CM0343 Final Project Report

Second Year Group Project Management tool

An investigation into the current project management techniques and the development of a system which meets the desired needs of the students studying the second year group project module.

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Abstract

At the beginning of this project I was tasked with investigating the current project management programs used by the students and assessing their capability in dealing with flexible changes and different methodologies whilst being used with the group project setting. I noticed immediately the limited software resources available with the university regarding project management. The ones that were available had negative connotations were the students had expressed severe frustration towards them and avoided using them unless forced. In order to support the students view and remove the frustration they experienced, my aim was to recommend a new system to be developed which incorporated different methodologies and encouraged the students that project management is more than a Gantt chart.

To define the requirements for this system I knew that analysis needed to be carried out to find the root of the problems with the existing programs and how the new program will be used within the group project context. The analysis techniques used were a heuristic evaluation which defined the usability of a program by comparing usability problems against Nielsen's pre defined heuristic principles. I also used influence diagrams to spot relationships in factors that concern the project module. This allowed me to see the problem as a whole from start to finish of a project rather than just the plan. Finally I analysed the best type of management which should be encouraged within this program by using Deming's 14 points of management and Herzberg's motivational theory. I found that the student's views were supported and that project management by using multiple programs is often confusing and frustrating. I took these findings and created a set of detailed requirements surrounding the problem as well as more technical requirements such as reliability and portability requirements to ensure the system would be feasible and the requirements detailed were understandable so that the program can go into development after this project is complete. From the findings, I believe this program improves flexibility and the overall project management technique and should be implemented into the university as part of future work.

Acknowledgements

From completing this project there are several parties in which I would like to express thanks for the successful completion of this project. I would first like to express thanks to the sample group which was used through the duration of my project plan for their continuous help and opinions which helped me reach a successful completion of the project. I would also like to thank a selection of supervisors which also provided me with support and advice about being involved in the projects from the outside and what was required for them.

I would also like to thank the whole of the second year in which many participated in completing an online survey for me which aided me to get a large number of views quickly. Finally I would like to give a special thanks to my supervisor who gave me consistent support throughout the project and allowed me to choose a project in which related to my ambition of becoming a project manager post university.

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Introduction

I was tasked with investigating the project management techniques used within group projects in an academic environment. It was important to find how well project management techniques are used particularly in large group projects. This project suited well within the School of Computer Science and Informatics as the students in the second year had to undertake a group project module in which 8-10 people were assigned to each group. The members for these groups were selected at random so it was likely you would not have previously known your team members before undertaking this project. It was obvious from my own experience when I undertook the group project module previously and the initial investigation undertaken that there were negative connotations surrounding the idea of strict project planning. I administered a survey at the start of this project to find out if my experience and thoughts on the group project where matched to those of the current students studying the module. Further to administering a survey, I also used a sample group throughout the duration of their project in order to find out what programs they found useful, what methods they were using and how team collaboration. The interim report delivered discussed the stakeholder's views and how they really felt. I felt this was important to my project as I now feel the requirements delivered within this report truly reflect how the students feel and any recommendations for a new tool will be the consensus of the current students. If developed the program will be used by the students happily and achieve the overall aim of improving the project management techniques used in group projects. From carefully discussing the students view I managed to redefine my initial view of project management. It is not just about Gantt charts and fixed plans – it needs to incorporate flexibility and the communication of team members.

This report will discover supporting evidence matching the students initial views in order for me to build confidence in the requirements I will be developing. In order to do this I need to analyse the tools they use and find out if what they perceive to be the problems are true and how these can be fixed. In order to do this I have used many tools to analyse these programs. I have chosen to use a heuristic evaluation which tests the usability of programs against certain tasks. It uses Jacob Nielsen's ten heuristics which cover many usability problems such as flexibility of the program and user control. This

enables us to define problems and categorise them in order to truly find what the main problems of the program are. I will also assign a severity ranking in order to see how hard these problems are to overcome and how much they frustrate the user. This will enable me to understand where these problems have arisen and suggest appropriate solutions in terms of my recommendations for a new system.

I have also analysed the need for good project management and what management techniques need to be included in the program in order to get the most from the team. To do this I used Deming's 14 points of management and Herzberg's motivational theory which relates to the quality of management relating all points back to project management and what the students really want to benefit from by undertaking this module.

In addition, I used systems dynamics and influence diagrams to understand how all project factors have a relationship between them. This is a project with such a large scope that it is important to understand the relationship between entities and how they affect the environment around them which is uncontrollable. I began to think about the surrounding environment in the interim report by using soft systems methodology but I will now further investigate the relationships and how these relate back to the aim of good project management.

