigates *"…the total set of possible relationships or 'configurations' contained in a given problem complex."* (Ritchey, 1998[24]). Two common principles of creativity are used: breakdown and association. The problem at hand is broken down into component variables (that are significant for the problem) and the thinker assigns possible values to each. Through mixing and matching different combinations from the variables, new configurations arise resulting in greatly varied results. The outcome is a matrix of parameters which uncovers the multiplicity of relationships with a problem complex (ibid). It creates an incredible number of results, often thousands (based on how many parameters are used). However, the main idea is to find some that have value and can be realistically implemented. The approach is a strictly formal one to the creative process. A step-by-step sample description of how to perform the morphological analysis is included in appendix H.

Assumption smashing

Getting a new perspective on existing material can be an interesting way to produce new ideas or solve problems, which is the purpose of the technique 'assumption smashing'. It is performed by stating known assumptions about a topic and then dropping each assumption individually or more at a time to explore what

[21] http://www.diegm.uniud.it/create/Handbook/techniques/List/MorphoAnal.php
[22] http://www.swemorph.com/ma.html
[23] http://www.diegm.uniud.it/create/Handbook/PresentazioniPDF/PDF%20ENGLISH/Morphological%20analysis.pdf
[24] Dr. Tom Ritchey is a present-day advocate of morphological analysis who has given a detailed introduction to morphological modeling

will happen if the assumption is no longer part of the equation[25] [26]. This causes people to think out of the box and examine the issue from another angle without preconceived ideas clouding their judgment. No one particular person is credited for the assumption smashing technique, but it is said to be mainly based on content from Edward de Bono[27] [28]and his work with the po method, previously mentioned on page 22. In *How to be a brilliant thinker* Paul Sloane argues, that assumptions should be confronted, because people tend to condition *"…early experiences into wrong assumptions about similar but different situations."* (Sloane: 2010, p. 10).

Reverse brainstorming

Regular brainstorming is known and practiced by many and revolves around thinking of as many possible ways to fix a problem, regardless of how odd they may seem and then later picking them apart. Because it is so known and established, I choose to elaborate further on the lesser known reverse brainstorming. It is an ideation tool, like its regular sibling, but attempts to solve problems by looking at them in reverse, being negative and, as opposed to normal brainstorming, enforces judgment rather than suspending it. By focusing on how to cause the problem or make it worse instead of trying to solve it, the thinking becomes easier because the answer seems more apparent. After the process of worsening the problem, analytic (or creative) methods may be used to identify ways of preventing the causes listed[29] [30] [31].

The practitioner can try to think about what everybody else in the same market is *not* doing, i.e. is there a hole in the market you can fill? This was done by Nintendo when they launched their Wii console, by using technology in a new way that was not employed by the other major competitors on the market, Microsoft (X-box 360) and Sony (Playstation 3).

Reverse brainstorming is a preferable tool for individuals who have a strong analytical mind – i.e. the same as critical thinking and de Bono's black hat thinking. When it is difficult to identify solutions to the problem directly – which is often the case with creative problem-solving and innovation – the reverse brainstorming can be a useful technique[32].

A similar method to reverse brainstorming I have uncovered is the 'problem reversal' tool, which is much like this technique, but with slight differences. Due to the amount of parallels between the two methods I have decided only to make use of reverse brainstorming, but my work on examining problem reversal can be seen in appendix G.

[25] http://www.scribd.com/doc/4592659/Techniques-for-Creative-Thinking-Robert-Harris
[26] http://eng50411.tripod.com/psolving.htm#9
[27] http://members.optusnet.com.au/~charles57/Creative/Techniques/escape.htm
[28] http://isivivane.com/trans4mation/?p=47
[29] http://www.mindtools.com/pages/article/newCT_96.htm
[30] http://creatingminds.org/tools/reverse_brainstorming.htm
[31] http://www.mycoted.com/Negative_Brainstorming
[32] http://www.mindtools.com/pages/article/newCT_96.htm

Cross-pollination

Cross-pollination is an ideation tool that utilizes the way the brain thinks in patterns to develop new ideas. This works by using the associations a thinker has to a specific theme, word or concept[33] [34]. An example of the associations could be sea > planet Earth, white > black, printer > complicated. What should be noted is that no logic is needed for performing associations, only what is produced by the existing thought patterns of the practitioner. This can potentially lead the thinker from one idea to another by way of association, thus having ideas 'pollinate' each other. As such it is an extension of the random word method (see page 33) which also makes use of association, but in cross-pollination the practitioner can keep pollinating further and further.

Mind mapping

One of the more known techniques is mind mapping, which seven out of the eight game developers that participated in my survey about methods knew about (see appendix D). It is used to associate words, ideas, tasks or other items with each other as they arise in our brain when we think about a given word. It strides to identify and understand the structure of a subject. Although no one is specifically credited with inventing the idea, educational consultant Anthony Buzan is one of the main contributors to the field who popularized the concept[35].

Ideas are 'mapped out' by connecting information that has some sort of association with lines. The title of the subject to be explored should be at the center and the user should branch out from there with whatever connects to the subject and then lines should branch out from those correlations and so on, eventually having sub-topics and cross-linkages. Symbols, images and single words (or simple phrases) should be used to make the mind map less crowded and easier to read. The tool can be used as both an ideation tool, finding new connections to the topic at hand, as well as problem-solving and decision-making to figure out what is most important about the issue (closely tied to the center of the subject) and thus should be valued higher – and also by figuring out previously hidden information which becomes clear has some significance that should not be disregarded. Post-its can be also be used when creating a mind-map, allowing rearranging of the concept at hand if applicable. The exercise can be performed with pen and paper.[36] [37] [38] [39]

VNA

The VNA ideation tool stands for 'Verbs', 'Nouns' and 'Adjectives' which are the basic components involved in executing this method. Basically, three sets of cards are created; one with verbs, one with nouns

[33] http://www.imaginal.nl/Creativityontheweb.htm
[34] http://www.tenfacesofinnovation.com/stories/archives/17
[35] http://www.mindtools.com/pages/article/newISS_01.htm
[36] http://www.mindmapping.com/
[37] http://www.mindtools.com/pages/article/newISS_01.htm
[38] http://www.open.ac.uk/infoskills-researchers/developing-mindmapping.htm
[39] http://syque.com/quality_tools/tools/Tools31.htm

and one with adjectives. The words on the cards can be anything as long as they are in one of the grammatical categories. The tool is used for developing game ideas by choosing a card from each stack and answering three questions: 1) what is done in the game? (the verb), 2) what things are in the game? (the noun), and 3) what kind of a distinct feature does the game have? (the adjective). The method was created by Finnish game students in 2009 (Paavilainen: 2009, p. 40). I have decided to make the words a little less restricting by stating that the verb could be something any entity does in the game, not just the main avatar, or something that simply takes place. The noun does not necessarily have to be connected to the player or the main avatar, but can also be an antagonist, a prop, a setting or the like. Finally, the adjective can be a characteristic of both the atmosphere of the game, the characters, the environment or anything that exists in the game. The tool will be useful because it is directly involved with creating *game* ideas and as such can be used by the developers in a more concrete manner when it comes to coming up with a game concept. The words used in when utilizing the VNA method I have chosen myself. The full list of words written on the VNA cards can be viewed in appendix J.

GameBrain

A more alternative brainstorming method for actual game development is GameBrain, in which a brainstorming session is undertaken, but with each participant in the meeting bringing along a game to use as inspiration. The practitioners can bring either an entire game or any piece of a game and use it either strictly (combining) or loosely (associatively) for the idea at hand in order to produce interesting ideas (ibid, p. 41).

Conclusion on and criticism of tools

The main advantage of six thinking hats, DO IT and CPS is the ability to focus your thinking in one way at a time and to investigate a subject from the relevant angles needed to generate ideas, solve problems and make decisions. They are relevant methods, because the thinking otherwise easily becomes confusing and unconstructive. This way a streamlined approach to thinking is produced in which many of the creativity techniques can also fit in under, e.g. under the green hat of creativity of six thinking hats, the Open step of DO IT and the idea-finding part of CPS; the phases where ideas are to be produced.

An important thing to note is that the common denominator for many of these tools is that they are concerned with movement (to use the term coined by de Bono), not judgment. This is crucial in order to understand what the creativity tools revolve around and seek to establish.

However, some concerns come to my mind about these methods. The difficulty in getting the thinkers to ‘play along’ and participate actively is one. Will it actually lead to something or just be goofy sessions with no results? If the theory is not introduced properly and thoroughly enough to the practitioners, will they resent the tool right of the bat? What if no results are yielded during some of the methods? Will the exercises have been in vain? Will real game developers have a hard time taking the methods to heart due to their

familiarity with critical thinking and a belief that that is enough? Additionally, I have concerns about whether or not these techniques are both relevant enough and will achieve satisfactory results in terms of depth. Are some of the methods too superficial or too general?

Another area of concern is other's use of the six hats. Have others seen it work in practice? A search on the internet reveals mixed results; some know the tool and recognize its advantage but at the same time think the performing of a session is a hassle[40], while others enthusiastically embrace the concept and have great success[41]. In de Bono's book on the subject he mentions many examples of real world companies who have achieved actual results with the method, but realistically it would be strange if this was not the case. He does, however, also mention that he has seen some people perform the exercise wrongly, which could be the reason why some people reject the method. And if this is a problem recognized by de Bono, what are the chances of this occurring during my sessions, especially with everyone involved being relatively inexperienced with the method?

In terms of scientific approach I have examined the theoretical background to the subject at hand, making it a new point in the hermeneutic circle that is steadily evolving while reframing my initial problem formulation in regards to the information gathered. I have scrutinized the creative tools and how they work and the next step is to figure out how they can be incorporated in game development.

[40] http://www.debonosociety.com/forum/topics/six-thinking-hats-examples-of
[41] http://blogs.funiber.org/formacion-profesores/2011/01/23/six-thinking-hats/

Analysis of creativity sessions

In this paragraph I will analyze the creativity sessions which were performed with other game developers, in which ideation, problem-solving and decision-making were emphasized in relation to creating games. For each session a variety of tools were introduced and tested. Some tools were embedded in other methods where I thought it relevant, due to the fact that some methods have specific stages which focus on either ideation, decision-making or problem-finding, making it ideal to combine some of the theories.

Quotations from session one and three are translated from Danish to English by me. After a quote I will state in which session it was said (abbreviated S1 for session 1), who said it and when (timestamp with hours, minutes and seconds), like this: (S1: T, 02:01:22-02:01:30). In the quotes where the participants refer to previously mentioned words, I will state those words in brackets in the quote, as well as describing any significant body language on their part in these brackets.

Session one

The first session was held at a private apartment with three other developers who worked on the game '1916 – Der Unbekannte Krieg' with me. Two of them are programmers and the third is a project manager. Their names have been anonymised to T, J and M. The main method used was six thinking hats applied to a situation where new game ideas were to be conceived. Under the green hat of creativity the following tools were introduced and tried: assumption smashing, cross-pollination combined with mind-mapping, morphological analysis and the random word method.

I started the session by explaining the six thinking hats concept to the participants. I thus assumed the role of the facilitator, who runs the meeting and assesses whether or not the rules of the method are being followed correctly. This is what de Bono refers to as the person who wears the blue hat and also includes announcing when a change of hats occur and at the end of the session asking for a conclusion. Due to the other attendees not having any experience with the method and de Bono arguing that inexperienced practitioners of the method should use a preset sequence of hats, I decided on a sequence that would attempt to fulfill the goal of the session. Because a six hats session always starts with a blue hat, the order of the hats and the reason for the order was explained to the participants during this step.

No actual colored hats were used, but slips of paper in all six different colors were presented and laid out in the middle of the table when the hat in question was 'worn'.

The starting blue hat

The purpose of the thinking of the session was specified in more depth: to create new game concepts and elaborate enough on them to create a plan for how a development team would take the idea further, firstly by creating a playable prototype and testing the core gameplay.

