Visualisation of Platonic Dialogues

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DECLARATION

I hereby declare that this project is entirely my own work and that it has not been submitted as an exercise for a degree at this or any other university

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Date
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Chapter 1

Introduction

1.1 Motivation

The project undertaken is a showcase, demonstrating the skills and abilities acquired during the course of the computer science degree. The motivation for the project was to engineer a software solution, and to provide a novel application to the target audience in the process. The challenge in undertaking a project that required the knowledge of multiple topics, added to the enthusiasm and curiosity of the author while working on the project. The opportunity to learn and explore, an area of computing that has not been covered in the lectures was a crucial deciding factor for selecting the project. Furthermore, the appeal and functionality of helping others learn became a deciding factor when taking on the challenge.

The technological advances in the computational field offers advanced learning options for visual, auditory and kinaesthetic learners. The project investigated whether or not, providing more learning options than the conventional textual representation of information, was beneficial to users. If so, how can multimedia learning techniques be applied, to help users understand the flow and structure of a platonic dialogue.

Platonic dialogues are widely studied and their philosophical content are of significant interest to the study of argumentation. Sometimes the structure and flow of the arguments in the dialogues can be difficult to follow, so the question arises if modern multimedia learning techniques can assist. The goal of the project was to develop a software tool which would help a user understand the structure of a platonic dialogue. The software tool is aimed to be an educational tool that facilitates better learning and not necessarily a revolutionary product.

1.2 Rationale for research

The rationale for the research was to understand if multimedia learning techniques can better a user's understanding of a platonic dialogue. The project was required to experiment the impact of 'multimedia learning techniques'. Research on the topic suggested that 'multimedia' was a large domain; a domain attracting more interest recently. Multimedia techniques are broad, comprising of theories from cognitive and behavioural psychologies. The domain provides techniques and tools to enhance various learning styles such as visual, auditory and kinaesthetic learning styles.

After initial research on the subject content, the scope and limitations of the project became much more evident. People are different and they tend to adapt different learning styles. Not everyone would benefit the maximum from the same style of learning. Kinaesthetic learners learn better by body movements, and movements and change in the information presented, while visual learners learn better by perception, attention and processing of information. However there is a possibility that learning can be made better, if the information presented is simple, clear and concise.

Rigorous analysis of multimedia techniques and their application showed that the domain of information visualization would be a suitable choice for the project. It
seemed to suit the project's scope and constraints in terms of the technical merit and the time limit. The literature review on classic visualisations drove the author towards proceeding with the visual representation technique. Research was done on classic visualizations to draw ideas and conclusions from them. Initially, it seemed to be difficult to present unquantifiable data as visualization. Later, the analysis and evaluation of the classic visualisations complemented the decision to visually represent the data. The visualization domain seemed to provide tools and techniques to enhance visual learning.

Misunderstanding and the wrong application of these ideas and techniques would result in a malfunctioning software tool. However, used effectively and accurately, there are possibilities to aesthetically visualise unquantifiable information.

1.3 Aims and objectives:

The aim of this project was to show that multimedia techniques can assist in learning the flow of platonic dialogues. The project aimed at visualizing the information in an attempt to help users comprehend the philosophical content. If the software tool is to help educate people, one needed to understand how the learning process occurred. Therefore the platonic dialogues were to be analysed and the difficulty in the learning processes were to be identified.

Once an effective solution to the problem was found, the focus of the project was to be on successfully designing and implementing this solution. The design and implementation was aimed at exercising the skills and techniques acquired during the course of the degree. An iterative approach during design and implementation was aimed at receiving feedback from users and Subject Matter Experts (SME). Upon finishing the software tool the project aimed at testing and evaluating the products on end users. After the evaluation phase, the aim of the project was to create a summary business plan. The business plan was intended to provide details on a potential market, customers and existing competition.

Objectives for the project include planning, design, development, business plan and the evaluation of the following:
- Methodology to map philosophical content to a visualization that enhances learning.
- Design and development of a software tool that implements the solutions found
- Evaluation of the technical content in the project
- Development of a business plan

1.4 Report layout

This report will demonstrate a systematic process of how the work has been undertaken throughout various phases of this project. The report will first review the main literature material that has been studied throughout the project. The report will commence by introducing the issues with a traditional approach used in learning platonic dialogues. An evaluation of classic visualizations will show how the visualization domain was considered to be a potential candidate for shedding some light on the issues faced. The literature review will continue to demonstrate how a systematic research and learning process have influenced the design and implementation of the software tool. The report will then move to the planning phase where analysis of target audiences and their tasks
will be examined in depth.

A critical overview of design principles, learning theories and multimedia techniques will then be explored in detail, showing the impact they had on each prototypes made during the design phase. The major issues in visualizing platonic dialogues and solutions for them will be discussed in detail. The report will then move on to the implementation phase of the project explaining the rationale for the technologies and assumptions made during the implementation phase.

The testing and evaluation phase of the project will explain how the feedback from users changed the software tool. The business plan will show a summary of the target market including competitions and market shares. The general conclusion and conclusions drawn from the end of each phase would then be outlined to explain how the author reached various decisions along the process. The strengths and weaknesses of the tool will be shown at the end of the report with the possibilities for future development.
Chapter 2

Literature Review

This chapter will explain the average issues faced by a learner while learning platonic dialogues in a conventional manner. The chapter will then show the multimedia principles, approaches and theories that have been studied. Various classic visualizations will be analysed and reflected upon in detail. The chapter will explain in detail, the literature material that has been studied throughout the project. The learning theories that has been analysed and applied will lay a background, to explain how they influenced the tool as a whole.

2.1 Issues with learning platonic dialogues

2.1.1 Information overload
The platonic dialogues in their content are often long and sophisticated. The difficulty is that the sophisticated philosophical arguments are hard to follow when presented in a conventional written form. With the increase in ubiquitous computing and communication devices with internet access, users are constantly receiving, sharing and creating large amounts of information. Amidst working with these tools that provide visual and auditory entertainment, a learner might find it difficult to sustain their attention on a conventional textual representation. The textual representation of dialogues does not provide any visual or auditory aids to help the user learn better.

2.1.2 Short attention spans
Even if a user manages to focus their attention and motivation on a dialogue, it could easily be discontinued. The information presented is perceived in a single format; as a textual representation. As the environment of the learning process provides distractions, the attention span of the user could easily be diminished. The motivation levels and interests on a topic is very important while understanding a new or foreign concept. While surfing the web, users tend to stay on a web page if they find it appealing and relevant. Similarly when a large platonic text is presented to the user, they might not find an appealing attribute in the written representation of dialogues. If they do immerse themselves in the dialogues, it might take the user a long time period to understand the correct structure of dialogues. This demand to strictly read the dialogues line by line might lead to a short attention spans.

2.1.3 Hermeneutics and argument structure
Hermeneutics is the study of interpretation of written texts, mainly texts in the domain of literature and religion. Hermeneutics is used to explain the structure and content of a written text. It includes the interpretation of multiple communication forms such as verbal and nonverbal information. A certain level of pre-requisite knowledge is required to critically evaluate a platonic dialogue. The issue with hermeneutics approach is that the user needs to interpret the flow of the dialogues from a written format. Some platonic dialogues tend to back track arguments in a dialogue. The textual format does not provide any indication as to where backtracking might occur. The user might find it rather mundane to read the dialogues over and over if the process does not reward them.
2.2 The process of learning with multimedia

Multimedia instruction signifies the process of facilitating learning through the usage and manipulation of environments. The instruction is a process which successfully guides and aids the learner in achieving his/her goals. In order to perform successful instructions, the context and goal has to be clear. Once the target audiences are identified, mental models for facilitating the target audiences should be. As explained by Alessi (Alessi, 2001) they can be roughly categorised in to four:

1. Information presentation
2. Guidance and navigation
3. Practice and repetition
4. Assessment and evaluation

The first three phases are presented based on successful research and instruction by Rosen shine and Stevens (1986).

2.2.1 Information Presentation
In order to teach or learn something new, instructor should present the available information. The simpler the instruction, the easier it is for the learner to comprehend it. The factor of motivation and interest being a key factor, the way the information is presented should be carefully analysed.

Presentation of the information need not be restricted to a single medium. The presentation of information is successful, when the user can comprehend the content through more than one medium. In our case initially, information is presented in a single medium; as a text file. The multiple domains such as textual forms, demos and visual formats can be utilised to resolve this issue. Representation styles depend on the user's ability and interest upon the content presented.

2.2.2 Guidance and navigation
While the presentation of information is media centred, the guidance phase interacts with the learner. In order to guide the learner, the design has to be made capable of realising and directing the user towards the right path. This includes providing the user with materials such as demonstrations, videos or textual HELP.

The guidance can also be performed by instructing the user. Instruction and feedback from the user needs to work well with the design model of a system. Many users prefer not to receive information about their mistakes in a threatening or distractive fashion. When an error occurs while using a software tool, the system should ideally guide the user towards the right path or prevent the user from making the same error. This in no way means that the user should not get feedback on the errors; instead the user should get constructive guidance to reach the target. If the system is built to avoid or prevent errors, it would be all the more beneficial. A system built to guide the user in the right path would be much more appealing and useful to the end user than a system that penalises user's mistakes.

Guidance is vital since not everyone can learn from a single glance at a complex system. The most effective systems or Graphical User Interfaces would be the ones where user
can understand the underlying principle with minimum training. To create a tool that requires minimum training and produces maximum throughput is not an easy task. Learner should be made aware of the consequences of their actions, without highly penalising their moves. This means providing the user with control and reversible options.