Overall, this report will include a large amount of analysis which will result in the production of clear recommendations for a new system that will improve the overall aim of good project management and changing the initial negative perspectives received in the interim report.

Scope

As discussed in the interim report – my main aim was to create recommendations and requirements for a new system that incorporates all the good aspects from the tools identified and eliminates the areas which frustrate the users. It is important that the tool defined in the requirements eliminates the negative connotations surrounding the idea of project management and change their views on using effective project management techniques.

Not in Scope

Due to uncontrollable time constraints I have readjusted my project aim in order to include more analysis and supportive evidence. This means that I have eliminated the requirement to produce designs as I feel time will be wasted on producing screenshots and prototypes whereas I feel a more clear project deliverable would be a detailed set of recommendations for a new system and supportive evidence to why this has been chosen. I think in doing this, the deliverables will be able to be passed to a design team and the requirements will be understandable and be able to be produced without error. I think the design of what the new system will look like in terms of screenshots and prototypes is not as important as long as the functionality is there and the understanding of avoiding the usability errors that we found initially.

Analysis Techniques

As discussed in the introduction this report will include a large amount of analysis which has been used in order to support the existing views found in the interim report. These views are discussed below and still have not been refuted.

From the interim report we found that the main tool the students saw when asked about project management was Gantt Charts used in Microsoft Project. Even with this strict view of what they believed project management entailed, they still did not see any benefit of it. They perceived it to be inflexible and frustrating to use. They preferred more informal methods of communication in order to plan a project and this is why communication methods were also analysed as they felt this is the most useful way to arrange tasks. They did not really perceive this as project management but project management is defined as according to the association of project management – Martin Barnes "At its most fundamental, project management is about people getting things done". To begin the analysis I wanted to see how inflexible these programs really were and ensure the student's views are supported. I did this by performing a heuristic

evaluation which allowed me to test the usability of the programs identified. From this I could then understand what the students wanted to achieve through these programs and why they found this difficult – I could then use these findings in order to analyse the entire project process establishing a "full picture" of the group project module in order to develop a system which meets all their needs. To model this entire system I used influence diagrams and comparison against quality techniques which all lead to the development of a detailed requirements document.

Heuristic Evaluation

The Chosen Programs

From the analysis already carried out in the interim report through surveying the students for their opinions on their current project management resources. it is clear to state that there are several problems with project management within the group project module currently. There is not one "fit for purpose" software program that meets the needs of a group of students working in a flexible project environment. As everyone is equal in the team, there is no defined project manager and these teams are regularly dispersed across the country on term breaks and commitments elsewhere. Due to the flexible nature of this, the teams are more inclined to use an agile approach to project management but from research there is no program readily available to the students.

The students from investigation have defined several programs that they use in order to try and meet their needs. These programs are:

- Facebook
- Google Docs
- E-mail (Cardiff University System)
- Microsoft Project

Why use Heuristic Evaluation?

A Heuristic Evaluation is a usability engineering method for finding the usability problems in a user interface (Nielsen, 1994). The benefits of doing a heuristic evaluation is that it is cheap in comparison to other usability methods as they do

not actually involve users. In the real world, this method is carried out with several evaluators but I feel in my project due to the experience of myself in undertaking the group project previously that I have enough experience of being the user that I can understand fully the frustrations of the user and be an unbiased evaluator. I chose this usability evaluation method as I had previous experience of using it in previous modules. I used this method previously on an already established program and saw the benefit of finding usability errors on a program which previously I thought was easy to use. I felt in comparison to other usability testing methods such as strict user testing or cognitive walkthrough, a heuristic evaluation did not involve users and was suitable for use on an established program. Other usability methods would be difficult to use in this environment such as user testing as users would have prior experience of using the project so may already have found solutions to problems trained evaluators might have identified.

Heuristic Evaluation Method

A heuristic evaluation is a technique developed by Jakob Nielsen. He outlined a set of usability guidelines which are used by evaluators which in this case will be myself to rate how usable the system really is in performing tasks that a user would usually do.

The ten heuristics Nielsen defined and that I will use are listed below:

1. Visibility of system status
2. Match between system and real world
3. User control and freedom
4. Consistency and standards
5. Help users recognise, diagnose and recover from errors
6. Error prevention
7. Recognition rather than recall
8. Flexibility and efficiency of use
9. Aesthetic and minimalist design
10. Help and documentation