The order I determined was the following: blue, green, yellow, black, white, (green), red, blue. Green was chosen after blue because there was no content to elaborate upon and the ideas created during this hat would be the basis for further discussion under the other hats. Yellow was chosen next because of de Bono's advice that one should always attempt to find benefits to an idea before looking for the dangers in the idea (see page 25). After yellow came black in order to criticize the idea and seeing if they outweigh the positives (or vice versa). White was after black in order to write down all that was explored so far and to see if there was any information that still needed to be collected. Green was next, but in a parenthesis, because it was only to be used if it was deemed relevant that new ideas were still needed in order for the idea to progress. In order to gauge the participants' emotions on the idea(s) the red hat was introduced, because if there was no enthusiasm for the idea it would be futile to move forward with it. Lastly, the final blue hat was used to summarize the meeting and creating a plan for contingent development of the idea.

Having shortly presented the team with the order of the hats, a change of hats was announced and the green hat was worn.

The green hat

Under the green hat a variety of ideation techniques were introduced and used at length to create new game ideas. It should be noted that de Bono's rule of employing only one minute per hat per person was not enforced during the green hat, because of the amount of ideation tools that I wanted to test with the team. The continuation of the particular hat is also approved by de Bono, as long as new ideas are created and not just prolonged for the sake of extending it. The purpose of the green hat is to create movement; thinking in terms of new possibilities and uncharted territory in order to move forward with an idea.

VNA

The first tool presented to the team was VNA. The participants took turns drawing three cards from three different piles consisting of verbs, nouns and adjectives. Only the idea that they continued to develop further is analyzed here.

T drew 'to braid', 'expert' and 'empathetic'. The combination made him think of a matchmaker who had to 'braid' people together, creating interesting results. M interjected that 'empathetic' was more about putting oneself in other people's stead and attempting to understand how they feel, and T agreed but also thought it still supported his idea. I asked how the game would be played to make it more concrete and T stated that if it were a game for girls, it *"...should be filled with pink, hearts and then a lot of guys enter this dating service and a lot of women enter the dating service and then you examine 'this guy likes ponies and this girl likes Twilight' so they probably won't work together."* (S1: T, 00:23:39-00:23:54). When asked what was 'fun' about this game, he replied "ask girls", i.e. acknowledging it was not his area of expertise and stating that it would probably require a female consultant to make it interesting for that demographic.

At this point a consensus was reached in the group that 'braid' was a difficult word to work with (S1: persons J and M, 00:24:55-00:24:59). However, that did not stop T from getting another idea when thinking of these particular words; the player acts as The Fates (also called Moirae in Greek mythology)[42], who are incarnations of destiny and decide the fates of mortals. They were widely popularized after appearing in the Disney movie Hercules. In the movie they cut the life strings of people on Earth to end their lives, but because the words 'braid' and 'empathetic' were involved in this case, T thought of 'braiding' different people together at some point in their life to see what would happen:

"Kind of like the Sims, but instead of building their houses you do something else with them.[…] So here [T points on table] *you get married, here you go to school, here you get kids, here you meet some asshole who bullies you or whatever."* (S1: T, 00:26:37-00:26:50)

At this point I asked T if this meant that you determined the entire outcome from the beginning when matching two people and then watching the 'match' unfold as the persons went about their lives. He replied that he thought it might be an interesting thing to do by crisscrossing different people. J added that the player could get small goals to accomplish along the way:

"…like getting as much success as possible or getting as little success as possible or achieving something specific with this person like having the person commit suicide after ten years or something." (S1: J, 00:27:02-00:27:12)

The idea evolved and T suggested the concept of having multiple persons 'collide' in a playthrough where the outcome was determined by an artificial intelligence. T made a short remark that he felt very enthusiastic about this idea, although this kind of thinking belongs under the red hat. No 'reprimand' was given due to the spontaneous nature of the comment and the fact that the discussion continued immediately after T made it. The idea was mentioned as being a kind of 'God game' and the game 'Black and White' was referenced for similarity. Additionally, T added that the characters of the game could have multiple characteristics such as a serial killer that liked cats, so if he was paired with a person who had a lot of cats, he would not murder that person and so on (S1: T, 00:28:30-00:28:35).

Assumption smashing

The next method I tried out was assumption smashing. The chosen topic was 'roleplaying games'. The group went on to state their assumptions about this genre:

- Always has a protagonist
- Always has an antagonist
- The player always 'levels up'

[42] http://en.wikipedia.org/wiki/Moirae

- You assume a role, playing a character
- Items to use/gather
- Skills to use/obtain
- Boss fights
- (Magic/sorcery)
- Mythology and something supernatural
- Something that takes a long time getting into, i.e. not convenient and easily consumed. Requires effort.
- Choosing whether to be good or evil
- Branched out gameplay with a lot of different options available to the player (S1: everyone, 00:41:03-00:43:03)

Now the smashing could begin and starting from the top I asked, what would happen if a roleplaying game had no protagonist? What kind of game would that be? M replied that he thought the game 'Black and White' might be such a game due to the lack of an actual main character. However, T disagreed and said it is not a roleplaying game, but more of a 'God game'. J subsequently stated that *"...if the game has no main character, you are not able to assume a role as such."* (Session 1: J, 00:43:47-00:43:53) and by saying this he combined the 'always has a protagonist' assumption with the 'you assume a role' assumption. M proceeded to elaborate on his first statement about Black and White and argued that it is about controlling the environment of the game, i.e. everything else but a protagonist. Another comparison was made, this time to the Dungeon Keeper games, in which the player sets traps for heroes who seek to vanquish the evils the player creates. However, this was opposed due to the fact that the player actually plays an 'overlord' in the game, thus becoming the main character. A discussion was encouraged about what exactly defines a 'main character', but the request was not followed through. Instead I asked what would happen if the player was playing a game like Final Fantasy with the same characters, but *was not controlling them*. The answer, according to T, was that they would be controlled by an AI, making the player a sort of game master[43] instead. An idea came forward that by having such indirect power over the character, you could basically control their actions as a kind of puppet master.

The team went on to smash three more assumptions and the results of this can be seen in appendix Q due to my need for conserving space in this thesis to present the analysis of many more tools. It should be noted that after smashing three assumptions I realized it would take a long time to go through all of the listed assumptions and decided on one last assumption before moving on to the next technique. I had not foreseen the extensiveness of the method and the amount of time it would consume; this means it should be chosen as

[43] In traditional roleplaying, a game master is the 'man behind the curtain' who organizes, moderates the game as well as being the person who enforces the rules of the game - http://en.wikipedia.org/wiki/Game_master

a tool more carefully and perhaps not incorporated in sessions which have multiple tasks that need to be performed.

The result of the assumption smashing technique was that a lot of interesting points were made, but no concrete ideas came to light. As a result, I believe it might be an idea to use the newfound epiphanies obtained during assumption smashing as a starting point for a new ideation method and have it be the basis of that particular session. Otherwise it may simply be a valid point that gets lost along the way.

Cross-pollination/mind-mapping

The next method under the green hat of creativity was cross-pollination paired with mind-mapping. I decided to combine them, because cross-pollination is about associating concepts, themes or words and mind-mapping is a visual tool for mapping out such cross-pollinations and easily making further associations and connecting them on the mind map, resulting in cross-pollination on a higher level upon seeing the full extent of the associations made. The starting word the team was supposed to use as a starting point for the cross-pollination was 'horror game'. From that word they made five associations: 'darkness', 'fear', 'shock effects', 'defenselessness' and '1916' (the game we made together). From these five associations, new associations were made, as can be seen of this digital version I made of the mind map that was created during the session:

Figure 5 – mind-map from session one

No associations were made to 1916 due to the fact that 'Utøya' was mentioned as the last association to defenselessness, referencing the terrorist attack on the Norwegian island in July 2011 in which 69 people were killed by a right-wing extremist, and as a result the team debated the inappropriateness of a game about this specific topic. At this time I explained them that because it was currently an ideation session, nothing

weas off-limits at this point in time; the time for criticizing the ideas generated would come at a later stage. While writing notes on my laptop, T and M expressed a wish to continue with the session by cross-pollinating different words from the mind map with each other to generate a new game idea and I did not want this enthusiasm to go to waste, so I agreed and this was done (S1: T and M, 01:08:35-01:08:40).

J initially tried to combine 'shadow', 'darkness', 'horror game' and 'shock effects' but failed to create a new idea from it, possibly due to the fact that those are standard for many games in that particular genre. T proceeded to take over with new associations. He came up with a horror game about a girl who wears sunglasses because she is being paranoid (S1: T, 01:09:07-01:09:22). Thus, four words from the mind-map cross-pollinated each other into a game idea, and T added that the sunglasses work as protective blinders from 'sudden light effects', making it a total of five words combined. He then went on to state he thought he was *"…just throwing shit out there"* (S1: T, 01:09:30-01:09:34), essentially criticizing his own idea and not believing in it. I promptly reminded him that he should not worry about judging his idea at this stage and that 'everything goes'.

J took T's idea further and incorporated 'Utøya' by stating that the game could take place there and the girl could be hiding in the 'shadows' and has a 'high pulse' – yet two more words cross-pollinated – and T added that she could be watching out for 'sudden light' and 'loud noises', adding another two words. M stated that the words *"…almost fit too well together!"* (S1: M, 01:09:41-01:09:43).

M presented a new idea about a young bird that is afraid of its own shadow to which the others laugh and T added that as the bird you need to try and get rid of it. The idea was not developed much further and as enthusiasm faded, I sensed that it was time to proceed with another technique. In hindsight it may have been a good idea to force the team to more elaborately specify what exactly the 'sunglass-wearing girl on Utøya'-game would consist of, so that the idea may have been more fleshed out and as a result thereof might have been picked for further investigation, should the group decide that such a game was interesting enough to develop further.

Concerning this exercise, it was interesting to note that M took a much more active part than under the previous tools of VNA and assumption smashing, perhaps due to his limited experience as a gamer during the those techniques, whereas he in this scenario felt more comfortable expressing himself because the associations made were not required to have a basis in logic or games per se. It was something everyone in the team could relate to, making it a productive session that did not come to a halt. The creating of the cross-pollination and mind-mapping could have been extended even further by branching out more of the written words on the mind-map; however, an idea for a game had already formed and thus proven the technique somewhat successful. Because there were other methods that needed to be tested, I continued with the next tool under the green hat.

Random word method

For the testing of the random word method, I used Oxford's Advanced Learner's Dictionary, the largest English language dictionary from Oxford University Press[44]. I instructed the participants to randomly look up a random word in the dictionary on an arbitrary page and to apply that word as inspiration to the subject at hand, i.e. a game idea.

The first word that was chosen at random was 'fatso', which is simply defined as a noun for someone who is 'fatty' in the dictionary, thus referring to an adjective with a more specific definition. However, the team immediately had connotations to that particular word as it was loaded with negativity about a person who overeats. This made T think of a game, where the avatar was a very fat person who was simply laying down and 'rolling over' old ladies with walkers, garden gnomes and similar as a kind of big boulder. He would increase in size as he rolled over marzipan bars and the player would control him by tilting the device (they hereby assumed it was a game for mobile devices with a gyroscope and accelerometer such as tablets and smartphones).

If the fatso rolled over a garden gnome in a person's garden he would get points deducted from his score, suggested J, while M added that *"…at the same time if you roll over something edible you will roll faster."* (S1: M, 01:12:07-01:12:10). M's suggestion of an increase in speed when eating something coupled with T's proposal that the character should increase in size when eating something, led to T getting an interesting idea of growing rolls of fat on the avatar on the exact part of the person's body that rolled over the food (S1: T, 01:12:17-01:12:22). This would essentially make it harder to control the character if the rolls of fat are distributed uneven across the character's body because it would lean to the side that had more weight on it. The idea was received positively due to the hilarity that might ensue upon seeing such a malformed sight.