2.2.3 Practice and repetition:
Practice helps a user to understand the ideas and methodologies behind a system. Repeating the tasks enables the user to perform actions with more accuracy and increased performance. If possible motor learning principles should be considered before designing a multimedia system. Motor learning is the process by which one learns from a novel experience or a repeated learning process. The tool to be designed should allow user's smooth and quick transition to the content and the platform, even under distractive conditions. Any design that helps the user retain information in the long term memory and not for a short period would be ideal. This requires a design capable of delivering instant attention, smooth integration and long term understanding of the content.

2.2.4 Assessment and learning
The user should be able to perform the tasks quickly and fluently without the need to think about it. The users could perform a task quickly, but performing a task fluently would require a deeper understanding of the whole picture. i.e. working in the psychomotor level. Psycho motor learning is the process by which users relate cognitive functions to physical movements.

Motivation is another important issue. A user’s motivation depends on the difficulty of the task. A great way to motivate users would be to create a system where the user's background skill can decide the difficulty level and not the system itself. The system should provide the user with the tools, and allow users themselves to choose the difficulty level.

2.3 Multimedia principles and approaches
Multimedia principles and approaches also focus on the user’s perception, attention and memory capacities. These principles are to be understood to design and develop a good multimedia based system. Alessi (Alessi, 2001) discusses the relevance and usage of these principles. Relevant principles that have been of use during the development of the system include user’s attention, perception, comprehension, memory and mental models. These are further discussed and explained in detail below.

2.3.1 Perception and Attention
Perception and attention are vital stages of the learning process. After the information gains user's attention, the user perceives the information. Attention can be lost due to many factors such as environmental issues and the level of interest in the content. Main principles relevant for perception and attention according to Alessi (Alessi, 2001) can be summarised as follows:

1, information must be easy
2, positioning of information affects our attention and perception.
3, differences and changes attract and maintain attention
Ease of perception depends on its content position and simplicity, text size, font and colour etc. Ease of perception is well complemented when the process of repetition occurs. If the user can repeat the same process, the repetition process triggers short-term memory. The repeated usage and organization in the short term memory would lead to information being retained permanently in the long-term memory.

Positioning of information benefits the GUI design. Positioning helps to attain and retain user's attention. The right positioning of content could lead to effective throughput while the opposite would adversely affect the interface. To retain attention the user’s motivation, knowledge, skills and difficulty levels should be complemented and adjusted accordingly. The attention and perception of the user has to be both gained and retained throughout a process.

Differences in pattern and colour attract and maintain user’s attention. The changes however need to be consistent and clear. The change in pattern is intended to help the user understand the contrasts in ideas.

2.3.2 Encoding
Encoding is the process of transforming the perceived information to a format that can be stored in the brain. Encoding depends on the format (language) and the medium (visual or aural). The visual information perceived can be accommodated and connected to other prior knowledge of information. For example, colour 'red' (red being the colour of blood) in many cultures indicate danger or caution. Sophisticated information can be visualised effectively with the usage of colour.

2.3.3 Memory
The human capacity to store and retrieve information is remarkable. However if we need to retrieve the information after a certain time span, we need to sustain connections in our brains semantic network. The two remarkable methods of enhancing the memory are the principles of organization and repetition by Fleming (Fleming, Levie 1978). Organization makes new knowledge more memorable and easy to remember. Organization can be easily understood by the idea of learning vocabulary in a foreign language. Fifteen arbitrary words would be harder to learn compared to the names of fifteen animals.

The repetition principle in semantic network theory argues that the more frequently the information is used, the better and longer it can be remembered. It is a very common but effective method of enhancing memory. However the organisation principle is argued to be more powerful than the repetition principle when new information is to be accommodated.

2.3.4 Mental models
Mental models help the user understand the content of a system. Users might develop either correct or incorrect mental models. It is very important that the user develops the right mental model because all the following actions would be created from the users understanding of the system. Alessi (Alessi, 2001) argue that many cognitive psychologists such as Frederiksen, white and Gutwill, (1999) consider mental models to be critical components of developing knowledge and expertise. According to Hagmann (Hagmann, 1998) a conceptual model help learners develop good mental models. A conceptual model can a device presented as instructional material. These could be
diagrams or computer animations. In our case the demonstration of the tool serves as a conceptual mode

2.3.5 Behavioural psychology

Behavioural psychology also known as behaviourism states that all behaviours are acquired through conditioning. In other words learning should be described as changes made in the learner’s behaviour due to changes in the environment. Edward Thorndike (1913) popularised the idea of operant conditioning; the use of rewards and punishments to modify behaviour. B.F. Skinner (1974) refined this idea and gave rise to the behavioural school of psychology and learning. Skinner went on to popularise the concept of behavioural psychology. The behavioural psychology theory states that positive and negative reinforcements or rewards increases in frequency while punishment and extinction decreases in frequency. The punishment refers to the state when positive reinforcements are no longer available. A well maintained balance of the frequencies would determine the quality and appeal of an interactive software tool.

2.3.6 Cognitive psychology

Cognitive psychology also known as cognitivism states that learning requires non observable constructs such as the perception, memory, motivation and problem-solving. The theory focuses on topics about how humans perceive and process information. Cognition means the process of knowing, and cognitive psychology emphasises the need to 'know how' the perception of knowledge is mapped in relation to peoples memory, motivation and the thinking process. Information processing theories argue that a human brain follows sophisticated yet systematic laws to facilitate learning. These theories argue that our memory and thinking capacity is limited causing failures during the information processing phase. Other theories of cognitive psychology are discussed by Alessi (Alessi, Trollip 2000) including the theory of semantic networks. The following argument by Alessi outlines how semantic networks function;

*They claim that information is stored initially in the short-term memory and must be used or organized to become stored more permanently in the long-term memory... Each brain cell is connected to many others, in a vast spider web or network. Similarly, pieces of information, or nodes, are hypothesized to be connected to many other pieces of information in a vast semantic network of interconnecting information and meaning. These nodes are connected by relationships, or links...*

Semantic network theory states that, our knowledge is stored inside brain cells (nodes), with billions of connections to other nodes. The cognitive activity in the brain triggers chain reactions in the network, further activating a node's relationships and connections with others. These chain reactions of information result in the cognitive process of thinking, perceiving and problem-solving. These information connections could be added or deleted in the brain to introduce new knowledge or revise older ones. The network semantic theory argues that the prior knowledge is vital in accommodating the new knowledge. The introduction of knowledge might occur in two ways. Assimilation introduces new concept or knowledge to the network, while accommodation modifies the existing knowledge to accept new ones.
2.4 Studying classic data visualizations

There are different categories of visualizations: metaphor, knowledge, concept, data and information visualization are some of them. The classic visualizations such as the London underground map by Harry beck was analysed and evaluated by the author to understand the principles and approaches used. The research on the history of the map showed that the initial visualisation made by Harry beck has undergone changes through the decades. However the original design and the latest version of the map have the same core values as its backbone: visualisation of complex information made simpler, effective and appealing. The map is so simple and accessible, many metropolitan cities in the world today, have adopted ideas from it to create their own.

A deeper evaluation of the map produced few key features that heavily inspired the design and GUI of this project. A classic visualisation is:

- Simple, clear and concise
- Aesthetic and accessible
- Effective and functional

These ideas were followed throughout the project to successfully visualise platonic dialogues. Similarly the Rose diagram by Florence Nightingale was studied as well. The findings and conclusions drawn showed a similar picture. The classics used visual aids such as colours, shapes and patterns to simplify complex data. A mental model and the actual mapping of data in the Underground map were different. Certain versions of the underground map had the river Thames removed from the layout in order to facilitate a coherent structure. These coherent structures represented only the necessary information, enhancing the simplicity and aesthetics of visualizations. What the user thinks happens in the visualization is mapped directly to how it actually happens. The user's perception of the visualization is channelled to ensure that users comprehend the right information. In the case of the London underground map, the distance and geographical area is not mapped and scaled directly to proportion.
2.5 Related work
A research Candidate in the Department of philosophy, TCD, David Horan has kindly provided an outline of his attempt to visualise dialogues. The Illustration 1 shows his attempt to demonstrate the structure and flow of dialogues. A Flowchart mechanism is essentially what has been developed by David.

Illustration 1: Flowchart by David Horan
Chapter 3

Planning

This chapter reviews the impact of relevant literature material that has been used for critical reading and thinking. The evaluation and analysis of major learning theories and principles used throughout the project will be explained in detail. The relevance and application of these theories will be put to test using prototypes. The feedback and conclusions received would be used to critically reflect and assess the state of the project as a whole.

The chapter will move on to show how the tasks were broken down to subsections. The target audiences, their learning styles and knowledge levels are studied and evaluated to resolve issues faced by an average user. the major tasks involved in the learning process are then analysed. The chapter then identifies the end users of the project followed by the analysis of available resources. The process of how platonic dialogues were studied will be reviewed. This chapter will also show the initial prototypes that had been made.

3.1 Root cause Analysis:

Knowledge skills and attitudes
According to Knowles Adult learning theory (Knowles M S 1990), Adults need to see the relevance of learning and the application of this knowledge in the real world. The adult learner must be an active learner and not a passive observer of the task. The learner should have the control over where, what and how they learn. (Knowles 1990:57). According to Knowles' theory, the participants must be well involved in an activity for them to benefit from it. Author decided to understand how a learner could be made an active participant. To understand the issues faced by a user, the tasks they would perform had to be studied. Hence task analysis was conducted to identify the major tasks involved in learning the flow of a platonic dialogue. Task analysis was done with the help of an undergraduate philosophy student. The student was asked to explain the regular tasks that would be involved in learning a platonic dialogue.