With the defined heuristics set by Nielsen I will apply these in order to determine usability errors. Due the vast variety of programs that I will analyse varying from communication tools to document sharing tools, it is important to understand exactly what functionality of these programs will be used in order to manage a project. In terms of Facebook for example, the only functionality we will use is the group space however there is so much more to the program. It is important to focus on the tasks relating to the project rather than analyse a project as a whole. In order to focus on this I decided to use a Hierarchical Task Analysis to set the tasks that I perceived the students to use the programs for and how they would use it. This was a good method because it enabled me to focus on what the students need rather than the program as a whole. I could see all possible ways of completing one task enabling me to get used to the programs functionality before performing the heuristic evaluation. A hierarchical task analysis is a structured approach which provides an understanding of the tasks users need to perform in order to achieve their goals. This tool originated with Human Factors and therefore compliments heuristics evaluations well Hornsby, P (2010). In order to ensure that the tasks selected for these hierarchical task analysis are what the students will actually use I will continue to use the sample group discussed in the interim report in order to get a clear understanding of what they use these programs for and model them using the hierarchical task analysis.

From this hierarchical task analysis I can actually perform the task in the way that I have broken down and at each stage analyse the usability by comparing it to the heuristic principles defined. By being able to group the problems analysed into the principles you can clearly see where the problems are and how they relate to each other and work on a improvement to that heuristic as a whole. The students when surveyed portrayed a frustration towards many of the programs used in project management. It is important to understand what those problems are and the reasons they find them frustrating in order to fix that throughout the new program and not just cover it up with new functionality.

The final stage of this heuristic evaluation will be defining the severity ranking. Many problems will be defined due to the complexity of the programs. A lot of the functionality being used in some of the programs is not the creators' main aim for people using their product – for example Facebook was not created in order to allow groups to manage a project – it is a social networking site. It is important to analyse how severe the problems we identify are. By doing this we can see whether a solution can be created if using the functionality from this program in my recommendations for a new system. Some problems will be cosmetic and will not cause huge frustration to the user. By noting this severity ranking we can clearly state where the large problems lie and ensure that these are covered fully in the recommendations. The severity ranking that we are going to use are listed below:

Rating	*Definition*
0	*Violates a heuristic but does not seem to be a usability problem*
1	*Superficial usability problem; may be easily overcome by user or occurs infrequently.*
2	*Minor Usability problem; may occur more frequently or be more difficult to overcome.*
3	*Major Usability problem; occurs frequently and persistently or users may be unable or unaware of how to fix the problem.*
4	*Usability catastrophe; serious impairs of product that cannot be overcome by user.*

Microsoft Project

Microsoft Project is a project management program which is very commonly used within Cardiff University's School of Computer Science & Informatics. It is readily available to the students and is encouraged to be used as a way to track project milestones. From surveying the students I found that they feel obliged to use this program as they feel it's the only "formal" project management technique that they are aware of. They feel that in doing a complex Gantt chart they will get more marks and have a better project. In attempting to create these complex Gantt charts that are often perplexing to the students. I first need to investigate to gain support for their views before I can make educated recommendations on what needs to be improved.

History of Microsoft Project

Microsoft Project is a well known developed tool which has been at the forefront of project management especially on an educational level. Microsoft Project even though aesthetically you can tell what you need to do for the object it is hard to really demonstrate the project objectives and communications between team members. Large projects would easily have enormous Gantt charts which would be hard to follow and hard to change. Brown, E (2007) stated these problems in his review of Microsoft Project saying that this program alone will not manage a dynamic project.

The views described by Brown, E are agreed with by Shu, S (2007) who argues that Microsoft Project is a large barrier to communication in project. In the group project module communication is key as all team members are equal and there is not one sole project manager explicitly defined.

Hierarchical Task Analysis

As a clear way to define how each task would be defined I have chosen to do a hierarchical task analysis. This is a method of breaking down tasks to the lowest level by defining sub tasks then sub sub tasks and so on. I have chosen to use this analysis as it focuses on the actual tasks a user will carry out and not on what the software assumes will be done. It also describes the tasks in a visual

format making it easy for myself to clearly see what each option the user will take.

When studying Microsoft Project I have decided to undergo three important tasks to test usability.

1. Scheduling 5 tasks in a Gantt chart
2. Changing working time
3. Link 5 Tasks together

Heuristic Evaluation Problems

Below is a summary of the heuristic evaluation problems found when completing the tasks using Microsoft Project. I found these problems as a result from surveying the student's views and completing the tasks. For a full list of the heuristic evaluation problems alongside supporting evidence. Please refer to Appendix B.