I then asked how the game could be given more personality and be more than just a fat person rolling on a hill. T replied the avatar should have *"…a pig's snout […] almost be a pig […] a Disney caricatured pig"*, while J pictured him as *"cartoony […] and with charmless sound effects as if he is almost puking"* and M stated he should be *"disgusting"* (S1: T, J and M, 01:13:24-01:13:38). Then comparisons were made to the character 'Fat Bastard' from the movie 'Austin Powers Goldmember' or something hairy, gritty and sweaty à la the movie Sin City. Another point was made by T who thought the character might be fighting his own compulsion to eat and in reality did not want to harm the people he would roll over, but could not help his own compulsions. When asked whether they thought the idea could be developed into a successful game, the participants responded very positively.

The use of the method continued with the participants, the results of which can be seen in appendix R due to a limited amount of space being available for analyzing all the methods in this thesis. The random word

[44] http://en.wikipedia.org/wiki/Oxford_Advanced_Learner%27s_Dictionary

method served as inspiration for several games, some more detailed than others. As with the assumption smashing technique it might have been a good idea to test it on a more specific problem instead of using it as an ideation tool for such a broad topic, i.e. basically just trying to come up with new game ideas. This is the case because it is two different ways of utilizing the tool and the way the method is used might spark different results and they might each have their own merits.

Morphological analysis

The last procedure under the green hat was morphological analysis. Because this is a more complex tool in which certain parameters are used, I decided we were to use a problem known to everyone in the group, so that it may ease the difficulties of making use of the method. The problem was one that became evident during the development of the game all four of us participated in creating – '1916 – Der Unbekannte Krieg'[45]. In the game the player must go through a trench and escape hungry dinosaurs. To properly deal with the dinosaurs, the player must rip off limbs off of dead soldiers lying in the trenches and throwing them as bait to the dinosaurs, thus distracting them and making them uninterested in the player. It is next to impossible to complete the game without using this mechanic. We introduced the mechanic by placing a dead soldier in the very first trench of the game, which did not branch out. The player could therefore only go one way and would always encounter the dead soldier and even a letter next to him, which, if interacted with, would show a letter and a drawing of two soldiers throwing an arm to a raptor and the raptor turning its head, as if distracted. It was also stated in the controls, which were always shown prior to the game starting, that players should use the 'E' button to interact with objects in the world and to 'hold the 'E' button' to 'take flesh'. Even so, some players would simply pass this dead soldier without displaying any interest in him or the letter and continue to move forward in the trench and eventually get eaten by a dinosaur, because the player never discovered the primary core mechanic that was 'throwing flesh'.

Due to the complexity of the morphological analysis and our collective inexperience with the method I decided to follow the instructions seen in appendix H to the letter.

The first step revolves around identifying the objective of the creative session. This was defined by the group as 'making sure the player interacts with the dead soldier and picks up a limb from said soldier'. The next thing to do was to list the things about the situation that can be varied or changed in some way, to which the team named the following variables: 'text', 'interaction', 'visual effect', 'sound effect', 'level design' and 'tutorial' (S1: everyone, 01:22:39-01:24:25).

The third step was to elaborate on two to six of the variables from step two to investigate further, which play a significant part in the situation. T advocated that we should examine 'visual effects' and 'tutorial' further

[45] http://1916.dadiugames.dk

and so they were chosen without scrutiny, which later turned out to be a mistake when carrying out step 6 of the model.

In the fourth stage of the analysis we were to list possible values under the selected variables – visual effects and tutorial – that can be changed or implemented. Under visual effects T stated that *"... you could make the dead soldier blink. Not with red, but just with a color that fits in the world, just making it brighter and then darker again to draw attention to him."* (S1: T, 01:25:31-01:25:41). J thought of another visual effect; the soldier could play an animation in which he gave the player permission to use his corpse as a 'weapon' against the dinosaurs before breathing his last. Finally, M suggested simply creating an arrow on the screen that pointed to the soldier's foot, indicating it can be interacted with. I asked the group if they could think of any other visual effects, but they were unable to do so and we proceeded to list the things under the tutorial which could be fiddled with.

T firstly proposed a cutscene to be played in a whole separate area, which the player would have to witness before moving on into the real level. The cutscene would consist of another soldier being hunted by a dinosaur taking a limb from a dead soldier and then throwing it towards said dinosaur, making it attracted to the limb instead, thus showing the player how the mechanic worked. T also put forward the idea that text could simply state the following on the screen:

"Pick up flesh from dead soldiers to distract dinosaurs." (S1: T, 01:27:01-01:27:04)

He added that it would probably harm the atmosphere of the game, but that it would also definitely work. At this point we should have thought about the fact, that 'text' was one of the parameters we listed in step 2 of the model and it was an entirely separate thing. This was, however, not realized at this time. T expanded on his suggestion by stating that the text could be displayed on the screen after the player had died, i.e. after the player had failed the game the first time, so as to give the player a chance to figure it out on his own. M jokingly suggested something similar to T's first proposal about a cutscene; a 'training ground' similar to the ones found in other first person shooters in which the player is not exposed to danger and has ample time to test the various weapons and techniques. It was put forward in a humorous matter due to the seriousness and bleakness of 1916, knowing it would not fit in. Nevertheless, it was included as a parameter that could be introduced. Finally, upon lacking input from the three participants, I asked if 'speak' could be added, such as having an almost dying soldier telling the player what to do to deal with the dinosaurs. They concurred that it was a possibility, but the same fallacy was made as with the text, because it was a point of its own during step 2. T even pointed this out, but I mistakenly said that it could be used because it would still be considered something of a 'tutorial'. This is technically true, but as it would turn out that is not the proper way to perform a morphological analysis.

Having come up with parameters for both the visual effects and the tutorial variables, I read about step 5 in the instructions on morphological analysis, which says one should select some of the values from step 4 to carry forward, but as we did not have that many parameters, we simply included all of them. We proceeded to the sixth part of the analysis, which revolves around finding a way to combining the items listed in step 5 (all of the items from step 4 in our case). I created a matrix with two axes, one stating the variables of the visual effects and one stating the ones for the tutorial. It looked as such:

Visual effect / Tutorial	Dead soldier blinking	Dead soldier animated	Pointing arrow on dead soldier
Cutscene in separate area			
On-screen text			
After death text			
Training grounds			
Dead soldier speak			

Figure 6 – Step 6 of the morphological analysis of the dead soldier problem in 1916

According to the sixth step of morphological analysis we should now attempt to combine the variables under 'visual effect' with the ones listed under 'tutorial'. We attempted this, but found that we were only implementing both of the variables listed in the model, not combining them to something new. An example of something new could be 'dead soldier animated' and 'dead soldier speak' which could result in the actual words or sound waves of the soldier being animated. In the template morphological analysis in appendix H, they do this by combining e.g. 'wall' as a variable under the parameter 'canvas' and 'ink' as a variable under 'materials', resulting in something new: graffiti. This was not how we used the technique. It could have been stated more obviously in the theory by its creators that one should attempt to break a variable down to the *smallest* components – not just any components. This also limits the possible solutions and usefulness of the method. We attempted to seek out the combination of variables that best suited the feel and narrative of the game out of all the different options available by matching them in figure 6. J thought the best solution was the following:

"I would take [dead soldier] *speak and* [dead soldier] *animation, because if it is supposed to fit in with the atmosphere without ruining anything crazy, then I would say that if you use some speak, […] and he tries to tell you in German or something then you might not understand so much of it, but if it is aided by an animation…"* (S1: J, 01:30:19-01:30:52)

Even though his reasoning made sense and it was a good answer to what we set out to do, this is not actually how the tool is supposed to be used. On the premise that we set out to use the model, however, his answer made perfect sense. By looking at it from this angle, we did actually benefit something from the technique.

At this point T divulged his opinion that he thought a cutscene would do fine on its own; it did not need to be paired with something. M added that it was difficult to combine the variables from visual effects with the ones from tutorial and thought this was a problem. It was around this time that I realized we were using the method wrongly. I showed them the template analysis from appendix H and T stated we had probably been thinking too abstractly and we had not been specific enough in defining the variables. It would need to be more structured if the variables were to fit together and form something new. The tutorial parameter was too broad, namely because it can involve almost anything: text, animations, interactions etc. After realizing our faults we wrapped up the green hat, because I estimated it would take too long to start the morphological analysis from scratch and we had already spent a lot of time under the green hat – time would be better used proceeding under the other hats.

We thought we were somewhat on the right track in terms of performing the morphological analysis, or at least I did. The reason for failing was inexperience with the method and it being untested on my part. I should have attempted to utilize the model myself on another problem before introducing it to the others. Even though the morphological analysis was not used properly, it still made its usefulness apparent, because we spent time thinking about what variables of the problem we could change. Granted, we were not specific enough about these variables, but analyzing the issue from many angles and trying to figure out a way to tweak these variables or combine them was a useful task. Either way it was a learning experience and at least we discovered we were doing it wrong instead of blindly following our misguided efforts.

The yellow hat

I started out with asking the players which one of all of the ideas that had been generated under the green hat they liked the best – which one(s) did they found most interesting and to hold most potential? M remembered that there was one idea under the VNA method that was discussed particularly much, but he could not pinpoint exactly which idea it was. After rummaging through the drawn VNA cards he found the word ‘braid’ and T commented that it was the ‘fate game’ about ‘braiding’ people’s destinies together and watching them unfold (described on p. 40). Another game that they mentioned potential about was the ‘hypnotizing pet game’, also generated by VNA. Upon thinking further on the braiding game, T commented:

“Well I really like that braid thing, but I have no clue about how to implement it” (S1: T, 01:35:39-01:35:43)

What is important to note about this comment is that it is both a red hat statement (he ‘really likes it’ – an emotional response) and a black hat statement (sees danger in the implementation of the idea). I pointed out that we were about to figure out how it would work under this hat – how would this work successfully? Concerning the red hat comment, I decided to let it slide due to the fact that him ‘liking’ the idea might also be interpreted as him seeing benefits in the idea and not exclusively being an emotional response.

When asked what positive things there could be about such a game, T said that *"…it could be really, really damn deeply engaging and you can make the game mechanics so deep that you can sit and have a book this size* [takes the Oxford dictionary to demonstrate size] *telling you how to play the game."* (S1: T, 01:35:56-01:36:05). There was an agreement that if the idea was implemented right, there would be an unlimited amount of gameplay outcomes of the game. The game would never be the same game twice, providing the game was big and complex enough.

Another positive aspect of the idea was the fact that you could market the game to a broad spectrum of players due to the different characters the game could compose of. T mentioned dragons and knights for the boys, sparkling vampires vs. werewolves à la the movie Twilight for the girls, and Jørgen Demylius (old Danish radio host) on TV2 Charlie (Danish television channel aimed for a more mature audience) in order to create an 'old man's program' for the older generations.

M stated that the game sounded very original, to which T responded that he was in doubt because it might resemble The Sims a little much, except this would be without the house. When asked who the game would apply to, T said *"…it would depend on how you created the game."* (S1: T, 01:37:11-01:37:13) and J stated it could be anybody. Generally speaking, the team agreed it would depend on the direction the creators took the game. This led to a discussion about how exactly the game worked: would the outcome of combining two people's fate and when they would intertwine be determined at the moment the player paired them? Or would you let the people live their lives and then at any moment be able to intervene and have two fates interact with each other? I asked them to try to analyze, which of those two scenarios would have the most 'awesome' gameplay, i.e. which one has the most benefits? J thought it would *"…be more action-packed if the player did it ongoing."* (S1: J, 01:38:26-01:38:30). This led to J evolving the gameplay experience to giving the player the option of braiding people at the start of the game, and once having paired two people he would continuously get smaller subgoals related to those individuals during the progression of the game upon which he could act by braiding other people to achieve the appropriate outcome. Lastly, T mentioned that you could expand upon the game after it was released by offering downloadable content, e.g. new characters, which could be bought through micro transactions.