To study the issues involved in learning platonic dialogues, the above mentioned philosophy student was taken as a model candidate. To identify the typical tasks involved, the student was asked to systematically explain how they would go about learning a dialogue. The following summary as shown in Illustration 2 has been reached from the student interview. The goal for the philosophy student is to read, analyse and understand the flow of a platonic dialogue. The main skill and task knowledge required are the motivation to read platonic dialogues, along with the skill to analyse the structure behind the arguments. The three main duties of the student is to read, analyse and understand the structure of the platonic dialogues. The three main tasks are to understand the dialogue content, rationally examine the views and to critically analyse the arguments. These can be subcategorised to describe the student's skill, knowledge and attitude. The following list is the summary that shows how they can be subcategorised:

Once the student provided the necessary information about the tasks, a bigger picture was drawn. The following diagram was created inspired by the task analysis by Lee.
The four levels in Illustration 2, demonstrates the position, duty, task and finally a combination of knowledge, skills and attitudes. The three tasks labelled in yellow in Illustration 2 are further subcategorised in the following list.

Illustration 2: Root cause analysis

The following list explains the 9 green boxes shown in Illustration 2. The green boxes are the knowledge, skills and attitudes required to solve the tasks.

1. Understand the meaning of platonic dialogues.
   1. Basic philosophical knowledge
   2. Attitude and motivation to read and understand the dialogue
   3. Reading levels of secondary level education or higher

2. Rationally examine the views and arguments.
   1. Basic knowledge of philosophical dialogues and argumentation
   2. Skills to distinguish, clarify and support arguments
   3. Motivation and attitude to focus on the arguments made

3. Critically analyse the logic and reasoning behind the arguments
   1. Basic knowledge of philosophical dialogues and argumentation
   2. Analytical skills
   3. Critical evaluation skills
   4. Motivation and interest to analyse and rationalise dialogues sequentially.

After studying the above mentioned process, the author had reached the conclusion that the complexity of the skills and tasks involved is a major issue. Author argues that the difficulty in simultaneously applying these skills might reduce a user’s focus and concentration. A possible solution was to create a design where the users can use their skills in a more efficient manner. The system could be designed to simplify the tasks involved and could present the information in a simplified manner.
3.2 Audience analysis

After identifying the problems faced by a typical user, it was necessary to identify the target user group. If a user cannot benefit from a product then the product is arguably worthless. So after identifying the tasks involved, an attempt was made to identify the customers. Identifying the potential audience is significant, since it gives the designer a fair idea of what the end user might want. The philosophy student was further approached to evaluate the potential users’ skills. After the discussion, the attributes shown in Table 1 were identified. This table served as a reference throughout the project. This gave a clear mental picture to clarify who the product is aimed at.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Weaker Learners</th>
<th>Average Learners</th>
<th>Stronger Learners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational level</td>
<td>Secondary</td>
<td>Third level</td>
<td>Third level</td>
</tr>
<tr>
<td>Reading level</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Motivation</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Philosophy Knowledge</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Computer proficiency</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>Web proficiency</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>Typing Ability</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Access to Computers</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Access to Web</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Time Availability</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
</tr>
</tbody>
</table>

Table 1: Audience analysis

The target audience in a general outlook can be concluded as anyone interested in teaching or learning platonic dialogues. A deeper look showed that they are users with some philosophical background. They would ideally have an interest to learn the flow and structure of a platonic dialogue. Users could be individuals learning platonic dialogues during their leisure time or experienced users such as Philosophy lecturers in Universities and colleges.

3.3 Resource analysis

Once the issues and users were identified, the author decided to study the platonic dialogues in a conventional manner. This was done in order to get a feel for the actual problem. The platonic dialogues were collected online from Internet Classics Archive (1994) on Massachusetts Institute of technology (MIT) website. A sample platonic dialogue was also provided by the Subject Matter expert. To apply the learning theories and principles previously evaluated, a profound knowledge of the platonic dialogue was to be developed.

The current option available to learn platonic dialogues was to read and interpret the text in a conventional manner. This was an imitation of the problem in question. This process helped to successfully discover the issues concerned. After the process, it became clear that the learning process demanded effort, time and high levels of concentration. A platonic dialogue between Socrates and Laches were put under analysis.
Socrates' question:

Soc. Then, Laches, suppose that we first set about determining the nature of courage, and in the second place proceed to enquire how the young men may attain this quality by the help of studies and pursuits. Tell me, if you can, what is courage.

Laches' answer to the Socratic question was:

La. Indeed, Socrates, I see no difficulty in answering; he is a man of courage who does not run away, but remains at his post and fights against the enemy; there can be no mistake about that.

At this point the first prototype was under construction. Reflecting on the literature review on multimedia techniques and visualizations, the first goal of a prototype was to clearly organize the arguments. Harry Beck's underground map had shown the usage of colour to distinguish route information. Data visualization techniques also presented the data in a coherent manner. Multimedia techniques have also promoted the use of multiple mediums (e.g. visual and textual) to visualize information. Literature review had shown that, to successfully gain attention, information presented must be easy. Change in colours and patterns would also attain user attention.

Upon critical evaluation of these facts studied during literature review, the author decided to create a prototype that presents information in a coherent manner. The prototype would also have the ability to gain users attention and would present information in a clear and consistent manner. The usage of colour would be used to display changes in pattern. Hence the prototype shown in Illustration 3 has been developed. The concept of using colours was applied to distinguish between participants. This change in colour pattern was used to gain users attention. A structure displayed from top to bottom was intended to represent the arguments in a sequential manner. The callout boxes clarified that the dialogues belonged to a particular participant. The pictures were put in place to clearly illustrate the participants.

Illustration 3: Prototype 1
Results and findings:

The initial prototype was delivered to the Subject Matter Expert Brendan Tangney for evaluation. The usage of consistent colouring and callout boxes for each participant received positive feedback. However, feedback on the weakness of the tool, revealed that the prototype designed, does not have the capability to show the 'backtracking' of arguments. Further studies and analysis were conducted to find out the importance and relevance of 'backtracking' algorithms in platonic dialogues. After having a deeper look in to the text, Socrates' initial question seemed to reappear after a while: now in a different phrasing.

Socrates. And now, Laches, do you try and tell me in like manner, What is that common quality which is called courage, and which includes all the various uses of the term when applied both to pleasure and pain, and in all the cases to which I was just now referring?

La. I should say that courage is a sort of endurance of the soul, if I am to speak of the universal nature which pervades them all.

As shown above, the Socratic' dialogue turned back to the original question; “what is courage?” at a later stage of the dialogue. Laches has initially answered that; courage is “remaining at one's post and fighting the enemy”. However the second time he was asked the same question, his answer was essentially “courage is the endurance of soul”. What changed Laches' answer?

A deeper study of the text shed light to the problem. Socrates’ arguments have made Laches back track his arguments. The dialogue studied showed that another argument was backtracked in the same dialogue. Another platonic text involving Socrates and Polemarchus about the 'nature of Justice' was studied. The backtracking of the argument occurred in this dialogue as well. Backtracking of arguments occur in platonic dialogues, and it is might be difficult for novice learners to understand where the backtracking occurs.

Conclusion:

A new prototype capable of demonstrating the backtracking mechanism had to be designed and implemented. A method to clearly state that, an argument is being backtracked was to be shown. The information presented in the last prototype was in a textual form with the usage of colour and shapes. The structure was not very aesthetic; neither did the subject matter Expert find it very easy to understand. Hence the second prototype aimed to display a coherent structure, simplified information and most importantly to display backtracking. The usage of colour was decided to be continued.

3.4 Prototype 2

Reflecting on the results and findings from the prototype 1, the second iteration considered the usage of shorter phrases for a clearer representation of the dialogues. These shorter dialogues were key phrases taken from an argument. Sophisticated dialogues were given detailed explanations in a textbox on the left. The colouring approach was altered to distinguish between an old and current argument. i.e. The same
participant would have multiple arguments and so lighter shading of the colour was used to distinguish his/her older arguments. I.e. An argument that user has already interpreted was shown in a lighter colour. Therefore current argument has the brightest colour and the oldest argument was represented with a faded version of the colour. The structure still represented a top to bottom view to model the sequential flow of arguments.

As Illustration 4 shows, the backtracking was shown using the colour Red and with an arrow pointing back to the initial question. However it was difficult to point the arrow to the initial question due to the length of arguments. Colour Red was used to gain users immediate attention and infer the notion that there is a halt in the argument. The arrow indicated where the halted arguments have been redirected to.

**Results and Findings**

This iteration shown in Illustration 4 was delivered to the SME for feedback. The usage of colour and the simplified structure received positive feedback. The way in which backtracking was displayed was also appreciated. However the structure was to be improved to show where the arguments have been backtracked to.

**Planning phase conclusion**

So the planning phase concluded that the prototypes and designs had to show the backtracking of arguments clearly in a more aesthetic structure. A coherent structure capable of displaying the arguments in a single pictorial representation would be a desirable outcome.
Chapter 4

Design phase

This chapter will review how the conclusions drawn from the planning phase was made useful in the design phase of the project. This chapter will show how brainstorming and mind mapping found hints to solutions. The chapter will then explain how literature review on multimedia learning techniques helped in deciding on a consistent structure for the software tool. The chapter will show the vital role of the Human Computer Interaction (HCI) approach used throughout the project.

The design phase of the project was made highly iterative and was subjected to constant evaluation. To assess the tool's capabilities and user's interaction with the tool, continuous assessment was conducted throughout the project. These are done rigorously from the planning phase to the testing phase of the tool. The feedback from each prototype and evaluation is considered a checkpoint to reflect on the requirements of the design.

4.1 Human computer Interaction

Human computer interaction approach used in the project was a very careful decision. It played a vital role in the smooth progression of the project. Human Computer Interaction approach focuses on the interaction between humans and computers. The core values of Human Computer Interaction model is that, processes are highly iterative, user-centred and they combine multiple disciples such as Computer science, cognitive psychology, philosophy, ergonomics and design.