1. Can add tasks without being forced to add start dates and durations. –
   Severity Ranking -1, Heuristic Violated – Error prevention
2. Difficult to print a large plan on one page enabling it to be readable for the user.
   Severity Ranking – 2, Heuristic Violated – Flexibility & Efficiency of use.
3. Can add start time and finish time without adding a title enabling you to have blank entities in the plan.
   Severity Ranking – 1, Heuristic Violated – Error Prevention, Match between system and real world.
4. Difficult to identify that you can add resources to plan without prior knowledge of the program
   Severity Ranking – 0, Heuristic Violated – Recognition rather than recall.
5. When adding resources you can select more than one resource easily.
   Severity Ranking – 2, Heuristic Violated – User Control & Freedom, Flexibility & Efficiency of Use.
6. When selecting the calendar you can only set up one project calendar but team members can have different schedules which can't be accounted for.
   Severity Ranking – 3, Heuristics Violated – Match between system and real world.
7. When a date is altered tasks unlink themselves without a reasonable error message or warning to the user.
   Severity Ranking – 4, Heuristics Violated – User Control & Freedom, Flexibility & efficiency of use, Error Prevention, Help & Documentation.

Conclusion of Findings

As you can see from above there are many usability factors which support the initial views gathered from the survey of students undertaken within the interim report. The program lacks a large amount of flexibility and this is why many of the above problems affect heuristic principles – flexibility and efficiency of use and User control and freedom. The students noticed this large lack of flexibility and found planning using this software more of a challenge than the project itself as it does not match the requirements for the way in which they perceive beneficial to plan meaning it does not match the real world violating "match between system and real world" on many occasions. .

From these findings I think I need to reevaluate what the students would prefer in order to increase the flexibility. I think from the above findings change is the biggest factor. They found it difficult to plan correctly in the first place due to an inflexible calendar, difficult scheduling habits and lack of change control. The students have been encouraged to use agile methodology so a large consideration needs to occur over the use of agile within this program and whether the problems found above in the heuristic evaluation have been supported when comparing it to the agile methodology.

Microsoft Project and Agile methodology

The biggest conclusion I can draw from the analysis of Microsoft Project is its lack of suitability for projects which use agile methodology. In the School of Computer Science & Informatics within this module the students are encouraged to use agile methodology as their means of software development. Agile methodologies main advantages according to Williams, L (2010) are to embrace higher rates of change in requirements and customer expectations.

According to Ambysoft (2012), there are several agile planning tips which must be followed in order to schedule a plan effectively. He states that characteristics of these are as follows:

- Only plan accurately in detail for nearby tasks

- Gantt charts do not really have any true value in agile projects
- Involve the people
- Use short iterations
- Use a requirement based approach
- Choose an approach which best selects your own environment- does not try to tailor yourself to another person's methodology if it does not truly fit your environment.

These characteristics relate back to the agile manifesto which dictates agile methodology as being flexible and reacting quickly to customer change. Microsoft project does not really reflect these characteristics as it uses a much more strict and rigid approach. This program is heavily reliant on a strict Gantt chart where as Agile is so dynamic that having strict deadlines and planning a whole project in advanced is not really feasible. According to a survey undertaken by Ambysoft (2007) it was found that Gantt charts were the least valuable work product on agile products. They are too inflexible for suitable use. In terms of the group project and questioning the current groups – they found that they use Gantt charts as a way of gaining extra marks in the project but do not follow the plan once created – it is only another appendix in their report which shows it has no true value to them.

Facebook
Social Networking has become a huge part of student's lives. As this project is based around the group project module the students will have access to social networking on a regular basis. According to Johns, T (1995) Communication amongst teams improves overall project management and ownership of work. They state within this journal that well run projects nearly always contain paths of informal communication where longstanding relationships are built. In this group project scenario were all team members are equal it is imperative to build these relationships in order to everyone to have a sense of ownership and teaming. By having a good team it has been found that the overall project quality and value of the product created is increased substantially.

Students need to be connected on a personal and academic level so to integrate the two becomes very convenient for the user. According to a study taken by the University of New Hampshire - Chuck, M(no date) 96% of users are using Facebook. This shows the substantial reliance on social networking in a student's lives. As the group project module is not full time and is incorporated with other commitments of the students it is difficult to keep in contact via a strict project plan. The teams need to be able to quickly contact each other and react to the changes or heavy commitments of other modules. At the moment a project management tool is not available that allows for steady communication amongst teams which is easily accessible so they have to integrate a personal tool. This is good as information is readily available to the students as they would use this normally anyway. However they do not have the opportunity to opt out when they do not want to be involved in project work.

From surveying the students at the beginning of this project, Facebook was clearly defined as a tool which they find useful. They said that they set up a group using the social networking site that only group members have access to and then post information and notices on there. The main issue with this is the possibility that someone does not have a social networking account. In the sample group, this was the case. The initial solution was to send all notifications to the student via e-mail that appeared on the Facebook however this would be extra work for another team member and was often forgotten. In the end, the group encouraged him to sign up and only use the site for this project purposes. He did this but he shouldn't have had to do. Due to the lack of available project management programs that really encourage team communication other methods had to be used meaning this student did not have the opportunity to opt out.