The black hat

After having examined the positive aspects of the idea it was now time to think of what to be cautious for in terms of the concept. Which flaws were there in the idea? What would some difficulties be that would be needed to overcome? What might make the game fail being a success? So, the negative black hat was collectively put on by the team to scrutinize the idea.

T mentioned that the game might become too strained, meaning it would be difficult for the players to acquaint themselves with the gameplay. I asked him to elaborate and he said:

"The thing about it is that you might have to become familiar with way, way too much, you have to think about too many things." (S1: T, 01:41:12-01:41:17)

In essence, it might be a problem to find out how the game works. The consequences of the player's actions might seem immeasurable to him and then he would give up before actually getting into the game. You would have to give the players a way to reason his way into how certain people would interact with each other.

Another point was made by T who claimed the outcome would have to be very visual; it would be a problem if it was just people's 'life strings' that interacted with each other. He commented it would be like watching an animation movie of your actions unfold, to which M replied that it could be difficult to get this operate well. J simply stated that *"The AI will be amazingly difficult to make."* (S1: J, 01:41:47-01:41:50), drawing upon his background as a programmer to come to this conclusion. To this concern I asked if it were at all possible to create such an artificial intelligence, because if not then that would be something that could bring down the entire idea. T replied cautiously optimistic by stating that it would be possible if done cleverly and J agreed. M presented the viewpoint that the game might not even be fun to play at all to which the others were in agreement. He expanded upon this sentiment by asking what would happen after five minutes of playing the game; would it reach a standstill or become increasingly uneventful? T responded that it would depend on how the game was shaped by the creators. Finally, J stated that the game might have a steep learning curve, substantiating the previously mentioned danger concerning the game being too difficult for the players to acquaint themselves with.

Having brought all these negative aspects of the idea to the surface, the group was now aware of them and it was something they would have to take into account later under the final blue hat (see p. 52).

The white hat

After switching to the white hat, the group used it to figure out, which questions they needed to ask ourselves in terms of moving forward ('what information do we need?'). What knowledge would they need to obtain to bring the idea to life? It was not possible to list the 'facts' of the concept, because we had just made it up and describing an idea that might still change many times would not be considered 'facts'.

J said the primary thing to figure out would be how the AI would work. I tried to make them elaborate on this point and J and T stated they would need a map to indicate the different states the AI could be in, i.e. how should a character react to a player interaction. Would it be a fluent AI that could figure things out on its own and be taught how to react or should the outcome of a given player action be the same every time? Next a list of questions was added that needed to be answered:

- How are the characters (and their actions) and the game world visually represented?

- Can the player die?
- How long does the game experience last?
- What happens if you fail?
- Is it a casual game or a roleplaying game?
- What variable characteristics do the characters in the game have that need to be defined? (S1: everyone, 01:45:59-01:53:38)

Already during the white hat there was some talk about what could be done to alleviate these potential problems, such as creating a prototype. This is not an objective for the white hat and for the most part the participants were encouraged not to elaborate on this part yet, as it would be done under the final blue hat.

The red hat

The time had come to figure out how the group really felt about the idea. They had explored both the potential benefits and dangers, but what was their knee-jerk reaction to it on an emotional level?

T was asked for his opinion first and he ambivalently stated that he thought it might be *"…incredibly fun to watch all these destinies come together in some way"* (S1: T, 01:58:55-01:59:03), but he also felt that if he were to actually be a developer on the game, it would be disheartening due to the complexity and immensity of the game.

Secondly, J expressed that he believed that *"…it could definitely be a fun game. A challenging, very challenging game. Very hard to implement concerning the AI, but I have great expectations that it could be a good game."* (S1: J, 01:59:47-01:59:59). Just as T, J expressed ambivalence by feeling enthusiasm, but also hesitation due to the deterrence of such a daunting task of actually creating such a game.

After hearing of the two programmers' concerns, I asked them how much time they would need to create such a prototype. I was carried away with trying to diminish their feelings of frustration about the difficulty of the work. This was not part of red hat thinking and I realized it myself minutes later and stated we would cover this under the final blue hat. At this point I was writing notes on my laptop before proceeding, while the discussion continued among the group. I thus forgot about asking M his red hat thinking on the concept. I later realized my mistake and when asked for his opinion, M said that he felt it might easily be a boring game or too challenging and that it would be hard to make the game work properly, i.e. being fun.

The final blue hat

Under the final blue hat we outlined the next steps we would need to take if we were to proceed with the concept and actually make a game out of it. T and J, the programmers of the group, were quick to establish that they needed a clear-cut direction before being able to start writing code. There needed to be some concrete design on the game, such as flowcharts of the AI's state system. In the words of T:

"First of all you need to explain, you need to get the game designer to explain to the programmers how the AI should work and it can't just be overall fluffy-fluffy values." (S1: T, 02:00:50-02:01:19)

This takes us back to the game design angle of the creativity tools of this thesis and the fact that games are formal systems with certain characteristics. While six thinking hats does state that the practitioners should figure out what to do next, it provides no tool to document such actions in terms of game development. It would perhaps be too easy to simply state that the following tasks should be distributed to the respective competences and that they would have to use their own skills to figure out what this meant. Ideally, you could modify the method by adding a step that outlines some of the things the developers can do to get ready to build a prototype, whether it is making flowcharts, creating a game design or concept document, game storyboards, sketches and so on.

In this early stage of game development, when a lot of design is still up in the air, it is not a good idea to flesh out an entire design document because it would waste a lot of time due to the iterative aspect of game development. At the same time, the artists and programmers of the game need specifics to go on before they can start making playable prototypes. Therefore I suggest a middle ground, a sort of hybrid between a concept document/pitch and a design document, which quickly shows the core of the idea with the most crucial gameplay elements described in detail. It could also contain flowcharts, game storyboards and the like.

The participants mainly emphasized the immediate need of a playable prototype to figure out if the game would actually be fun and to get a common understanding of what kind of game it actually was in terms of gameplay, target group audience and genre. The programmers estimated that it would take about a week's worth of work to create a playable prototype in which two destinies were able to interact with each other in different points of their lives.

Under the final blue hat the thinking process we had just undergone was evaluated. The team thought VNA was a success and yielded interesting results. J and M were keen on using six thinking hats on another occasion, because they felt it was good to separate the different kinds of thinking, especially when trying to generate new ideas. T did not speak his opinion on the method, but reminisced that he had had trouble with a director in a previous game development in which said director had crushed all ideas immediately upon hearing them. It should be noted that subject T prior to the session was hesitant about the dividing of the thinking and to try out the various creativity techniques, but as it turned out he was the most productive in generating new ideas. His hesitation was founded on the fact that he sees himself as a very critical individual who loves to point out the flaws of an idea, i.e. black hat thinking.

The group also thought of a way to combine several of the tools; you could choose three random words – a verb, a noun and an adjective – from the dictionary and use them in a VNA session and then proceed to make a mind-map of the results where the idea could flourish and develop even further.

Session one conclusion

The session fulfilled its purpose by having the participants think of new game ideas. Even though the six thinking hats rules were not enforced to the letter and were occasionally broken (usually unknowingly), it worked out for the vast majority of the time. There was some criticism of some ideas; morphological analysis because it was not utilized correctly, assumption smashing because the subject presented was too general and the cross-pollination/mind-mapping tool was a little too rushed. However, there were no methods that were definitively rejected by the group; they suggested how they might otherwise work, be modified or used for fulfilling a purpose.

Assumption smashing was mainly used as an ideation tool and it could be relevant to try it as a problem-solving tool on a more specific problem as well for different results. The same was the case with the random word method, the results of which on a specific problem could be interesting. Also, no concrete ideas were listed during assumption smashing, but good points were made, i.e. 'there is some potential to an idea like this', but it was not developed into a game idea.

The yellow and black hats were used to judge the chosen idea in a positive and negative way, respectively. The group had no problems in doing this and most importantly is the fact that there was no overlapping of the two ways of thinking, i.e. that positive and negative thinking was used under other hats. The white hat was used to make the group figure out what questions they needed to find the answers to concerning the idea, which was the basis for the plan of action that was created under the last blue hat. Finally, the red hat surfaced the participants' emotions on the idea they had generated, showing enthusiasm as well as a feeling of resignation of the amount of difficult work it would take to implement the idea good enough.

M was not so active during the session, which might be because he is less of a gamer and more of a project manager. This was also pointed out several times by the group. It might be worth considering designating people's talking time to prevent some individuals from hogging the session and constantly speaking. T turned out to be the most outgoing and idea generating of the three participants, despite his self-proclaimed negative attitude and desire to criticize everything. I interpret this as a successful outcome of the six thinking hats method where the types of thinking was divided, giving him room to be creative and use the other parts of his brain.

Session two

The second session was held at Progressive Media, a mobile platform game developer located in Aalborg. Two developers participated, both with a producer background. They are called N and F. For this session I decided to mainly make use of the DO IT method with reverse brainstorming and GameBrain added under then Open step. Before engaging in the DO IT method, however, I decided to do a round of VNA with the participants in order to gain a concrete subject matter they could apply the DO IT method to.

VNA cards were drawn six times and the words were used to gain ideas by the developers. Of these six subjects one was picked to be continued with in the session. Only the chosen game idea is described in the following paragraph.

VNA

F drew the cards 'to conquer', 'panda' and 'authoritarian'. F thought of Chinese people who destroy forests, the natural habitat for the pandas, who are an endangered species. His idea was that the pandas would be seeking revenge and wanted to take back their land. N thought of a panda as a dictator and humans would be slaves. His second idea was that *"...pandas love bamboo. So it's sort of the idea that there are all these pandas and they just need more territory to grow more bamboo because they kept eating it all the time."* (S2: N, 00:10:32-00:10:42). He described how the player would also have to breed more pandas to increase the population that consequently could help conquer more territory. The kind of gameplay he envisioned for the game was something akin to the game 'Mushroom Wars', a real-time strategy game where the player controls mushrooms and attempts to conquer the mushroom forces of a computer AI or human opponent. In this instance, the game map would be divided into playfields and when one was conquered the player would be able to breed more pandas and grow more bamboo.

DO IT

The DO IT method was used as suggested by starting with Define, then Open and lastly Identify. Transform was not utilized because it revolves around putting the idea into action, i.e. actually creating the idea. As this was a session to test the technique and not carry the efforts made through the tool into life, it was excluded. It was decided that a rapid prototype of the game would be needed to be created, but an exact plan of action for such a prototype was not made, as the time of the session was running out and it would be considered a waste of time to create such a plan since it would not be carried out anyway.

Before proceeding with the individual steps of the tool, N and F were to write down a broad statement of the problem at hand. They were unsure of what this could mean and thought it might involve speculating about the target group for the game. I replied that that could be the case, but it could more likely be something like *"we want to make a game about pandas that breed a lot, but it shouldn't be exactly like Mushroom Wars."*

(S2: me, 00:25:19-00:25:27). They thought that this was an adequate and broad enough description of their idea and decided to stick with that.

Define

Under the Define stage of the DO IT model, I first used the catalyst called 'mind focus', in which the practitioners are to divide the problem into smaller problems, leading to more narrow and precise restatements of the problem. To simplify, I asked them what they would need to do in order to progress with the idea. Their answers were two statements:

- *"A precise idea for the core gameplay."* (S2: N, 00:26:16-00:26:20)
- *"A clear vision about the game."* (S2: F, 00:27:05-00:27:08)

I then tried to make use of the mind stretch catalyst, which aims to clearly state the goal of the session. They referred to their statements listed just before, but also added that a goal could be to discuss the idea thoroughly. The reason for their response might be due to the fact that the game was too unspecified for them at that stage to state exact problems with the idea and as such it was easier to define the goals for the session, making the problem how to develop this idea into something concrete with a clear vision. The problems might not present themselves until later. As DO IT also states that the various catalysts under each step of the method can be cherry-picked for the particular topic at hand, I did not foresee this to be an issue.