The reason behind choosing the approach is the belief that, software designs need to support the user, not the other way around. If the user constantly find themselves unable to interact smoothly with the content of a system, the implementation is not the most efficient. Human Computer Interaction emphasises the importance of feedback. According to Preece (Preece 1995) the process of user feedback signifies the progress given to a user on where they are on a process. The feedback should ideally tell the user how much progress they have made and if the input received is unsuitable. The user should be made aware when they have to provide input. Upon providing the input, users should get confirmation that the input has been received.

4.2 Brainstorming

In order to reflect and build on the conclusion from the planning phase, author decided to brainstorm for ideas. The prototypes needed to have a much coherent structure. To find out whether such a structure could be achieved, the author conducted brainstorming to bring all the literature material together. The findings from classic visualizations and multimedia theories were rigorously studied. Brainstorming for ideas, author produced a list of requirements for the prototype. Critically reflecting on the literature studied, the next prototype was to be designed to at least partially accomplish the list shown below. The prototype should be:

- Coherent, concise and functional
- able to present information using text and also visual mediums
- able to map user's mental models directly to the functionality of the tool
The visualizations studied in chapter 1 inspired the author to display the data in one pictorial representation. The author further studied the theories and principles. The semantic network theory produced a turning point. As discussed in chapter 1 semantic network theory depicts the way in which our brains functions. The brain contains a network of nodes that are organized and connected to each other. The author was inspired by the structural similarity in the network theory, relative to what was to be designed. A benefit of repeating and organizing the information by Fleming and Levie (1978) was another crucial argument that the author analysed.

After critical evaluation of the literature, the author believes that organizing data is a very effective approach. The reason behind the assumption can be made clear with an example of someone trying to learn a new sport. The terminology in a new sport can be easily learned if the words can be related to the action performed. The literature review and analysis has convinced the author that organization of data can play a vital role in helping people learn. Therefore an organized structure was decided for the next prototype.

The design of the prototype was complicated due to the amount of textual content in the platonic dialogues. Simply organizing the information would not help portray the flow of arguments. After further brainstorming a list of nodes seemed to offer a partial solution. The nodes would represent an argument phrase. This node could then be organized in some manner. The representation of arguments in a top down approach was preserved. The idea of nodes for an argument was also preserved from the last prototype.

4.3 Prototype 3

So nodes in a top-down fashion had to be connected in a logical manner. The flow of arguments had to be preserved as well. After further brainstorming and mind mapping, the author decided to construct a tree structure with nodes linked to each other. This approach was evolved after the author tried to structure the nodes in a coherent manner. The tree structure also means that the users mental model as reviewed in chapter 1, will be mapped directly to the presentation.

Information presented as a tree preserved features from last prototypes, such as the usage of colour and representation of an argument with short phrases. The tree as shown in Illustration 5 was developed by an online brainstorming tool bubbl.us. The tool as shown below was well capable of connecting the nodes together. The usage of shorter phrases meant that the data can be represented in a pictorial format. The nodes were ideal to show the 'backtracking' mechanism. The colour Red was applied to the nodes, along with an arrow. The brainstorming tool provided the tools to convey the aforementioned ideas. The nodes that required further explanation had a collapsible node to their side. This node contained detailed explanation of the shorter phrase.
Feedback and findings
The iteration was delivered to the SME with certain amount of satisfaction. As expected, the SME replied with positive feedback. The usage of colour to represent participants and the way in which backtracking has been displayed was highly appreciated. The nodes with detailed explanations were positively welcomed. However the SME forwarded a suggestion to visualize at least one full platonic dialogue.

Conclusions
Now the prototype has a coherent 'top-down' structure that conveys the flow of arguments. The backtracking of argument is represented by the colour Red along with an arrow. The prototype was represented in a clear and concise manner as a pictorial representation. The nodes are organized together providing the user with a clear structure of the argument. Information is visualised using colour patterns and also with text. e.g. the participants are represented by a colour. The tree structure does what the user thinks it does (a similar mental model). i.e. the tree follows multiple branches of a dialogue and a red node at the end suggests backtracking.

Feedback based Iterations
The full platonic dialogue was to be visualised as suggested by the SME. A great way to figure out if the tool would be useful to create visualization was to visualize the whole task. To realise the full potential of the prototype, a complete platonic dialogue was examined and visualised with the prototype made. The platonic dialogue between Socrates and Laches as shown in Illustration 6 was fully visualised using the prototype techniques.

Feedback on prototype 3.1
The iteration was presented to SME for review and evaluation. The platonic dialogue between Socrates and Laches, displayed as a picture seemed to interest the SME. The
appropriate usage of colour and the tree like structure was labelled acceptable for development. Backtracking displayed in the pictorial format was an acceptable achievement. The SME suggested that the final tool would benefit from the collapsible node feature.

**Result:**

Conclusion:
All the features from prototype 3 were kept in this iteration. The screen space was maximum utilised and the whole tree was represented in a pictorial format. The author’s evaluation of classic data visualizations has led to the belief that simple and clear visual representations are more eye-catching than a text based alternative.

After brainstorming for ideas, providing short phrases with colours seemed to be more appealing than the textual format. Mind mapping tools used were put to maximum use, mapping the ideas generated from brainstorming. A coherent structure was developed to demonstrate the continuous flow of arguments. Backtracking which seemed to be difficult to display as a picture, has now been shown with clarity and simplicity. Linking the arguments in a top down list as a tree structure with nodes has received positive feedback from the SME. The collapsible feature was an effective feature in the prototype, since it helped collapse the detailed descriptions and backtracked nodes.

**4.4 High fidelity prototype**
The final version of the prototype was created to replicate the actual tool. This helped in identifying some final additions for the tool (e.g. a text file). The high fidelity prototype

Illustration 6: prototype 3.1

![Illustration 6: prototype 3.1](image)
was designed to identify any discrepancies between the prototypes and the GUI. The author found it logical to eliminate any design mistakes or incompatibilities in design as early as possible.

**Result:**

- **Feedback and findings:**
  The high fidelity prototype was delivered to the Subject matter expert. The structure and layout of the tool has been accepted by the SME. The buttons would activate a function when clicked. The user would have to click on a node first. Thereafter, the buttons would manipulate the selected node. The 'New Node' button for example, would create a new node under the selected node. The backtracking in the prototype has been shown with colour Red and a red arrow. There is a button to backtrack arguments and another button to change the node colour. Another important feature was to be added to the GUI was a text file displayed in parallel with the visualization. The notion behind the idea was to simultaneously view and build the platonic dialogue. Therefore, the user can build the visualisation from studying a traditional textual representation.

**Conclusion**

The high fidelity prototype has been labelled functional by the SME. The feedback has proposed the addition of a text file as a new feature. The textual format of platonic dialogues has to be added to GUI. The design of the GUI has to be layered accordingly. The project has now to gather user requirements for the tool.

**4.5 User Requirements Analysis and Expert Review**

An appointment with an expert; Dr. Brendan O'Byrne, the curator in the department of philosophy in Trinity College Dublin was planned to gather user requirements for the tool. Dr. O'Byrne has been forwarded, the latest prototype for inspection. From an experts view point, Dr. O'Byrne suggested that the prototype developed was “interesting” and had good functionality.
However, during the meeting, Dr. O'Byrne suggested the notion of “characterisation of participants”. He pointed out that the current prototype is a proposition of structural arguments in an analytic manner. According to the expert, it was a new trend to articulate the structural arguments and to discard the thematic plot and the behaviour of the character. An example excerpt involving Socrates and Meno made the suggestion clearer. Socrates as a person claims to not know, but claims he has beliefs. Meno on the other hand has pretence that he has knowledge. So the expert forwarded the idea of characterising the participants. The meeting was concluded by a decision to meet up again to further study the user requirements.

User Requirements analysis
Although the idea was intriguing, the issue of a time constraint and the scope of the project were raised. This issue has been discussed with the project supervisor Dr. Brendan Tangney. The project supervisor has suggested that the characterisation is indeed outside the scope of the project. Hence the idea of characterisation was dismissed.

The main user requirements were gathered soon. The six major requirements for the visualisation tool were:

- options to create nodes,
- display backtracking,
- an option to change the node colour,
- a detailed textual description for nodes,
- Collapsible feature for the nodes.
- A text file displaying a platonic dialogue.

Once the user requirements were established, the task and concept analysis for users were to be done. This was an important step in understanding what the user would do with the tool. To design a system that can equip the user with appropriate functionality, the designer needs to know, what actions are going to be performed on the tool. Understanding these tasks and requirements helped the author design the GUI of the tool.

4.6 Task and concept Analysis

4.6.1 Task analysis
The project moved on to understand the steps involved in effectively implementing the software tool. These were created in order to reduce the effort; a user needs to put in. Average user scenarios were replicated to see how a typical user would establish the goals. This was done with the help of the same philosophy student who contributed in root cause analysis.

The task analysis in the planning phase looked at the psychological and cognitive skills involved in tackling the challenge. As the HCI approach focuses the user at its centre, it was quite necessary to understand how the users would interact with the technology. With the help of the philosophy student, challenges in bridging the philosophical content and the technological requirements were identified. Hierarchical Task analysis (HTA) was done to comprehend the users view point. Hierarchical task analysis is the process of breaking down tasks in a top to bottom fashion, there for showing a hierarchical relationship between tasks. Multiple levels of HTA were created.
Shown below is a level 2 Hierarchical Task Analysis diagram.