Hierarchical Task Analysis Tasks

From the information gathered from the survey and my own experience studying the group project module I have decided to study the following three tasks as I believe they are a good representation of what the

students will need to do in order to communicate project activities amongst each other.

1. Setting up a Facebook group
2. Posting a meeting request
3. Uploading a document

Summary of Facebook Problems

Below is a list of the heuristic evaluation problems found:

1. Immediately forced to "Write a post" rather than have an option to do other activities.
   Severity Ranking – 1, Heuristics Violated – Flexibility & Efficency of use, recognition & recall.

2. When using "Add Question" option – does not make it obvious that you need to add poll options.
   Severity Ranking – 1, Heuristics Violated – Error Prevention, Help & documentation.

3. In a group, you can delete all group members and be the sole member of the group.
   Severity Ranking – 4, Heuristics Violated – Error Prevention

4. Difficult to find the "Add Document" option
   Severity Ranking – 1, Heuristics Violated – Recognition rather than recall.

5. Does not update number of documents added instantaneously.
   Severity Ranking – 2, Heuristics Violated – Visibility of System Status

6. Does not allow to add .doc formats – must copy and paste information.
   Severity Ranking – 4, Heuristics Violated – User Control & Freedom, Flexibility & Efficiency of use

Conclusion of Findings

Facebook's main use is not group activities. It is a social networking site set up for the communication with friends. According to Van Grove, J(2010), Facebook groups was revamped in order to give users the ability to control the information they share with friends in a private and flexible way. When surveying the group this statement is supported as team members can create a private space where only members can view posts and can easily use the new instant messaging function in order to communicate quickly with eachother. This is great for distance communication for example on breaks from the academic term. However it still displays several usability flaws which mean that the system is not fully suitable to the students needs. Importantly it does not have great functionality for sharing documents of several file types. Each document uploaded must either be plain text which is copied and pasted into a text box or a picture. This is unusable as for academic documents these are usually created using the doc. format. It is extremely difficult to use this function as the sole group space when documents cannot be added without confusion of changing their file type and it still means that documents must be stored in two places.

The biggest problem with using Facebook within a group setting is the need for sign up. As shown by the influence diagram (see Appendix A) if the students are unwilling to sign up to a program then they are less likely to use it and check it regularly meaning communication will be poor. From analysing Facebook I can use this to determine several requirements. I think most importantly is the sign up process. Within the sample group I used initially there was a team member who was reluctant to sign up and he missed out on important information being passed between the group. A way to have a less complicated sign in process would be beneficial to the user.

Cardiff University E-mail System

Another program defined by the students in the initial investigation was the use of Cardiff University e-mail system in order to contact the group members and academic staff such as Clients and Supervisors in a more professional nature.

They believe that by using this system they have a traceable appropriate method of communication in which both students and academic staff have regular and uninterrupted access too. The types of e-mails sent would consist of plans to schedule important milestones such as Presentation meetings – including information on room bookings etc.

Even though this email system is accessible regularly to students it does have some downsides. As this program's primary use is not planning the project then it may be overshadowed by other tasks this e-mail system is used for communication in other modules. Important project information may be missed in a pool of other e-mails. This is stated by Sumecki, D et al (2011) who says that users of e-mails for work related activities regularly experience email overload where they can no longer quickly identify business critical e-mails.

Hierarchical Task Analysis Tasks

From identifying this as a tool I questioned further what tasks the students would need to perform in order to use this as part of their project management and communication tool. The main use for the tool is to contact all group members and the client so this needs to be done quickly with ease. Also they use the e-mail system to formally send documents of importance to the client or other group members.

1. Send an email to all group members
2. Attach a document

Below is a summary of the problems identifying from completing the following tasks. From analysing the system I found that even though this program does not have many usability errors it does not conform to being used within a project management setting and therefore features are not flexible enough for the team to use.

Problems

8. Cannot quickly add a mailing list of all group members.

   Severity Ranking – 2, Heuristics Violated – Flexibility & Efficency of use.

9. If two users have the same name it's difficult to find the correct user.

   Severity Ranking – 3, Heuristics Violated – Flexibility & Efficiency of use

10. Does not allow the student number to be linked to the person's name in differentiating two people with the same number.

    Severity Ranking – 2, Heuristics Violated – Flexibility & Efficency of use.

Google Docs

When surveying the students they identified that there was not a secure storage place in which they can all have access too. They wanted a space which they can easily upload and download important files which all students can have access to the same versions at the time and place that they require.