Open

In order to make progress with the game concept, the Open stage was commenced. The mind prompt catalyst was not utilized, because it requires people with different competences to give their viewpoint on the idea and the participants were both producers. Mind surprise was also excluded because its purpose is to 'list ridiculous and laughable ideas' and I wanted something that would stimulate their creativity more directly instead of having them rack their brains for 'ridiculous' ideas without any external input.

Reverse brainstorming

The first step I decided to make of was therefore the reverse brainstorming tool, in which the users should think negatively about the problem and how they could make the game 'worse'. In this particular session I decided to focus more on the part of the technique, which states that you can think about what the concept should 'not be like', because the idea was derived Mushroom Wars. So the objective became figuring out how to make the game 'not like Mushroom Wars', attempting to create different and new gameplay. N thought about it for a moment and presented the following idea:

> *"Mushroom Wars is structured in, you know, hubs or something like that or well you know mushrooms, right? I was thinking more in terms of having everything in a complete playfield. So you don't have sort of bases."* (S2: N, 00:29:37-00:29:52).

He then proceeded to draw the playfield he had in mind in order to explain it to F. The playfield was 'squared out', i.e. it consisted of smaller playfields that could be conquered and then each player had a base in opposite ends of the entire playfield. He mentioned there should be a visual effect that indicates how the population of each faction grows, but did not specify what this could be. N went on to propose that it could take time to conquer an area and that the duration could perhaps depend on the size of the square that a player is attempting to conquer. F took N's idea further and suggested that upon conquering a square a small amount of the pandas that conquered the playfield would be lost, because some of them would have to stay there to work in order for the square to grow bamboo. His immediate estimate was that if ten pandas were taking over a square, then eight would be left to go explore and conquer new tiles, while two would have to stay behind to cultivate the land. F then went on to suggest that the player should be able to convert the peasant pandas into warrior pandas, having two different kinds of pandas the player needs to balance. N stated he did not think of various kinds of pandas, only 'pandas', i.e. one type of panda. In his mind the growth of pandas would simply increase upon having the player conquer a square. This caused F to say that *"…that is exactly how Mushroom Wars is"* (S2: F, 00:33:36-00:33:38), meaning that he was trying to uphold the conventions of the reverse brainstorming technique.

This prompted me to ask what Mushroom Wars were *not* doing. F replied that they were not converting their units into something else and that this might be an aspect worth pursuing. He stated it would add complexity to the game and that the player would have to think about his next movement based on the territory and how many troops he can have, making the game about estimating whether or not your army, population growth caused by bamboo fields plus their workers and the surrounding territory are balanced in your favor.

N made an attempt at thoroughly describing the idea for the gameplay that F had suggested. Firstly, he defined the playfields that are owned by either player which are basically bamboo fields that generate bamboo (food) over time. These fields have workers that increase the amount of bamboo generated and they can be converted into fighters for a cost of bamboo. N and F agreed that the gameplay would revolve heavily around balancing these two kinds of unit to get a suitable mix; e.g. a too high amount of warriors would slow down the food production significantly and also mean that less fighters could be created, while a too high amount of workers would mean a high amount of food resources that were not spent on warriors resulting in slow advancement in terms of conquering squares.

Having fleshed out the unit suggestion properly, I proceeded to ask what happens in Mushroom Wars when two opposing forces collide on the playfield in order to use reverse brainstorming to figure out how we should not it. F answered:

"You don't have collides on the field, you just conquer the territory, which means the mushrooms." (S2: F, 00:36:03-00:36:08)

He elaborated that it meant that the areas would simply overlap and the one who sent the most mushrooms would eventually control that area. I asked how their panda game could then be *not* like Mushroom Wars in this regard to which N replied that if you run into an area you just attack it. Unsure himself of how this would work, he asked F if it could possibly just be that the player with the smallest amount of warriors there loses the tile, to which F agreed. F went on to say that he just wanted the game to be simple unlike Mushroom Wars, where the player can upgrade the mushrooms and the houses, adding an, in his opinion, unneeded level of complexity. He also believed that upon having learned the basics of the game, the game speed should increase significantly namely because the game would be simple and easy to understand – a casual game. Because the basics of the game should be easy to understand, N suggested adding terrain differences to the levels to vary the game experience. This could be walls, a lake or similar.

Mind free/random word method

Having made use of the reverse brainstorming tool to develop new ideas and make the game differ from Mushroom Wars, I decided to make use of the mind free catalyst, in which the participants force similarities between the issue and things that are not logically related to it. I used the English dictionary to have them pick words at random to do this, essentially making it the random word method, as is also described on page 30. Because DO IT specifically mentions this method, I figured it would make sense to use it and also because of the fact that the mind prompt could not be used due to the two thinkers having the same competence background.

The first word chosen at random was 'exultation' which means: 'great pride or happiness, especially because of something exciting that has happened'. This caused N to suggest that every time the player achieved something, there would be a spectacular visual reward. F took the idea further and thought of the Mortal Kombat fighting games, in which the player can perform extraordinary finishing moves on an opponent when he is close to death. Transferred to the panda game it would mean a very visceral display whenever the pandas would clash on the battlefield and one side would win. Another idea was presented by N relating to the word 'authoritarian' which was one of the VNA cards that initially inspired them to create the idea. He stated that there could be a panda leader, a kind of general, who would overlook the playfield and would be overly excited when the player won a square, but also very angry when a square was lost.

The second word was 'hillock' which is defined in the dictionary as 'a small hill'. N immediately stated: *"Well, that was easy! We add a small hill right here"* (S2: N, 00:42:58-00:43:02) at the same time pointing to the terrain map representing the playfield he had previously drawn. However, he did not just add a hill to the map that was nothing but an obstacle. In fact he proposed it might be an idea if the fighters moved slower uphill and faster downhill, resulting in clutch moments in the gameplay, where it would be harder and harder until the top of the hill was reached, after which the battle would swing in the hill-conquering player's favor. It would be very difficult for the opponent to conquer that hill from the front, which caused me to ask how

one would then be able to overtake a conquered hill. N gave the answer, that you would have to surround the hill from as many sides as possible, making it a battle on several fronts for the one who has possession of the hill.

The mind free/random word method resulted in two interesting ideas; one visual which added a stylistic element to the game and an actual gameplay addition adding a bit of complexity to the playfield.

GameBrain

For the next part of the Open stage, I introduced the GameBrain tool to help develop new ideas for the game. The purpose of the technique is to think of a game and a powerful and/or interesting mechanic or aspect of that game and brainstorm from that mechanic and project it onto the game at hand.

F expressed he really liked Grand Theft Auto and that his favorite thing about the game was the ability to drive freely around the city. Upon asked to elaborate what was good about driving, he said *"the sensation of speed… adrenaline"* (S2: F, 00:45:33-00:45:39). He also added that he thought that the mini-games in which you have to race in the city, but at the same time not wreck your car, was interesting. I.e. trying to be as fast as possible, but at the same time taking precautions so as to not hurt the vehicle. I then asked them to relate this fast-paced and adrenaline-filled feeling to the panda game. It resulted in an alternate game mode – 'adrenaline mode' – where every part of the gameplay is sped up very fast. The bamboo would be created much faster and the player would have to constantly create fighters before the bamboo hit the cap where no more bamboo could be created on a tile. It would be a much more stressful and skill-demanding game mode for the players who want an extra challenge.

Having tried the GameBrain method and gained an interesting result, I decided to proceed to the Identify step of the DO IT model.

Identify

Under the identify step it is time to stop thinking of new ideas for the game and instead try to criticize the ideas and evaluate which ones might work best and are to be continued working on.

The first catalyst I presented to the two developers was mind strengthen, in which they should list the negative aspects of the idea and attempt to modify them to reduce dangers. It is similar to de Bono's black hat, with the difference that the pitfalls should also be attempted to be rectified during this step, which under the six thinking hats method would be the equivalent of using the green hat again.

The biggest concern for the developers was balancing. If not balanced correctly, the outcome might be decided so early in the game that there would be no reason to keep playing. They described it as boring 'tic-tac-toe' gameplay, meaning that the winner was declared early if you made the right moves from the beginning. Another thing to handle with care was the interface, according to N:

"The interface should not in any way be disturbing. It should be easy to move your troops around and not annoying, irritating" (S2: N, 00:49:05-00:49:15)

At this point there was a small discussion about which parts of the interface needed to be clear in particular, and he mentioned the transforming of workers into warriors as one such important gameplay aspect. From their point of view, being game developers for mobile platforms, the interface had an even greater significance due to the fact that the game might be developed to many different platforms, each with their own buttons, touchscreens, screen sizes, technical limitations and so on. Because mind strengthen is also about minimizing these dangers, I asked what could be done as a countermeasure to these pitfalls. F answers the following:

"First thing, when I do a game like this, I know perfectly, or I, at least start with the target group for it. Because you cannot fulfill everyone." (S2: F, 00:51:05-00:51:14)

Interestingly, F mentioned the importance of establishing the target audience to developing a new game like this before advancing further when trying to solve the problem of the interface. This is the first time the users were brought into the discussion and F stated knowing who they are as a prerequisite for shaping the game in a particular way. According to him, this task involves figuring out everything about this particular demographic and then using it when creating this new game to suit their preferences.

Mind energize was the next catalyst to be used under this step and its purpose was to make the practitioners list the best and worst case scenarios for this game. Their knee-jerk reaction was that the best case scenario was for the target group to like it and the worst case scenario that they did not like it. I tried to rephrase the question to make them think a little deeper about the subject, by asking what would be the best and worst case scenarios in terms of *gameplay*. They were quick to agree that the worst thing that could happen was if the players did not understand how to play the game or would play it in a way the developers had not thought the game could be played in. Part of the worst case scenario was also that it could turn out not being fun if the way the controls had been designed 'sucked' so the players would potentially lose that level of adrenaline or flow that was supposed to be fun. They also stated that part of the worst case scenario could be that the players did not find the game visually appealing, and lastly they once again mentioned balance (or lack thereof) as a major thing that could ruin the game. On the opposite end of the spectrum they said the best case scenario would be that people understood the gameplay and would find it easy to use, i.e. from a pure player interaction point of view. They agreed that the best case scenario was basically the positive opposite of the things listed under the worst case scenario.

For the last Identify catalyst, mind integrate, the developers should evaluate the progress they had made during the session in relation to the problem statements they had listed under the Define catalyst mind focus. The statements were concerned with having a precise idea of the core gameplay and a clear vision for the

game. F said down-to-earthly that the core gameplay was *"still pretty rough"* (S2: F, 00:53:59-00:54:01). N added that he also did not think the core gameplay had been completely established. I asked them what they would need in order to have a precise idea about it, to which F said he wanted to see simple level design of the first level and the last level, which would then make them able to fill in everything in between quite easily, because the starting point and ending point would be defined. Creating this level design did not involve making an actual software prototype, but rather a paper prototype in which the different elements of the game were each cut out in paper and the developers would then be able to play around with them and try different setups for the game, before reaching something they were confident in proceeding with, after which an actual software prototype could be created. As for the clear vision of the game, there was not as much immediacy in their answer as the one they gave to the first statement. However, F stated after some deliberation that the vision was not yet completely clear and when asked what he would need for this to be the case; he said it was the same as what he described in his answer to the first statement. N halfheartedly agreed, but also added that this would also include figuring out something like target audience, i.e. not only game design, but also the things around the game. F took this sentiment upon and finished off with saying the following:

"It is more clear what I want to do, but I don't see the shape very clear, it's not sharp, you know? It's like I see somewhere far away and I need some glasses to see it sharper. It's not so foggy as in the beginning, but I need at least some details on the balancing which I guess is really important." (S2: F, 00:55:53-00:56:10)

In essence, things were much clearer for them now than in the beginning, but they were still not at a point where they were completely sure about the core gameplay, and it would need some experimenting on their part before they could settle on this matter. In addition to drawing the levels or using paper prototypes, I asked if something like game storyboards could be useful, to which N said that it definitely would be a possibility.