The HTA identified the procedures involved in successfully visualising a dialogue. The task analysis concluded that there are two main sets of tasks involved in visualising a platonic dialogue. Creating a tree structure and then demonstrating the flow of the arguments. In our case backtracking has been identified as a task, users might benefit from. The third step involved is a guidance mechanism that guides the user to achieve their goals. It should ideally have information about the technical functionality of the tool as well as subject content.

4.6.2 Concept analysis
The second part of the Analysis was concept analysis. Concept analysis is the process of deriving a concept hierarchy from a set of rules. While task analysis evaluated the procedural skills involved in the tool, concept analysis analysed the principles and rules involved in visualising the tool. Flowcharts have been used for the concept analysis method. Similar to Hierarchical task analysis various level of flowcharts were created.

The Illustration 9 shows a level 2 flowchart. The philosophy student was further approached to give feedback on the rules involved. The concept analysis conceptualised, what an average user would like to do, and the process of how they would go about executing the tasks. The conclusion of the flowchart shown in Illustration 9 is that when a user is presented with the visualisation, they can select the root node and then create a tree structure using multiple nodes. They have the option to select and upload a platonic text file, if they wish. This text file could provide a simultaneous view of the actual dialogue. Backtracking can also be displayed where required.
Conclusion
The design phase of the project has now produced enough materials to develop a visualisation tool. The prototypes have a coherent structure and they benefit from the appropriate usage of colour.
Chapter 5

Implementation

The main technical objective of the project was to produce a visualization tool. However there was another technical requirement for the project. Both had similar aims and objectives, but differed slightly in functionality. The first phase aimed to manually visualise platonic dialogues. The second and the main phase of the project were to develop a tool that dynamically visualises platonic dialogues.

This chapter will provide a detailed overview on the implementation of the software tool. The chapter will review the issues faced by the author while implementing the solution. The impact and influence of ‘Agile’ software development methods in the development phase would be explained further. An explanation of how problems were tackled, and how the new solutions were smoothly implemented in the system will be discussed in detail. A summary of the approaches and decisions made will be further reviewed.

5.1 Software development methodologies

The Human Computer interaction approach was used in the planning and design phase of this project. This approach helped the author execute an iterative process with users at its centre. It was rather significant to continue this user-focused approach. The priority given to the user was continued in the implementation phase as well. A combination of 'Agile' and ‘iterative and incremental' software development methodologies have been studied by the author. The author has been working simultaneously on a group project where ‘Agile’ development methods were strictly enforced and exercised. The core of agile development methodology is a highly iterative development process. The short iterations in Agile method avail of the feedback provided by experts or users.

Agile software development method emphasises the importance of frequent iterations with a people-centred approach. Agile development methods rely on user feedback, and unlike the 'waterfall' development model, it encourages changes and modifications to be made even at a later stage of the project. Although the regular feedback mechanism creates new requirements, the iteration deadlines could be a motivation to resolve these issues. This approach lends itself to dynamic planning and a highly effective development process. The end result is a well refined product that has evolved through multiple stages of requirements. The Agile approach is very flexible and encourages changes; exactly what was required for this project. The flexible, highly iterative and user-centred qualities of Agile, was the underlying reason to adopt the Agile development method.

Instead of building the whole system in one sitting, this project has delivered short weekly iterations to the Subject Matter Expert. This helped to systematically eliminate errors and bugs in the tool. The system was regularly tested by the author, before delivering the weekly iteration to the expert. Chapter 6 will further explain in detail how Agile development methods helped in integrating more features even at a later phase of the project.
5.2 Decisions on Implementation Platform

Several platforms were considered and weighed to calculate the advantages and disadvantages. The major options considered were .NET/C#, HTML/JavaScript/CSS, Flash and JAVA Swing. A mock-up of the visualization tool was initially created in Visual Basic as shown in Illustration 10. However the issue of platform and accessibility came up with this choice.

The HTML platform was chosen after a critical review of following facts. First of all, a great visualization is one that is accessible to the end user. The HTML / FTP delivery platform seemed to be much more accessible than others. The HTML option had another significant advantage. The platforms such as Windows, Linux and Macintosh all provide popular web browsers. This meant the development in HTML overcomes the barrier of platform accessibility issues. The availability of tools and technologies in JavaScript such as the JavaScript libraries and JQueryUI were better suited for a shiny interface. The performance issue would also be less of a problem with HTML, since the browser does not need to run on much system memory. As explained later in this chapter, the design is intended to give users control over the tool; not just control over the functionality but also control over when and where. A web browser is much more accessible than an application that is strictly for one single platform.

![Illustration 10: Visual basic mock-up](image)

5.3 Technologies used for phase 1

Phase one of the project was to manually visualize platonic dialogues. The challenge was to design a visualisation that imitated the 'look and feel' of the prototypes. Upon research, Google chart tools seemed to provide an organizational chart labelledOrgchart. The reasoning behind selecting the Orgchart was to not 'reinvent the wheel'. The organization chart labelled 'OrgChart' had some basic functionality in terms of what was to be achieved for phase one. The data can only be hardcoded with the Google organization chart. However the first part of the implementation was rather a relatively
smaller objective. The main target was to 'dynamically' visualize platonic dialogues.

To achieve easier debugging and efficient throughput, a web based tool named jsfiddle.net was used. Jsfiddle is a web based tool that aids in testing and debugging web development code. It supports HTML, JavaScript and CSS code along with multiple libraries. It also supports many frameworks including JQuery libraries. After combining the OrgChart, CSS and JavaScript functions, a visualization was successfully produced.

**Feedback**
The first iteration delivered to the SME was a basic visualisation. The visualisation resembled the features and properties of the prototypes. The collapsible nodes and a 'hover-over' feature were well received by the SME. When the mouse is hovered over a node, the 'hover-over' function displays a detailed text description of an argument. The tree structure and usage of colour was also accepted by the SME. However the arrow to show backtracking was not displayed. This was criticised, since one way of visualising backtracking was through a line pointing back to the node where the argument is being backtracked.

**Iteration no. 2**
HTML canvas was used in an attempt to solve the issue. The canvas is a HTML element, part of HTML5 that allows dynamic, scriptable rendering of shapes and bitmap images. After working with HTML canvas it seemed that HTML canvas was incompatible to draw lines with the tool chart. The arrow could not be drawn over a layer of objects with HTML canvas. HTML canvas could not draw a line over the Orgchart layer.

So after further evaluation, a possible solution arose. A red colour picture of an arrow could serve as a solution. Another issue was how the arrow can be placed where required. JavaScript functions were used to drag and drop the arrow as shown in Illustration 11.

**Result:**

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![Illustration 11: Phase 1 Iteration 2](image_url)

**Feedback:**
This short iteration delivered was not the most aesthetic of solutions. So this iteration was kept as a back-up. A whole platonic dialogue had to be visualized now from the current visualisation. It was a way of observing how a full dialogue be structured.
**Final Iteration for phase 1**

The final iteration for the phase 1 can be found on the main page of the project website under 'Tool Demo'. This can be found at the project webpage at [http://www.tradeinall.com/tree/dial.html](http://www.tradeinall.com/tree/dial.html). Here the collapsible nodes are activated. The backtracking mechanism is not hardcoded, since the users might want to start from the very beginning of an argument. However the structure has been clearly along with the usage of colour. To realise the full potential of the prototype, a complete platonic dialogue was examined and visualised with the current tool. The platonic dialogue between Socrates and Laches was fully visualised as shown below in *Illustration 12.*

**Illustration 12: Phase 1 final iteration**

**Feedback and conclusions:**

The final iteration of phase one delivered features such as collapsible nodes, a coherent tree structure, a backtracking mechanism and a ‘node-hover’ feature. The main objectives for the phase had all been accomplished including the backtracking and
collapsible node feature. However, as mentioned earlier backtracking is only delivered partially i.e. with colour. The initial part of the project is now delivered; in a infographic format.

5.4 Implementation of dynamic tool

The implementation of the second phase of the project was the next objective. In fact this was the major objective of the project; to dynamically visualize platonic dialogues. The nodes in the current state of the project cannot be dynamically edited with HTML. Hence various other possibilities for a development option were searched for. The solution found was to use PHP in conjunction with the Orgchart. Logic behind selecting PHP was that the nodes can be manipulated as per required. Another advantage was that user input could be saved with PHP. If the user inputs data there should be a storage mechanism to store their data. PHP as a web development platform seemed to provide good flexibility with saving user data. Another reason for selecting PHP was that it was well compatible with HTML/JavaScript and CSS; the technologies that have been under development. The major advantage was that PHP allowed manipulating objects in the OrgChart.

A server based approach was implemented here. The web page www.tradeinall.com/tree was set up, to facilitate the web development aspects of the project. The domain was not bought; instead the server space was rented from an organization.

The implementation commenced by manipulating the nodes. The first issue faced while manipulating the nodes was the selection of nodes. Although PHP selected and manipulated the nodes, when the page was refreshed, the data was lost. This issue was resolved by saving the data as a session in the browser cookie. After working and connecting the OrgChart and the PHP together a dynamic tool was developed. The design would let users create new nodes and let them back track the arguments. The node colours could also be changed relative to the participant. The tool also allowed the user to display a text file in the GUI. The Illustration 13 shows the GUI of the iteration delivered. The collapsible feature for the dynamic tool was implemented, but it had to be disabled since it affected the functionality of the tool.

Feedback and findings:

The GUI shown in Illustration 13 was delivered to the Subject Matter Expert for review. Apart from few positive comments, the feedback from the SME suggested that the GUI had to improved. The features to add nodes and change node colours were successfully implemented. Backtracking was successfully displayed with the colour Red.