A big issue in project teams is the issue of versioning. If the same information is being updated regularly by team members then there will be regular versions in the same group. This will cause lots of confusion and will be unproductive for the teams. Google documents are a fairly new feature to Google and have enabled users with a Google email address to quickly upload and share documents. Not only can they upload existing documents made in common programs such as Microsoft Word but they can create dynamic documents including presentations and slideshows using Google's features meaning even on computers without software installed they can still create documents if they have a internet connection. This means working on the go has never been so easy.

Tasks
- *Upload existing word document*
- *View document uploaded by a friend*
- *Edit document*

Summary of findings

Below is a summary of the conclusions made through undergoing a heuristic evaluation from the following tasks above.

- Not obvious how to share a document as there is not a share document button to quickly share documents with team members.
  Severity Ranking – 1, Heuristics Violated – Flexibility & Efficiency of use.
- The system does not clearly display who else the document is shared with only the owner.
  Severity Ranking – 2, Heuristics Violated – Visibility of System Status.

- When uploading a document, it requests you to change your document from Microsoft word into a Google docs format. This may confuse the users who want to keep their documents the same when uploading *Severity Ranking – 1, Heuristics Violated – Flexibility & Efficiency of use.*

Conclusion of findings – Google Docs

After analysing Google Documents functionality I can see why the students have chosen this to share their documents but the functionality offer does not pose any really benefit over sending emails out attaching the document. The documents they upload must be changed to an unfamiliar format, they must select each user they want to share their document with by entering their email address and it allows the document to be edited by multiple people at once. Its biggest benefit is its online capability allowing students to access documents on their mobiles or at home where they do not have the updated version saved on a memory stick for example. I think by incorporating the online functionality as well as the ability to share documents will be used in the development of the new program however a quicker and easier way to do so should be established.

Summary of Heuristic Evaluation Findings

At the start of this project, I was aware from the student's opinions that there were issues that they weren't happy about in relation to their project management techniques but I had no evidence to support this. A great way to gather supportive evidence to ensure what the student's are feeling is true is to undergo a heuristic evaluation. A heuristic evaluation was a good way for me to cheaply but effectively test the usability within the programs the students have identified to use to aid their project management. It is cheap and effective due to its requirements not involving real users; I can carry out the evaluation myself through the tasks that the students have identified to me.

I analysed four programs in which the students identified they use in order to manage their projects. These are Microsoft Project to develop strict project plans, Facebook for communication with team members, Cardiff University E-mails for communication with university staff members and sharing documents with them and finally Google Docs for sharing documents between team members easily.

I found from anaylsing these programs that the areas of the heuristic evaluation that were violated the most were user control and freedom and flexibility and efficiency of use. These heuristic principles supported the student's views who said that they experienced frustration through the inflexibility of the programs described in using them to support their projects.

In terms of Facebook, E-mails and document sharing facilities their primary use is not for use in project management and communication within group projects so the program cannot be criticised for its lack of project management support. However a program in which solves the problems described within the heuristic evaluation which will reduce their complaints and encourage a better perception for project management so that it is used effectively within group projects.

Influence Diagrams

In this project I found there were many areas of research which could give me a clear idea of the project management techniques. These research ideas stretched from communication tools, quality of project management techniques, success of the project and detail included in the plan. It is important that these research areas link together in order to be able to provide a thorough list of recommendations which correspond to what the students want and are supported with evidence. From completing the heuristic evaluation I saw the initial problems surrounding the student's project management techniques and knew that I needed to understand the full project process in order to understand what is required in their project management. I felt an influence diagram would be a good way of linking research and ideas together with the problems identified in the heuristic evaluation in order to create "a full picture" of what the problem is and be able to see how each area links together quickly in a way that I can reference throughout the duration of the project.

Influences diagrams is a methodology included in systems dynamics which involves the simulation of a system in a clear diagram. It enables you to put your personal thoughts onto one sheet of paper allowing myself to show my understanding of the system. An influence diagram is made up of strategic

resources and flows. The flows show the relationships between each resource with a indicator of whether this influence is positive or negative. Influence diagrams used in this project have been used in order to identify key factors which surround the project activities. By identifying factors such as quality of project plan and amount of team member's commitments I could begin to build a "full picture" of the whole system. I noticed immediately when starting the influence diagram with the factor "quality of project plan" you can quickly build a large system of linking factors. This allowed me to think of areas that without the prompt of this influence diagram I would have forgotten and have deemed them unnecessary to consider.