This concluded the Identify part of DO IT and the conclusion could be drawn that their desire to experiment with the gameplay was their next step in proceeding with the idea and was their suggestion for a Transform step, seeing as that step is concerned with making a plan of action and identifying what needs to be done.

Before ending the session, N expressed his opinions on the entire process. He was surprised with the quality of the idea they came up with and that it was, in his opinion, actually good enough to continue developing on. He also thought that VNA made for some interesting results, but that he also sometimes felt too restricted by having to incorporate all three words in the idea, so he proposed perhaps leaving out one of the words. F did not share the sentiment concerning the limitations of VNA and also added that it was a nice way to think creatively and that he liked combining and associating concepts to help shape game ideas. He thought the

company in which they both work should have such creativity sessions more often. Both of them agreed that first and foremost, it had been a fun experience.

Session two conclusion

The results of using the DO IT method were somewhat mixed. Under the Define step the group attempted to list both precise problem statements and goals, but they ended up being the same. I conclude that this is the case because the participants were working on an entirely new idea and not a well-established game they had worked on for a long time, with which there could be more significant and specific problems one could attempt to define more precisely and at the same time list more clear goals for. As such, it is my belief that the Define aspect of the method becomes more useful when applied to an existing problem, or in any case more useful than when applied to generating brand new content. It is criticizable that DO IT does not have a formal element to help developing entirely new content and that these difficulties with new content are a concern.

Under the Open stage of the method plenty of new ideas were developed at a steady pace. However, this part of the tool had been modified with external techniques to improve the benefits of the idea development. Unfortunately, one of the catalysts under Open could not be tested in the current setup with only two people with the same background, so this remains untested. While the mind free catalyst proved itself useful, it is exactly the same as the random word method and as such cannot say to contribute something new to the table. However, the most important thing under the Open stage is to develop new solutions and think outside the box and this *was* done with the help of reverse brainstorming and GameBrain, so it is perhaps of lesser importance that it was not the exact catalysts (subtools) that are listed as default under the DO IT tool which were used. What is important is that results were achieved. Ultimately, it is better to modify a technique so as to better make use of it than to have it be set in stone and only reap very limited benefits.

As the participants continued to the Identify stage of the method, they evaluated the ideas they had come up with and tried to highlight both the positive and negative aspects of the idea; what possibilities did the idea have and what did they have to look out for when building the game? They were also asked whether the goals and problems they had listed under the Define step had been answered, but they did not believe this to be the case, because it required a more detailed description of the game and its components. They did however recognize that they had come much further with their initial idea than they ever imagined.

Because DO IT possibly performs better on existing problems, it might be ideal to add and modify the catalysts under the Open step with tools that fit better on already known problems, so that the method may be optimized for such endeavors and used solely for this purpose and let other methods, such as the six thinking hats, handle the process of developing entirely new ideas. This will be a note for myself when attempting to make use of such creativity techniques in the future.

Session three

The final session was held at Bretteville, a collective office building for creative industries such as game developers, interactive digital media designers, experience designers and the like. The participants were two programmers and a producer, all three with prior experience with game development through DADIU. They will be called O, K and R respectively in this paragraph.

As with the second session, VNA was the starting point so the participants had something to develop further with another tool later on. I will only describe the VNA turn in which the idea that was continued with was created. The idea which was most liked by the team would then be subject for further development under the Creative Problem Solving (CPS) method, which had been modified to include some of the other tools presented in this thesis.

VNA

The three words that were drawn were 'to draw', 'pyramid' and 'passive-aggressive'. The pyramid word led the group to a game that was Egyptian themed. K thought about a game where the player draws pyramids as a game mechanic, but stated that he found it hard to tie passive-aggressive to the concept. O added that it could be incorporated by simply having a voice in the game that gave feedback on the player's actions through snide, sarcastic remarks not unlike the enemy of the Portal games 'GLaDOS'. K went back to trying to define the gameplay of the game and suggested it could take place inside a pyramid where a mummy would be chasing the player. To prevent the mummy from catching up to the player avatars (explorers/archaeologists), he would have to draw obstacles for it. O mentioned that the explorers could then be the ones making passive-aggressive remarks whenever the player performed poorly. When asked what kind of genre the game would be, they thought it reminiscent of the drawing game Max and the Magic Marker with an added time trial aspect. O also thought it could be a combination of the games Battletoads and Solipskier. Upon discussing further about these games they also thought it might be an interesting idea if the player drew a labyrinth inside the pyramid.

Creative Problem Solving

Having found an idea they thought interesting enough to proceed with, the CPS model was introduced and followed step-by-step to see how the concept could be developed further with this particular method and the individual sub-techniques that had been incorporated into the method.

Opportunity-finding

The first part of CPS was to think of the opportunities the game could create. This meant figuring out what was unique about the idea and also thinking in terms of project scope and the creativity that could be accumulated in it. It is a step which is useful when using the model on new ideas and as such was perfect for our task, which revolved around an entirely new intellectual property.

R was quick to express that she believed there were simply too few 'labyrinth games' available on the market. After this statement there was quite a long silence, which led R to say that she thought we might have to describe the idea in more detail before initiating this step. I told her, that this would be done at a later step and that hopefully they had somewhat of an idea what the game they had chosen was about. K carefully remarked that he thought it could be a game with a great atmosphere to which R added that it would be easy to wrap a narrative around the game by using an existing mythology such as Ancient Egyptian or Ancient Greek. R proceeded to think of possibly making a clear distinction of the characters in the game, such as a rich and powerful pharaoh vs. the common slave who works himself to death, and how that could be a selling point for the story.

When asked about the scope of the project and the room it created for the developers to be creative in, O started talking about the potential for a game like this; you have simple tools in the game that are easy to use and the player can use them to how he sees fit. K then proceeded to list possible obstacles that could be drawn, such as snake pits, lowering ceilings, spikes, rolling boulders and axe pendulums. He noted that these would be recognizable objects for the players, making it easier to understand how they work. When directly asked how they would pitch their concept, they said it was *"…a hectic, engaging, atmospheric puzzle game… unique… action-sim-puzzle"* (S3: O, K and R, 00:44:10-00:44:20).

At this point in the opportunity-finding step of the session, R turned on a dime and started questioning the core idea by stating that she enjoyed exploring much rather than building the labyrinth. K blatantly said he thought it more like The Incredible Machine, with numerous possibilities of creative player input. This faltering led me to proceed to the next part of CPS, because it concerns itself with all kinds of data about the problem and getting the facts straight.

Data-finding

Seeing as there was some uncertainty about the core idea, I thought it appropriate to try and map out what the group had already discussed and narrow down their discussions so that there was a steady foundation for the concept. It was necessary to clearly define what the purpose of this game idea was to become.

Firstly, I summarized the points that were clear whether it would either be the building or the exploring idea: either way the game would revolve around a mummy that chases someone inside a pyramid and with someone making passive-aggressive comments directed at the player. It was also relatively set in stone that the interior of the pyramid was a labyrinth of some kind.

I proceeded to ask them what else they needed to be certain about concerning the game. K thought it most important to figure out what the role of the player would be, summarizing the initial core gameplay and R's suggested exploring gameplay. Choosing between one of these two options would be of major significance for the game. Because this choice were two be so important, I asked them to try and argue which of the ideas

they thought best of; R was first to reply that she thought *"…it sounds very interesting with a dark labyrinth where the player walks around with a small light and it's not until you get very close that you are actually able to see that 'hey' there is a wall here. And that you totally lack an overview and darkness, especially in a magic world where mummies exist in a pyramid, I think that could create a really frightening atmosphere."* (S3: R, 00:50:33-00:00:50:58). K rebutted that he thought it sounded like Doom 3 and O said he believed it was more like the game Amnesia. Ultimately, O took a stand and stated that, in his opinion, it would be far too big a turn to twist the original idea.

I sensed a great reluctance from both O and K against R's exploration idea and asked how the chasing game would work to get the session back on track. Would the game be in real-time or turn-based? K imagined a possibility in which the player created all the traps in the labyrinth before the game started and then pressed 'play' to watch the events unfold themselves, inspired by gameplay from The Incredible Machine. O thought this could result in a flaw in the game design, because the player had no control over the mummy, but was the one who created the maze. It resulted in them agreeing on the player assuming the role of an Ancient Egyptian maze designer, who tries to stop intruders in the pyramid, which was still a variant of the original idea. K evolved it further by suggesting the player would create the traps in the labyrinth and as he pressed play, time would rapidly pass until hundreds or thousands of years had gone by and intruders entered the pyramid. Then some of the traps might not hold or only activate sometimes due to the decay of time. He also thought the intruders could break in continuously, like every ten years or so, and then it would be about seeing how long your traps could last. However, this idea bore too many similarities with the tower defense genre and was thus scrapped.

To get a better idea of what the idea looked like in their heads and to figure out if they were in agreement, I continued to ask them a more specific question about the game. When asked about the angle of view the game would be seen from, they answered in unison that it would be isometric and could be both in 2D or 3D.

After this O and K turned the discussion back to the exploring idea to try and include R more in the session. Eager to have them make a decision so they could settle on an idea, I asked them what they liked the most, basically trying to incorporate some red hat thinking to see if this would help. R and K fundamentally disagreed, each preferring exploring and building respectively. O did not state his direct opinion, but rather tried to stay objective on the matter. The reason they were unable to agree is perhaps that they are two completely different player types, each preferring a specific kind of gameplay that they think is 'fun'. Admittedly, I was perhaps trying to force them too much to make a decision, being frustrated that this discussion was still being had. I had allowed R to present her alternate gameplay concept in the earlier phase of CPS because much of the game design was still up in the air, but at this point the dispute was becoming a destructive force for the progress that was supposed to be made. O tried to make a compromise by suggesting that the player would set traps and create hiding places and would then go through the maze in real-time

afterwards while being chased, creating a combination of the two ideas. After having considered the idea for quite a while, K agreed that this might work and this became the idea that was to be continued with.

Data-finding was attempted to be used to concretize the gameplay rather than look for actual facts about the game, because we knew none; there was no prototype already made we could refer too or focus group studies with the target audience stating what they wanted. Therefore the step was used to establish the data that was relevant to be able to proceed with the idea. It could be argued that parts of this involved creating new ideas (or developing existing ideas further), which should actually rather take place under the idea-finding step, but seeing as it was done as part of the important task to establish the basic framework of the game, it was allowed.

Problem-finding

Having spent a long time under the data-finding hat and achieving minimal results, I decided to try and change the pace by proceeding to the problem-finding step. This was the case, because the group had had problems deciding on the gameplay, and it seemed prudent to analyze the problems of this new idea that was a result of a compromise in detail.

The Path to the Ideal

The first problem analysis tool I had the team utilize was The Path to the Ideal, in which the users list the current state of affairs on one sheet of paper, the ideal state of the concept on another sheet and then try to describe the steps that need to be performed to go from one state to the other on a piece of paper in the middle.

When asked about the current state of affairs K said the following:

"We don't know what elements you are actually going to be building with, we just know you are supposed to build an obstacle course and then afterwards you will need to force that obstacle course yourself, while there are others who probably need to have difficulties forcing the obstacle course, so the basic challenge is to build an obstacle course you can complete, but the ones that are chasing you can't." (S3: K, 01:13:52-01:14:12).

So what were still missing were the building blocks the player was going to make use of. O added, that the various properties the enemies had and how they should behave had also not been described as well as what would happen if the player failed or even how to win the game. R also mentioned it would need to be clarified how many building blocks the player had available and in what order the player should gain access to the different traps. I pointed out that it would possibly also need to be defined what happens once a trap is activated; does it break and become inactive or does it keep working over and over?