However the SME pointed out that there were many issues in the GUI and visualisation. First of all the text was displayed on the bottom of the page. This did not prove to be an efficient, ergonomic design. The user was required to scroll the text bar up and down. Second issue was that nodes cannot be deleted. Another issue was that the way in which backtracking is displayed is restricted by colour Red. The next issue was to improve the look and feel of the web layout.
Conclusion

Three main issues had to be fixed for the next iteration. The functionality to delete a node and to better display the backtracking feature was the first challenge. Placing the text parallel to the visualisation was the second. The third issue was to improve the layout of the GUI.

5.5 Generating solutions

After receiving the feedback from the expert, the functionality and layout of the tool has been improved. The node deletion functionality was implemented first. The problem with deleting the node was that all the children nodes get deleted after deleting a node. This indeed caused some problems since, child nodes occasionally lost the connection to parent node. This issue was resolved by connecting the head of the child node to the tail of the parent node.

The backtracking was the next issue. Currently the colour Red on a node would indicate that the argument had been backtracked. As a result of backtracking, the following arguments would start as a new branch. However if the user decided to backtrack to the middle of a branch, it could not have been done. To resolve this issue, a function that searched for the child nodes was implemented. The child nodes were searched, selected and then the colours of the child nodes were changed in order to display backtracking.

The web design layout has been drastically improved. The design of the GUI was improved to accommodate five panels. Three main panels were the core of the design. The left panel displayed the visualisation while a right panel displayed the text. The top panel was designed to provide the user with 'HELP' and sample visualizations. The top bar also lets the user to create fresh visualizations. The following principles and ideologies have been critically studied in improving the GUI.
5.6 GUI Ergonomics

Since Human computer interaction approach is used throughout this project, a “Human Factor” element was an inevitable occurrence. Many users find themselves repeatedly making the same errors, or sometimes it takes too long to figure out how to achieve what you want to do, using a system. These are classic examples of systems that are highly prone to human error. This system does not have the capability to either prevent or recover from human error. This phenomenon occurs frequently when designers ignore a Human Computer Interaction based approach. So the tool was improved with few significant steps in mind.

The visualization would always be displayed on the left side of the screen. Every node created would be inside this box. The box will automatically resize to allocate more nodes. The right box was a text box where users can upload their dialogues. This provided a simultaneous view of both the visualisation and the text under study.

After studying the importance of feedback, the author realised that there was an issue to be resolved. The issue was that the authors himself tend to create nodes under a wrong node. It was basically a slip. A slip is basically where the user has made the right decision and has the right intention in mind, but fails to execute the action correctly. In our case this was resolved by providing a node title in the text box. Therefore if a user clicks on a node, the title of the node will be displayed in the text box. Whenever the user tries to create, delete or edit a node, the text box would have the title of the selected node. This simple mechanism was implemented after both the author and SME repeatedly created nodes in the wrong position.

Then it was the issue of the screen layout. This was resolved by implementing a clear and simple GUI. According to Dabbs (Dabbs, 2002) the design cannot rely on the user’s knowledge to 'get back out' from a specific state. So the Ribbon bar approach was used in the system. Ribbon bar is a row of buttons that execute an action when clicked. Buttons in the Ribbon bar will take the user to a particular page. Finally the iteration shown in Illustration 14 was delivered.

Result

![Illustration 14: Phase 2 final release](image-url)
Feedback
This yielded much better results from the SME. The backtracking, deletion of nodes and GUI were all established. However the relevance of the Horizontal bar in the text filed was criticized.

5.7 Evaluation and further implementation
The implementation of the tool has been successfully executed now. The project moved on to test the implementation on users. Hence this phase of the project was actually implemented during the evaluation and testing phase of the project. Users suggested that saving data would be a useful functionality. Chapter 6 will explain how the evaluation and feedback has gathered data from the users.

The Agile development methods have been proved very useful at this juncture. The decision to alter the design so that the users can save data came at a later stage of the project. The user feedback showed that it was necessary to save the data. The agile approach which encouraged small iterations, allowed changing the code base and adding a new data base to the system.

A new database was setup with MySQL. The PHP server was connected to the MySQL database and then the data was saved. Data that has previously been saved in the browser is now successfully saved in the database. The GUI has also been modified so that users could login or register. Once the user is logged in, their data including the text file will be saved in a database. Error checking has been implemented in both registration and login pages of the tool.

The help mechanism was improved following criticisms from the user. The technical and subject matter has both been added to the HELP mechanism. The horizontal scroll bar was also fixed in general. However it is not fully functional for all platforms.

Results:
The Illustration 15 shown below illustrates the error checking process in the registration page. The top panel has also been improved in order to facilitate user access.

Illustration 15: Registration screen
The **Illustration 16** shown below illustrates the user log in page.

![Login Screen](image)

**Illustration 16: Login screen**

**Conclusion:**
The way in which Backtracking has been displayed was improved and implemented. The nodes can be added and deleted as required. The GUI has placed the visualisation on the left and the text area on the right. The top bar provides the users with help and sample demonstrations. The GUI as a whole has been given an appealing look. The colours for each panel distinguished the placement of objects. The visualisation at the beginning is been displayed to be welcoming. I.e. when starting the root node displays the text: ‘start here’. Only after the user has clicked on the node, the functionality to manipulate nodes are provided. This helps in keeping the GUI clear and simple. The screen space is also saved by the hover – over functionality and helps in keeping the visualisation clear.

After receiving feedback from the users the final GUI has been improved to save the user data. The users can now register and then log in to save their work.
Chapter 6

Testing and Evaluation

This chapter will discuss the effects of evaluation and testing done on the software tool. An on-going evaluation of the project has been exercised throughout the project life cycle. However the project was evaluated as a whole at the end.

The evaluation has been done on four people. The four candidates were allowed a total time of 15 - 20 minutes. The two candidates in the evaluation were philosophy students. The third participant was a computer science undergraduate and the fourth participant was a secondary school student. The first two participants had basic knowledge of platonic dialogues. The other two participants had no philosophical background, but had an interest in learning platonic dialogues. All the participants had tried the product on Windows 7 machines. A web browser choice of Google Chrome or Internet Explorer was given to the users. Three of them chose Google Chrome while the fourth chose Internet Explorer. The data was gathered using a 'fill-in-form' and a survey questionnaire.

6.1 Ethics

Users were assured that the information collected was for solely for educational research and their participation was a voluntary decision. The users were further assured that the data and results collected would remain anonymous. Before commencing the process, users were notified that they could stop the process any time they wished to.

6.2 Feedback from Users

The users interacted with the tool and attempted to visualise dialogues from scratch. The appendices in Chapter 10 will show the form used for the evaluation. The form was inspired by an original by Alessi (Alessi, 2001). The computer scientist and the two philosophy students suggested that it would be useful to save users data. Once the visualization was created, it was necessary for the user to save it and access it on another machine. The users pointed out that the 'HELP' section of the tool did not provide subject content information. One among the philosophy students suggested that the 'challenge factor' provided by the tool was not difficult enough. The users also criticized the issues with the horizontal text bar.

6.3 Criticism

The issue with saving the data has been criticized by the users during the evaluation phase. During the implementation phase the Subject Matter Expert has suggested that there were improvements to be made. E.g. the horizontal toolbar was identified as a usability issue. The functionality to collapse nodes was identified as another issue by the SME. The system has also received negative comments for restricting the ways in which backtracking is displayed. The system does not perform greatly under multiple platforms.

6.4 Achievements

A form and survey that has been provided to the four users were used to gather the
information. After the information was collected, the author analysed the data in the forms and surveys. All four of the participants had a positive approach on the tools functionality. The tool was praised for its simplicity and aesthetics. Users commented that the tool performed what they wanted and did what they were expecting it to do. This shows the similarity in user’s mental model and the actual functionality of the system. Feedback from the survey showed that users found the tool to be rather easy and simple to interact with. The users were asked if they learned a platonic dialogue. Three of the users commented that they understood a platonic dialogue better after using the tool. The users had suggested that colours have influenced their learning pace.

6.5 Feedback and Solutions

Following the feedback, the final iteration was modified again. The horizontal toolbar was the first issue that had been pointed out by the SME. This issue has been fixed by the author for multiple platforms and multiple browsers such as Google chrome in Windows 7 and Mozilla Firefox on Mac OS X. The horizontal bar in the text box has been successfully removed in multiple platforms, with the exception of few browsers. Testing the tool on multiple platforms and browsers has showed that not all browsers supported the update.

Feedback showed that the users would like to save their work. The data was saved in the browser as a cookie. The users pointed out that, if data was to be accessed later on another machine, there was no option to do so. Some users detected that the horizontal bar in the text box is an undesirable feature. The introduction of MySQL with PHP was successfully done as explained in chapter 5. The Agile development methods helped in integrating the code base with the new database. MySQL and PHP was connected together to save user data in a database.

The help screen was also edited in order to add comments on the subject content of the tool. The functionalities required to operate the tool has also been explained clearly.

After user testing, the tool was tested on multiple platforms. Platform testing produced the following table.

<table>
<thead>
<tr>
<th>Browser versions</th>
<th>Mac OS X</th>
<th>Windows 7</th>
<th>Linux Ubutnu</th>
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<tr>
<td>Mozilla Firefox (11.0)</td>
<td>Good</td>
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<td>Good</td>
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<td>Google Chrome (17.0)</td>
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<td>Internet Explorer (9.0)</td>
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<td>Safari (5.1.5)</td>
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<tr>
<td>Opera (11.61)</td>
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<td>Bad</td>
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</table>

Table 2: Platform test
Chapter 7

Business Plan

Business Plan

Augustine Vettikka
VizWorld Ltd.*
The Digital Hub
Pearse Street
Dublin 2
01 4000000
vettikka@vizworld.ie

* Company not registered
7.1 BUSINESS DESCRIPTION AND VISION

Mission Statement
“To provide anyone interested in teaching or learning platonic dialogues, custom made visualisation software that dramatically enhances and eases the learning process with the help of multimedia”

At VizWorld, our vision is to be the leading software company in the visualisation Industry. With our custom made; multimedia enhanced visualisations, we will make the learning process enjoyable and efficient. We provide custom made tools for visualising information using multimedia techniques. For each of our clients, profound study on their needs would be conducted. This is done in order to ensure our products are efficient. Our services are available on the World Wide Web with an intention to reach a global audience.