I decided to use influences diagrams as I felt they allowed me to map the whole process in one easy to reference diagram. I knew from talking to the students initially that the problems they described were complex. I had to completely redefine what they perceived to be project management as there were so much negative connotations. In order to understand what they really wanted to use the program for, in terms of their project management it was important to understand the whole process and not just the initial plan. The idea of agile methodology means less reliance on a strict plan and more reliance on communication, client collaboration and change management. The influence diagram allowed me to start by choosing factors involving the project plan such as the overall quality and then implementing all linking factors from that starting point. For the basis of this report, I have managed to split the influences into sections in which I will consider relevant research and students opinions relating to parts of this influence diagram. Please refer to Appendix A for influence diagram in full.
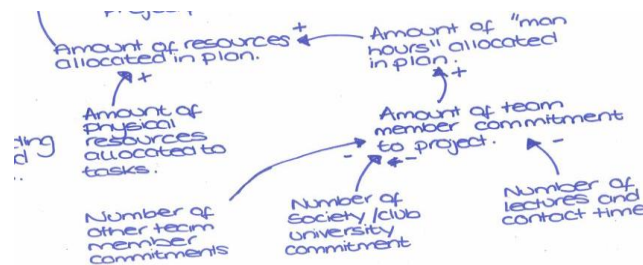
Team Communication
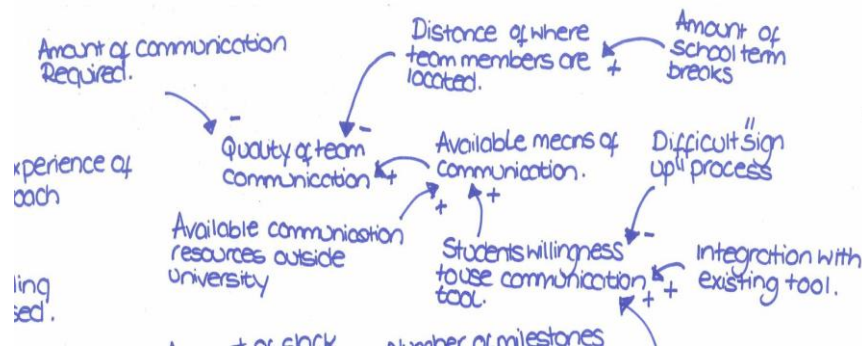
The quality of team communication influences many things. Importantly I believe it strongly influences the understanding of tasks which manipulates the overall quality of the project plan and whether the project succeeds. It is important to have strong team communication which will then ensure tasks are completed on time, the project is completed to specification and the project is an overall success.

In terms of the group project module it is difficult to project manage as just a strict plan. There are so many other commitments the team has to consider in terms of other modules and extracurricular activities, that having good communication to share out tasks is extremely important. This is why I have redefined part of the project aim in order to consider relevant team communication as I believe that any tool that I recommend will need to have sufficient available communication tools for the team.

According to Johns, T (1995), a characteristic of a well run company who undertake projects is intense communication across project teams and their customers. In the most well run projects within companies, teams prefer informal communication so that interpersonal relationships are built between team members. I believe that this is true in the context of the group project because having close relationships with your team means that there is a happy environment, better morale and in turn project quality and the likelihood of pleasing the client will improve. The groups in the group project models already see the benefit of informal communication in terms of "posting" on each others

spaces on social networking sites but this is not because of the desire to use informal communication but more because there is not a program which meets their desired needs to project plan and communicate with the team.

Team Member Commitment

Amount of resources allocated in plan. Amount of "man hours" allocated in plan.

Amount of physical resources allocated to tasks. Amount of team member commitment to project.

Number of other team member commitments Number of society/club university commitment Number of lectures and contact time

An important area highlighted within the influence diagram was the amount of team member commitment. I have managed to identify that in order to succeed in the project good team member morale needs to be established which derives from good communication and lots of commitment to the plan and to the project itself. This subsystem is important in the establishment of a good project plan as the developer of this plan needs to know how many hours their team are available, what tasks they have the abilities to do and the resources needed in order to fulfil them. However, these characteristics of how much commitment they have are often outside of the team's control. These factors are shown on the influence diagram above and consider information such as lectures and other commitments such as societies and part time work.

From analysing the influence diagram I have established one recommendation which will be included in my final list of recommendations for a new project management tool. More consideration needs to be given to other commitments and not just assume that every team member will have the same schedule and will work on this project solely. Even in a workplace it is likely that there will be other commitments that will ensure that not all team members will only have this project as a priority. To test whether the perception I had was true, I interviewed several employees who use project plans in order to run several projects within their business of General Electric to update their quality systems online. I found from talking to 5 employees within the department all were involved in an average of 3 projects and not the same project team was repeated twice. Even though my project is set in the context of an academic setting it is important that the findings simulate projects within the real world. From this information I have

found that calendars and working times should consider the use of other commitments in a user friendly way for all team members individually. This will be discussed further in the recommendations section.