I went on to ask them what the ideal state of the concept would be, to which K quizzically simply replied that it would be answering the questions and undefined parts of the game they had just written down on the first piece of paper. In addition, R made a remark on the significance of balancing the different elements. I understood K's reasoning concerning the subject and wrote down that the ideal state would be having defined the tasks that were listed as uncertain under the current state.

Lastly, I went on to ask them what they would need to do to get from the current state to the ideal state and I was unprepared for the answer, which K presented as merely taking the time to map out the different aspects of the game; which essentially was the same they had just said was the goal for the ideal state. The reason this did not work out as intended, is because the concept was perhaps not yet so complex that specific steps could be taken to fix the problem. While it was a problem to accurately find out how the system should work in particular, perhaps it was not yet a problem so elaborate or described in depth, that the path could be mapped out clearly.

Six serving men / Why, why

Having made little progress under the path to the ideal I proceeded with the six serving men and had the group answer twelve questions about their idea; a positive and a negative question based on what, when, why, who, how and where. Because I could not think of relevant 'why' questions to ask them for the 'why, why' exercise, I would instead ask these questions continuously during the six serving men session to make them elaborate on their answers.

I attempted to be more concrete about the questions and firstly asked what a good trap is. O replied a good trap was one that was unique and useful to which K added that it would be something that was more interesting than simply killing an enemy. When asked what makes a poor trap, O said it was a trap that was too similar to another trap or that felt like it had no impact on the game. R pointed out that a pitfall about such games as this one was that some traps might be too powerful and result in the player not making use of his entire arsenal. This led to a congruent belief that some traps should be good some places and bad in other areas (and vice versa).

'When is the gameplay good?', I asked, forcing the team to think of the success criteria for the game being fun to play. O said it would be good, when the player has a plan, carries it out and it actually works while not feeling trivial. K elaborated that the gameplay would be good when the balance between having enemies clever enough to force the obstacles and traps being effective was struck, essentially creating a 'sweet spot' for the player to try and reach. As I asked them when the gameplay would then not be good, K stated it would be to implement simple 'kill switches' that just dispatched the enemies easily and trivially. O added that if the traps were too easy to overcome for the player it would also not be good. K remarked that a lot rested on the creation of the traps. I asked him 'why' to elaborate and he repeated that they had to be hard for

the player as well, to which I again asked ‘why’. He replied it was because otherwise it would be too easy, but that at the same time it should not be too hard, again referring to the aforementioned sweet spot. Finally, O said that the gameplay would not be good if it seemed to the player that there was only one solution to a level, a certain number of specific traps laid out in a special manner. When asked ‘why’ this was, he said it would not be good if the player had no sense of creative freedom; that would be boring.

Next question was ‘where the game should be played?’, referring to what platform they thought the game should be released on. They agreed the game could be developed as a browser game, for tablet devices such as iPad, X-box Live, PlayStation Network, Wii and possibly Nintendo DS, resulting in a wide possible range of release platforms. To the opposing question, where it should *not* be played, they reasoned that some mobile devices (smartphones) might have too small a screen for the game to be displayed well enough.

‘Who should play the game?’, I continued to ask, making them think about the target audience they wanted to appeal to. Initially they replied that they wanted to appeal to almost everyone, because they meant for it to be a casual game. As I attempted to make them narrow it down further, they stated it might be people with a preference for puzzle games, but then again not targeting purely puzzle-interested players, because the game also had engaging action sequences, when the player runs the course. In the end they settled on men in their teens and up to their 20’s as well as people who liked puzzle-like indie games. They were less in agreement when it came to who should not play it, with O stating it was probably not a game for housewives and K disagreeing and stating he thought it was an obvious target audience. He did however concede that it might be too complicated a game for such a demographic.

As to ‘why the players should play this particular game’, they answered that they envisioned the game as an original blend of elements from Dungeon Keeper and Plants vs. Zombies that players cannot find anywhere else. O went on to describe his own reasons for playing some browser-based games; he likes seeing peculiar ideas put to life. When confronted with the opposing question ‘why the players should *not* play the game’, K said that when a puzzle has been solved approximately three times, it is not fun to solve it again. They have a limited lifespan and are fun when solved the first couple of times, but then it just becomes tedious due to the lack of novelty. So K and O acknowledged the game’s limited lifespan for each player.

Finally, I asked them ‘how do you play the game’? While it may seem like an uninteresting question, we had not actually clearly defined how the player performs the trap-setting actions. K stated that the player had a toolbox from which he can drag traps and place them in the level as well as the ability to link traps together, such as activation plates that, when run over, would activate another trap in the level. As to ‘how *not* to play the game’ they were a bit at a loss. I said that the way they had described the game so far, the player would not be able to pause the game during the action sequence of the game and insert new traps, i.e. the traps set would be the one you ran through. O agreed, but added that he thought that if the player felt that the traps

currently placed did not work out during a playthrough, he should be able to go back to the trap-placing mode of the game and set new traps and start the level from the beginning again. When asked 'why' this was, he said it would just be too easy for the player.

While the six serving men pointed out guidelines for the developers they should follow when working further with the game, the results that came to light were more general tips rather giving hands on insight to the topic. It made them answer questions they had not yet answered and some aspects of the game did become clearer. During the exercise R also had to leave due to pressing engagements, so now the progress of the session relied on O and K. Why, why was not used in its intended manner, simply because it was difficult to find 'why' questions to ask, so instead it was incorporated as a part of the six serving men method.

Idea-finding

Having attempted to make the group define the idea as it appeared to them individually more thoroughly to gain a mutual understanding of the core of the game, I decided to switch gears by moving on to the idea-finding stage of CPS to try and create new ideas to develop the game further. At the time of the session I had two tools I wanted to test called 'problem reversal' and 'forced analogy', but after investigating further they were essentially the same methods as the random word method and reverse brainstorming, therefore I removed them from the thesis and instead used the procedures I had already used the previous two sessions.

Reverse brainstorming

As I introduced them to the concept of reverse brainstorming, I asked them 'how they would create traps that did *not* stop the enemies'. At first they found the question difficult to answer, so I rephrased the question to this: 'how do you make sure no one is in a grave robber's way?' This was easier for O to reply to:

"You place something he can notice, see, something he can see right through." (S3: O, 01:36:34-01:36:39)

K added that you would place obvious traps, which the enemies can just go around. I then asked them to reverse it back again and they said that the player should make traps that were concealed or the player should not make use of the same traps repeatedly, because the enemies would then figure out how to go around the traps, learning by their mistakes. Implementing this feature would encourage the player to use his entire arsenal of traps and be diverse when placing them.

GameBrain

As I sensed an increasing amount of frivolity between the two remaining participants I hastily moved on to the GameBrain tool to get as much out of the idea-finding session before continuing to the next step. They were asked to think of a game they liked and K answered Sid Meier's Pirates and O said King's Bounty. I then asked them to think of the mechanics they liked in those games to inspire them in regards to their labyrinth game.

From the Pirates game K said a big part of the game was conquering other ships. When trying to transfer this to their game, he said it could involve collecting the souls of the trespassers of the pyramid that died by the player's traps and then use them as slaves to help build new traps in later levels. He then added that the souls would be worth more according to how much torture they had gone through, making it a creative exercise for the player how to create more ingenious traps. In King's Bounty, a turn-based strategy game, O stated that the player had the possibility of creating a very versatile army and that different creatures belonged to different cultures. When transferred to the maze game, he said that there could be various arrays of traps each being inspired by different cultures, such as Aztec, Egyptian etc.

Random word

The final idea-finding tool I tested was random word. O and K looked up the word 'double act', defined in the dictionary as: 'two people who work together usually to entertain.' The word formed an idea that seemed obvious to them; the game could feature co-op, a game mode in which two players work together to defeat the game. They thought one player might the one who inserted the traps in the level and the second player would be the one to complete the obstacle course in the labyrinth, possibly with the first player acting as a guide of some kind.

Solution-finding

Under solution-finding the two thinkers should think about how they would implement the features of the game in an actual game. Therefore I presented them with the game storyboard method as a way for them to create a plan of action for what they should write in code. If it was adequately described in a game storyboard, they would know exactly what to do. I chose the overall scenario of gameplay, which they were relatively sure about. Sadly, only very crude drawings or none at all were made due to the session nearing its end and neither the two participants nor I were any good at drawing. Therefore only the descriptions are available. The following table displays results of the game storyboard session:

1. Build mode: Player places traps in maze. Seen from an isometric top down view. Toolbar displays available traps.	2. Player presses 'Play!' button.	3. Action mode: Player moves forward in level.
4. After N seconds enemies start following the player.	5. Player avoids traps and enemies enter them or player activates traps for enemies remotely.	6. Player reaches 'goal' (pyramid exit, treasure or similar).

Figure 7 – game storyboard from session 3

The goal then becomes for the developers to implement a prototype of this gameplay scenario as a basic framework for the game which can then be tested further through playtesting.

Session three conclusion

The CPS method produced results, but I believe it was more because of the tools that were incorporated into the tool rather than the overlaying method of CPS itself. Opportunity-finding produced indefinite answers and the problem-finding phase felt out of place due to the unspecific nature of the newly created concept. The idea-finding step did generate ideas, but none of the techniques used were in particular related to CPS. Data-finding made the group clarify their idea, but there was still a major discrepancy because some of the practitioners disagreed on the core gameplay and which direction it should take.

The problem-finding techniques felt a little out of place and as if they were forced onto the subject. The tools used under this step produced questionable results; the path to the ideal almost just stating the obvious and the six serving men tool answering very general questions about the game. It is possible that the method would have produced different results if it had been applied to an existing and more complex problem, which has been a recurring theme in all three sessions. However, results *were* yielded, although possibly not the ones that were meant to come to light under such procedures. Ideally a more hands-on approach could be taken with brand new game ideas.

Idea-finding generated plenty of ideas, but mainly because of the tools that had been incorporated. The issue with CPS is that it does not provide specific techniques for each individual step; it simply outlines what should be done, but provides no means to do so. This forces the practitioner to modify it on his own accord, resulting in mixed results, because the tools might not match the objective at hand or the method in itself. If no guidelines as to how to perform the task is given, how can the thinker know what results to expect? It is surprising that they have not at least made even a little effort in this regard by describing ways to do so, such as the DO IT method does with its catalysts. CPS also does not distinguish between entirely new ideas and existing problems, as well as the varied amount of complexity that can appear which may results in different outcomes and could mean that there are different ways of using the method and that it should be altered according to the problem at hand.

Lotus blossom

The last method I will use is the lotus blossom, a technique I found too elaborate and convoluted to integrate in the three empirical sessions. Therefore I have used the technique on the specific problem in 1916 – Der Unbekannte Krieg, which we have previously discussed in the first session under morphological analysis, see page 46. The 'T' that appears in some circles stands for 'trigger', meaning an invisible object placed in the level that activates something else when the player reaches it.