As the Illustration 17 indicates, we need an investment of seven thousand euros to advertise the products and employ developers. In order to establish a presence in the market, this expansion is a vital role in our company’s success.

Goals and objectives:
In 10 years’ time we see ourselves as the leading “visualisation software provider” in the Industry. Apart from the current product, which visualises platonic dialogues using multimedia techniques, we intend to provide customised visualisation tools that fulfil the needs of our customers. Our aim for the first fiscal year is to achieve a 20 per cent profit margin and a client base of more than 100 premium users. We target to achieve a 20 per cent growth on our annual sales each year.

Business philosophy:
VizWorld stands for simplicity, quality and Easy learning. Our aim in the market is to
equip the user with powerful visualisation tools that facilitate easy understanding of a particular content. The products are intended on an audience trying to create effective visualisations with minimal effort. Our current product for example, helps students or teachers understand the content and structure of platonic dialogues.

**Industry**

The visualisation industry is a competitive one with few large scale companies exercising strong influence on clients. The market research has shown that there can be some space for our start-up. To achieve a better hold in the industry, a Human Computer Interaction (HCI) based approach and its impact would be demonstrated to the potential customers.

With the recent increase in the popularity of tablets and handheld devices, internet access is easier than ever. In the next 5 years, the visualisation industry, attracting more and more clients every day, could provide VizWorld with potential customers. We are targeting this particular time period in the market to launch the business to the next level. In next 6 months, we have planned to provide a smartphone application of our current product. In following years we hope to provide a free, trial version of our products and services on smartphone devices. [patent not received]

![Illustration 18: Industry statistics and forecast (Data Discovery market)](image)

**Source: Garnter (June 2011)**

As Illustration 18 shows the industry growth, we envision for a similar growth in our business. The strength of VizWorld would be its loyal, satisfied client base. The satisfaction element is attained and ensured before every product is released. Our confidences in clients are rooted on the fact that, the clients themselves are offered trial versions of a product. The valuable feedback from the clients would be used to eliminate any unwanted features. The timing at which we are providing these HCI based tools would play a vital role in the company’s success. Market study has shown that a “bespoke-design” model, would provide us with an advantage over competitors.
### 7.2 PRODUCTS AND SERVICES

The current product we offer is a visualisation tool that helps anyone learn or teach platonic dialogues, using multimedia techniques. The current product as shown below can be found online at [www.tradeinall.com/tree](http://www.tradeinall.com/tree). The current product can also function as an organization chart. The future product range would also be custom built to accommodate any particular need of the client. The future products and services would also have a Human computer Interaction design as their backbone. Visualisations created as a final product would use multimedia techniques to enhance visual and motor learning skills. Following on the footsteps of classic visualisations, the finished products would have attributes such Simplicity, Aesthetics and high-functionality.

![Create New Tool Demo Login Register](Image)

Each tool would be custom designed to make maximum impact on the end user's learning styles; whether they be visual or auditory leaners. Each tool would be equipped with the “User-centred” HCI design to ensure that the end user receives the maximum benefit. To enhance the user’s attention, Perception and memory levels, products will be put under rigorous study. The conclusions drawn from the studies will deeply impact the “highly iterative “design and development of each tool.

Our intuitive interface would enable users to create visualisations without much training. The unique aspect of our product is the ability to help users visualise data dynamically (not just predefined and quantified data) and without having to program or develop the visualisation models themselves. The tools advantages over alternatives would be its appeal and a design that boasts contributions from disciplines such as Cognitive psychology, Ergonomics, Engineering and Design. A cognitive and behavioural psychology based evaluation will be applied for improving the functionality of the tools. To facilitate easy learning, target user’s attention, perception and memory levels were studied along with ethnographic studies and evaluation processes.

The current marketing strategy requires us to provide the services for free. The products are free to use for a certain amount of time. After this trial period the user is prompted to create an account. The current strategy suggests that in order to charge and engage users for a product, a solid and loyal client base is required.
7.3 MARKET ANALYSIS

Economics
The market research combined the analysis of industry surveys and evaluation of articles on the industry. Illustration 19 shows the competitive data visualisation market shares, according to an article published by Gartner Inc. on 17 June 2011. Gartner Inc.; a leading information technology research and advisory company have suggested in the above mentioned article that ‘visualization-based data discovery’ will be a $1 billion market as soon as 2013.

Illustration 19: Data visualization Market share by Gartner Inc. June 2011

A survey done by Wise Analytics in quarter 2 of 2009 included most of the Competitors in the data visualization industry. In Illustration 19 “QlikTech” has a market share of 48 per cent; effectively controlling half the market. The rest of the competition labelled “Other Vendors” only account to a small 12 per cent; where VizWorld would have its market share at first.

The survey done by Wise Analytics shows the delivery models used by the majority of vendors. VizWorld has some very significant advantages over competitors with regards to the deliver models. As shown in Illustration 20 the “on-demand” delivery model is the least favourite for most companies. However the envisioned delivery model for VizWorld is “on-demand” and hence provides advantages in a competitive aspect.
Another such advantage is the targeted customer group. The current demand in the market includes the need for unique visualization types. The idea of visualising platonic dialogues has not yet been marketed. This should give us an advantage in terms of the uniqueness of the product we offer. The consumer preferences as per shown in Illustration 21 were the major trends in 2009 (Wise Analytics 2009). These figures show that only a small group of vendors target audiences outside the business world.

Illustration 20: Delivery model of vendors by Wise Analytics 2009

Illustration 21: Target Audience by Wise Analytics 2009
The 16 per cent of 'others' include users in different walks of life, including academics and students; exactly whom VizWorld are targeting. The target customers VizWorld aims at are students and teachers trying to learn platonic dialogues. This avoids a fair amount of competition and boosts the potential client base for VizWorld.

The barriers faced upon the market entry include consumer acceptance and brand recognition. VizWorld is a start-up and so the company and its products are not familiar to the customers. A strong advertising campaign has to take place in order to gain customers attention. Again this can be made cheaper. The majority of target audiences are much likely to be associated with an educational institution. Advertising inside an educational institution should be considerably less expensive than advertising on a commercial basis. VizWorld has financial issues, however they do not threaten the company's future. The technical 'web-based' start-up has relatively few expenses, shipping or logistic charges are not involved and has a relatively low production cost.

Products

The survey done by the author has shown a potential for the product. The survey was done along on four participants. The products for example are versatile and unique. The current product is a visualization tool mainly used to visualize platonic dialogues. However it can also be used as organizational charts. A small survey done shows our products appeal. Data was gathered by a questionnaire given to participants.

Illustration 22: Survey done on our product's appeal
**Strength-Weakness-Opportunity-Threat (SWOT) Analysis**

<table>
<thead>
<tr>
<th>Strength</th>
<th>Weakness</th>
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<tr>
<td>1. Unique products</td>
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<tr>
<td>2. Cheap Pricing</td>
<td>2. Lower Brand value</td>
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<tr>
<td>3. Target customers ignored by competitors</td>
<td>3. Advertisement expenses</td>
</tr>
<tr>
<td>4. On-demand delivery model</td>
<td>4. Small product range</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Threat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Opportunity to develop more products</td>
<td>1. Branded well-known competitors</td>
</tr>
<tr>
<td>2. A growing market</td>
<td>2. Lack of proper advertisement</td>
</tr>
<tr>
<td>3. Hiring and expanding the business</td>
<td>3. Capital investment required</td>
</tr>
<tr>
<td>4. Industry contacts and advertising</td>
<td>4. Business management expenses</td>
</tr>
</tbody>
</table>

Table 3: SWOT analysis

**Niche**
The unique corner of the market for VizWorld is the appeal of its products and services. With academics as customers and competitors who are more interested in other sectors of the market, the VizWorld has a small yet desirable corner of the market to itself.
MARKETING AND SALES

In order to solve the advertisement issue, Search engine Optimization (SEO) and Social Media Marketing (SMM) strategies has been planned. Search engine Optimization is a process by which companies increase their visibility and presence in search engines. If the visibility in a search engine is high, more number of potential customers are made aware of the products. Similar approach is taken with the Social Media Marketing strategy. Since social networks are popular especially among students, the timing seems just right to market the products in the social networking space. Advertising on technical journals and visualization blogs have also been proposed. This requires more capital and is only a secondary option.

Advertising in social networking sites and search engine providers will be the done for the first fiscal year. During the first fiscal year, products and services will be advertised monthly or bi-monthly in magazines. The low-cost option is to contact educational institutions and cold-call the relevant personnel. Many major universities and colleges have librarians and technical staff who would provide technological help to students. These personnel can be 'cold-called' and pitched to about the products and services. This would be a much cheaper and direct approach of reaching our target customer. An envisioned 'Campus package' would offer customers a solid reason as to why they should buy the products.

The execution of pricing plan is in two phases. The first phase offers the customer with free services for a month. Here the customers who wish to directly sign up for a premium account could do so if desired. The second phase is the time period after the first month. All customers are encouraged to sign up for an account. Those who do not sign up would not have access to important features in the software tool. The customers who do sign up would be offered with three price plans. The first is the premium package for € 20.00 per year annum. This offers the customer a full range of premium products and services including the latest products. Second plan is the silver plan for € 10.00 per annum. This offers access to a few selected visualisation tools and info graphics. The third pricing plan is the bronze package for €5.00 per annum where the users can access a maximum of two visualizations. They have access to these visualisation for a year.
**Sales Forecast**
We target around 100 premium users for the first fiscal year, which amounts to 8 premium users per month. The best-guess and worst case forecasts for monthly sales are shown in **Illustration 23 and Illustration 24**.