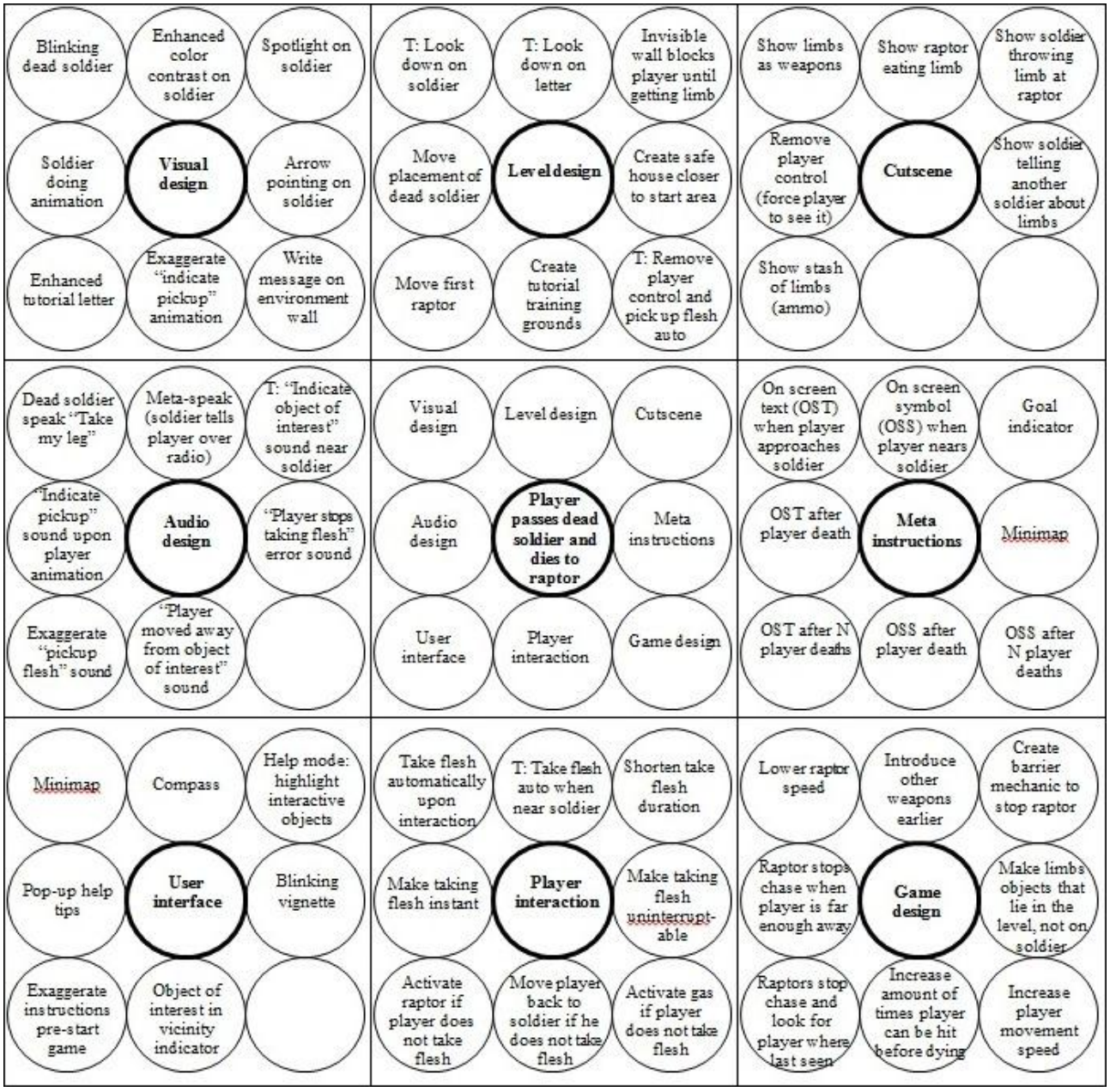


Figure 8 – results of lotus blossom technique

The result of the technique is plentiful; the problem has been examined rigorously and I have even explored several possible changes, which I had not thought of before. In this regard it actually becomes a useful tool. However it should be noted that creating the lotus blossom can be an extensive and time-consuming process, meaning that it should not be used every time a problem occurs, but rather when a particular difficult and much thought about issue arises.

Conclusion

In this paragraph I will conclude the thesis and answer my problem formulation, which is as follows:

How can tools that seek to improve ideation, problem-solving and decision-making impact the game development process?

Firstly, I gave a concise exposition of what makes games what they are. This was done to get a clearer picture of how the creative methods I would make use of later would fit in within a game development environment. I also briefly described the academic foundation of the creativity subject.

I then went on to describe the various methods which concern themselves with ideation, problem-solving and decision-making. What became apparent was the fact that some of the methods seek to sensitize the practitioners' ways of thinking, creating separate phases in which the following can be done without; ideas are created, the benefits are sought out, the subject is criticized, neutral facts are laid out, the participants' emotions regarding the issue are stated and creating a plan of action for the further development of the concept at hand is done. Some also have a step solely for analyzing and defining the problem in depth. The purpose of these methods is to make the thinking process, including ideation, problem-solving and decision-making, less confusing and more effective. Another important part of many of the techniques was the fact that they were concerned with *movement*, a term describing how the practitioners can move forward with an idea or problem by 'provoking' themselves, resulting in a new and different outcome that may be helpful.

After learning about these methods I tested how they would work in a game development environment with actual game developers. This was done in three sessions with different people from different parts of the industry. The last two sessions started out with an ideation phase in which the tool VNA was used to generate a range of game ideas from which the participants would choose one idea to develop further with the methods I had chosen for the individual session. This was done because VNA specifically attempts to create *game* ideas. In the first session VNA was an individual method under the green hat and not a starting point for creating a game idea to develop further. The technique produced interesting and varied results in all three sessions, although occasionally a particular combination of verbs, nouns and adjectives was problematic for them to work with and come up with a concept with.

In the first test the six thinking hats method was used as the overall procedure for creating a new game idea. Under the green hat of creativity I had incorporated some of the other ideation tools I have examined. The three participants came up with a plethora of game concepts, one of which they choose to develop further under the other hats of the six thinking hats method. The group did however state that they thought some of the tools under the green hat did not accumulate as much merit as they could have; the assumption smashing tool was used on the roleplaying genre and did yield results, but the team thought it might be even more

useful to perform the exercise on a more specific problem with a game. The participants deemed that the cross-pollination/mind-mapping method was performed too rushed and could have achieved even more results, but as there were many tools to try out – including the rest of the six thinking hats – this could not be helped. Morphological analysis was used incorrectly, because the parameters chosen did not consist of the small enough components so that new grounds could be made. Some insights were gained during the morphological analysis, but they were not the ones that were expected.

The yellow and black hats were used to judge the chosen idea in a positive and negative way, respectively. The group had no problems in doing this and most importantly is the fact that there was no overlapping of the two ways of thinking, i.e. that positive and negative thinking was used under other hats. The white hat was used to make the group figure out what questions they needed to find the answers to about the idea, which was the basis for the plan of action that was created under the last blue hat. The red hat surfaced the participants' emotions on the idea they had generated, showing enthusiasm as well as a feeling of resignation of the amount of difficult work it would take to implement the idea good enough. All in all the six thinking hats method proved very useful in both generating ideas and organizing the group's thinking so they could make decisions and solve the problems that arose underway. It was mentioned that problems with the idea would probably present themselves after creating the prototype of the game and testing it on the target group to which a new six thinking hats session could be utilized.

The second session made use of the DO IT method as the overarching method to be followed. It had been modified to include the tools GameBrain and reverse brainstorming, both because I found the DO IT method to provide an insufficient range of ideation tools and because some of the so-called catalysts of the method could not be utilized. Under the Define step of DO IT the two participants listed a precise problem statement and goal for the exercise, but they ended up being the same. I interpreted that this had happened because the idea they were working with was so novel and undeveloped that the goal and 'problem' simply became 'to flesh out the idea sufficiently'. The results may have been different if a more established idea with more concrete problems had been the subject. Either way, it is criticizable that DO IT does not have a more detailed approach to new ideas, specficially.

Under the Open stage of the DO IT model the developers came up with a wide variety of ideas for to help strengthen the game idea and making it more unique. The mind free catalyst overlapped with the random word method, but still made the two users produce ideas they liked for the game. GameBrain made them think of an alternate game mode for the game with faster pace. Reverse brainstorming made the developers think in ways they would not have done otherwise, they admitted, and it made them clearly try to differentiate their game idea from others on the market. Overall many new creative ideas were developed under this stage, but not specifically because of the Open stage; it was rather due to the tools that the Open phase had been modified with.

During the Identify phase of DO IT the developers evaluated the game idea and the possible aspects of the game they had generated both positively and negatively. They answered what they thought was the best and worst case scenario for the game. Finally, they were asked whether the problems and goals they had come up with under the Define step had been answered, but said this was not the case, because it required a more detailed description of the game and its components before a prototype could be started upon. They did however recognize that they had come much further with their initial idea than they ever thought they would have.

The third and final session used Creative Problem Solving as the overall method for developing a new game concept. The problem analysis tools had been incorporated into the problem-finding step of the model and reverse brainstorming, GameBrain and random word were modified into the idea-finding step. As with the DO IT method the tool produced results, but not because of the individual stages of the CPS model, but rather because of the techniques that had been incorporated. It was useful to divide the different kinds of thinking into a separate stage, but that alone would not have been enough because the method does not provide specific techniques for each step. If no procedures as to how to perform the task is given, it would be very hard for the practitioners to know what results to expect and know how to attain them. This is a critical issue with the method.

The first step of the model, opportunity-finding, produced unclear results because there was still uncertainty among the participants about what kind of game concept they wanted to create. The data-finding step attempted to make the uncertainties about the game more clear and force the group to clarify their idea. This provided a little more assurance in the group about what they were dealing with, but they still wanted to take the game in different directions.

Proceeding to the problem-finding step I asked them what the current state of affairs regarding their game was and what the ideal state they considered the idea should have was. This was done with the 'The Path to the Ideal' technique, but as it turned out the current state listed all the things that needed to be done and the ideal state was simply stated as performing those tasks. The path was also stated as being the same as the ideal state, making me believe that the tool was unusable at this stage of the development process, because so much was still undecided. Perhaps it would be more useful if performed on an existing problem later in the development process. The 'why why' tool was used in conjunction with six serving men and did answer important questions about the game, but also felt very general. Those questions might have been needed to be answered eventually, but it is uncertain whether or not this was the right time to do it. Under idea-finding more possible additions for gameplay were developed and under solution-finding they created a game storyboard mockup of the overall gameplay as they imagined it, making it clearer for them how they should proceed, should they continue developing the game concept.

I made use of the lotus blossom technique on my own because it was such an extensive problem analysis tool, which I felt inappropriate to use in the development sessions due to the large amount of methods we had to test in each session. The tool clarified a lot about the problem at hand, which was very specific in nature because it was a problem related to the fully developed and tested 1916 game. As such it proved quite useful because it examined the entire problem thoroughly and from various angles and new aspects of the problem and potential ways of remedying it came to light.

The entire process of this thesis has been empirically founded and in relations to theory of science the hermeneutic approach was taken, meaning that I had a preconceived idea about the subject which was continuously evaluated according to the parts and the sum of them in a reciprocal way. I believed that tools existed that could help structure the game development process, which turned out to be the case. However, I also learned that some of the methods do not apply as well on brand new ideas due to the instability of their framework at that particular time. This brings me to a hermeneutically deeper understanding of the subject.

Finally, it should be worth mentioning that prototyping and playtesting should be taken into account. Due to the importance of testing how the game idea works in practice and whether or not the target audience likes it and understands how to play it, this should possibly be incorporated as an optional step to some of the models. It should be optional because the entirely new ideas need the prototyping and playtesting, while the well-established ideas do not possibly need this, because it has already been tested. Alternatively, a method could be developed for existing games with complex problems and another could be used for entirely new ideas that need rigorous prototyping and playtesting.

The answer to my problem formulation must thus be, that tools for ideation, problem-solving and decision-making can improve the game development process by dividing the different types of thinking in individual stages, which each seek to deal with the problem or idea in its own way; be it analyzing the problem in detail, generating new ideas, seeking benefits of an idea, scrutinizing an idea, forcing the practitioners' emotions on the subject to surface, highlighting the facts of the topic or making a plan of action. The tools that seek to force a creative way of generating ideas must do so in an attempt to provoke the thinkers into thinking outside their normal thought patterns, causing what has been termed as *movement*. This can be done with a variety of tools, some of which are more useful on specific problems, while others can be used on more general issues. Because games are formal systems with certain characteristics and developers express a desire to document and describe these characteristics in detail before implementing the game concepts, this should be a part of the creative thinking process when these creativity tools are used in conjunction with game development. Furthermore, due to the importance of the target audience's opinion of the game – as stated by the participants of the empirical sessions – and subsequent input to help the developers become aware of problems and improve the game, playtesting should take an active part in the developers' work methods.

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