Illustration 23: Best guess forecast
As the best guess forecast in **Illustration 23** suggests, there would be around 80 to 100 premium customers by the end of first two years. Year 1 is represented in blue and year 2 in green. This is the objective of the company and what VizWorld is trying to achieve. On the other hand, as shows in **Illustration 24**, forecast is indicating around 40 to 50 customers in the worst case scenario. The worst case scenario is calculated on the basis that during summer holiday months, the educational institutions might not be functioning. Hence, a demand for the tool might diminish.

Illustration 24: Worst case sales Forecast
7.5 MANAGEMENT AND ORGANISATION

The business being a small technical start up, there will only be a small hierarchy. As the current Owner and manager; the author desires to hire an experienced business graduate and an experienced programmer. The author will remain the Chief Executive Officer (CEO) of the company with a 70 per cent share in the company. The rest of the 30 per cent will be equally divided amongst the two staff. This attitude of providing shares in the company should play a part in keeping the staff motivated.

7.6 FINANCIAL MANAGEMENT

Financial plan

![Illustration 25: 3 year profit margin projection]

References and sources:

Gartner June 2011 : Emerging Technology Analysis: Visualization-Based Data Discovery Tools. publication date: 17 June 2011, ID Number : G00213778

Chapter 8

Conclusions

8.1 Evaluation

*Do the multimedia techniques assist in learning the flow of platonic dialogues?*

Based on the feedback from the users, the usage of colour has helped them understand the ideas quickly. The participants in the testing phase easily distinguished the usage of colour. Some users suggested that the backtracking mechanism represented with the colour 'Red' have been very helpful to understand an argument halt. Users identified the tree structure of the dialogues as a major visual aid. Users suggested that the visual representation of the structure was much better than the textual format.

*Has all the project requirements been met and has all features been delivered?*

A dynamic visualization tool have been successfully developed, implemented and tested. An info graphic model of platonic dialogues has also been delivered. The tool successfully maps the philosophical content in to visualization. The major features of the project have been delivered with the exception of the collapsible node feature.

*Does the tool bare the signals of a good visualisation?*

The users commented that the tool was very easy to interact with. They found the tool to be structured and appealing. The HTML platform offer high accessibility. The tool is effective in delivering what is required. I.e. visualisation of platonic dialogues using multimedia techniques. The users commented that the GUI was clear and simple.

*Functionality over a mind map*

The mind maps offer divergent thinking. This is not what is required for visualising the platonic dialogue. A convergent thinking is required to get the users focused on the dialogues. This is a major advantage the visualisation tool offers. Furthermore the visualisation tool provides overview of a dialogue structure. Mind maps are built to provide more detail on a topic. The GUI offers simultaneous views of a dialogue and its visualisation. The entire tool is custom built to visualise platonic dialogues.

*Has the tool implemented multimedia and visualisation techniques?*

**GUI**

The Graphical user interface was developed for the ease of perception. The ease depends on the content position and simplicity, text size, font and colour etc. The web page layout has been structured in order to position the content appropriately. Positioning of information complemented the GUI. The content has been positioned in the right and the visualisation on the left. Ease of perception is well complemented when the nodes are repetitively created downwards. Consistency in displaying a new node in the visualization implies that the user’s actions are yielding consistent results.

**Human factor Design**

Most of human error occurs due to the lack of information: whether it is skill, rule or
knowledge based. The system provides this information through demonstrations or documentations. Therefore the human error margin can be reduced. The subject content and technical constraints, add to the difficulty of reducing human error. The GUI design has solved this by having consistency for the presentation and layout of the datum.

**Rewarding the user**
To retain the user’s attention and motivation the user is immediately rewarded by an action on screen. E.g. displaying a new node. The user is given the choice and freedom so that they can work at their own pace and relative to their knowledge, skills and difficulty levels. The user for example, can visualize dialogues in any detail they require.

**Encoding**
Encoding is the process of transforming the perceived information to a format that can be stored in the brain. For example, colour ‘Red’ in many cultures indicates danger or caution. The idea of backtracking is visually presented here with the usage of colour 'Red'. The usage of red represents that the argument has been backtracked or has come to a halt.

**Motivation**
Many motivation theories disagree on the definition of motivation and its applications. One of the famous motivation theories is based on Keller's ARCS motivation theory (Keller and Suzuki (1988). ARCS stand for Attention, Relevance, confidence and Satisfaction. The system has aimed to incorporate all four in to the visualization.

**Attention**
As mentioned in *chapter 1*, differences and changes attract and maintain attention. The visualization allows the user to change the colour of a node. The difference and change in the colour pattern is intended to gain users attention. The application of colour Red and the consistent downward creation of nodes also trigger attention.

**Relevance**
The user is shown the relevance of his action every time he manipulates a node. The new node created stands for a new argument in the dialogue. Each time the user changes a node colour, the relevant character is being represented with the colour change. A branch of the tree in colour Red represents that the whole branch of arguments have been backtracked.

**Confidence**
Every time the user is rewarded with the desired result, the user’s confidence in the tool grows. The user not only feels confident that he can achieve the goal, but also feels confident about the tools capabilities. When the learner expects a node to be created, followed by a node shown on the screen, it gives the user confidence that they are one step closer to the final picture.

**Satisfaction**
The user satisfaction is achieved through a fair and consistent manner in which the results occur. Every time the user has created a new node or changed a node colour, the desired action has successfully occurred.
**Assistance and help**
The user should always be aware of any actions they make and their consequences. Humans are error prone and we make mistakes. In such a scenario, a help mechanism to guide the user in the right path would make a considerable difference. The HELP mechanism in the GUI not only provides the technical guidance but also the guidance on content matter. The help mechanism should answer the user’s questions, such as the aim of the tool and its technical capability.

**Mental model**
The mental model of the tool is made explicit; a tree structure to follow the argument structure. The halt in argument is shown by colour Red. Each branch of the tree represents an argument structure.

**8.2 Future work**

**Implement characterisation and themes**
The project dismissed the possibility of characterisation since it was outside the scope. However, there are ways in which characterisation can be implemented. Further research on the multimedia paradigm should offer options to characterise the themes and plots of a dialogue.

**Backtracking arrows**
Even though the HTML canvas might not allow drawing lines over layers, the backtracking mechanism could be displayed using AJAX. The AJAX widgets or controls combined with customized functions could provide ways to draw arrows over a picture or a layer of object.

**Compatibility for multiple platforms and browsers.**
The tool is not performing greatly over multiple platforms. Testing and searching on the issues behind the platforms should make the tool work greatly in all platforms.

**Advertise and market the product**
As the Business plan has clearly shown, there is a market for the tool. Although small, the tool can be the first step for a small start-up. In such a case, the interface and functionality of the tool has to be smooth.

**8.3 CD attached**
The attached CD has the complete source code developed throughout the project.
Chapter 9

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## Chapter 10

### Appendices

**EVALUATION FORM**

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<th>Needs Work</th>
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<td>Matches goals</td>
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<td>Content Structure</td>
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| **Auxiliary Information** | | | |
|---------------------------| | | |
| Introduction / Demo      | | | |
| Directions                | | | |
| HELP                      | | | |

| **Affective Information** | | | |
|---------------------------| | | |
| Motivation                | | | |
| Challenge                 | | | |
| Curiosity                 | | | |
| Control                   | | | |

<p>| <strong>Interface</strong>             | | | |
|---------------------------| | | |
| GUI                       | | | |
| Presentation Modes        | | | |
| Text Display              | | | |
| User Input                | | | |
| Spacing                   | | | |
| Appeal                    | | | |</p>
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</thead>
<tbody>
<tr>
<td>Has the GUI grabbed your attention quickly?</td>
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<tr>
<td>Did you find the tool interesting and interactive?</td>
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<tr>
<td>Is the GUI lay out appealing and easy to work with?</td>
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<tr>
<td>Were you able to keep your concentration on the tool?</td>
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<tr>
<td>Does the tool perform actions that you desire?</td>
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<tr>
<td>Was the tool interesting and appealing as a whole?</td>
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<tr>
<td>Does the tool help in understanding the flow of the dialogues?</td>
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<tr>
<td>Did you find the usage of colour effective?</td>
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<tr>
<td>Was the tool easy to use, structured and functional?</td>
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<tr>
<td>Did you feel that you could control the tools functionality?</td>
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<tr>
<td>Did you feel rewarded while visualizing the dialogues?</td>
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<tr>
<td>Did your understanding of a platonic dialogue improve after using the tool?</td>
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<tr>
<td>What are your impressions on the tool and its functionality?</td>
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<tr>
<td>Has enough Help or demonstrations been provided?</td>
<td></td>
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<tr>
<td>How can the tool be made better?</td>
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</table>
### SURVEY on Product APPEAL

<table>
<thead>
<tr>
<th></th>
<th>Very Good</th>
<th>Good</th>
<th>Average</th>
<th>Poor</th>
<th>Very Poor</th>
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<tbody>
<tr>
<td>Visualisation</td>
<td></td>
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<tr>
<td>Multimedia techniques</td>
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<tr>
<td>Philosophical Content</td>
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<tr>
<td>GUI Appeal</td>
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<td>Easy to Use</td>
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<td>Versatility</td>
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<td>Functionality</td>
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<td>Comparison to a text File</td>
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<td>Preference to other tools</td>
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