Willingness to use a new tool
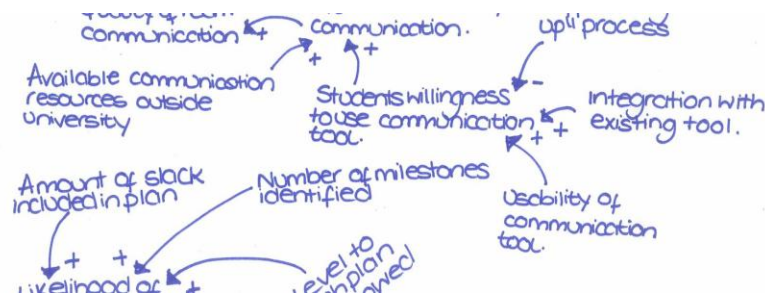
In order to develop a solution which satisfies the students, I need to ensure that the usability problems they described are solved. The main barrier will be ensuring the students are willing to transfer to this tool if it was to go into development. It needs to display benefits and solutions to the problems they initially displayed.

In order to understand the student's willingness to use tools I have modeled this within my influence diagram. The willingness of them to use these tools are affected by how difficult it is to sign up, how easy it is to use and whether it is integrated in something we already use. This is important in both the recommending of a new system as well as the research into problems with the current procedures of project planning in the group projects.

In terms of the programmes that the students have identified using- there is often signing up processes which some members may be unwilling to do such as enter social networking sites or join online storage systems. However if they do not follow the group norm they will be left out and may miss important information. By all using the same communication mechanisms information can be easily shared therefore improving overall communication which is modelled within the influence diagram.

By using this information described above I can use the influences to help determine recommendations. The main consideration which I feel is important is

the integration with existing tools. If a project management tool was integrated within a tool they currently use, the students would feel more willing to use the tool and more comfortable with its functionality. By linking a system to university login, you immediately have students data and information so could easily create group spaces – importantly, it also gives it credibility by being university supported which will increase the students eagerness to use the program.

Understanding of Requirements
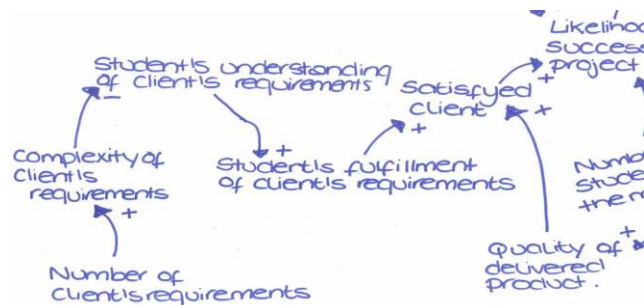
According to Coley, P (2001), Understanding requirements is a key task in ensuring project success. By having poor or no requirements your project is destined for failure before it even begins. By not planning adequate time for requirements gathering you are limited to how successfully you can understand and fulfil what your client wants. This is displayed within the influence diagram as if the students understand the clients requirements well the likelihood of success will be larger. By understanding the complexity and number of client's requirements before you begin you can clearly allocate adequate time and ensure the project is always focused on fulfilling what the client's wants.

Supervisor Support
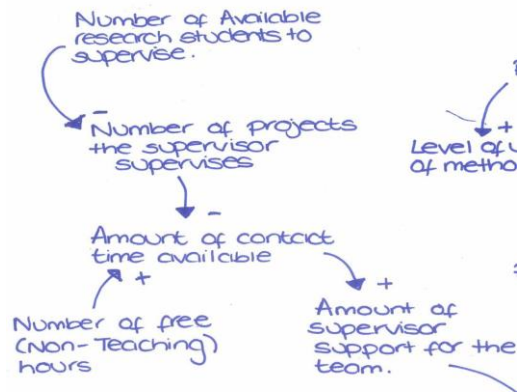
In the context of the group project it is important to ensure that the project plan includes supervisor support, their schedules and the understanding of what they want us to do. The supervisor is just as important as the team members as they must approve that the project is developing how the module desires and that all milestones are met. In any project plan time must be accounted for relevant meetings with them ensuring they are kept informed at every stage.

We need to consider how much the supervisor will be involved in the project so must understand their available contact times in relation to the team's times and therefore an available calendar for them should also be recommended. Further to this we must ensure that there is always an available method of communication within the system to ensure that any questions are asked and answered immediately and to ensure the project is without delays.

From surveying several supervisors who currently supervise group projects I found each group to differ greatly. Some supervisors kept to formal communication only via Cardiff University e-mails or formal meetings booked in advance. Other supervisors got more involved and were active within the facebook groups their teams had set up. It was important to make the processes more standardised by allowing for several methods of informal communication but only where the students see fit. Allowing them to opt the supervisor out of some communication threads if they do not perceive it to be beneficial for them to see.

Suitability of methodology
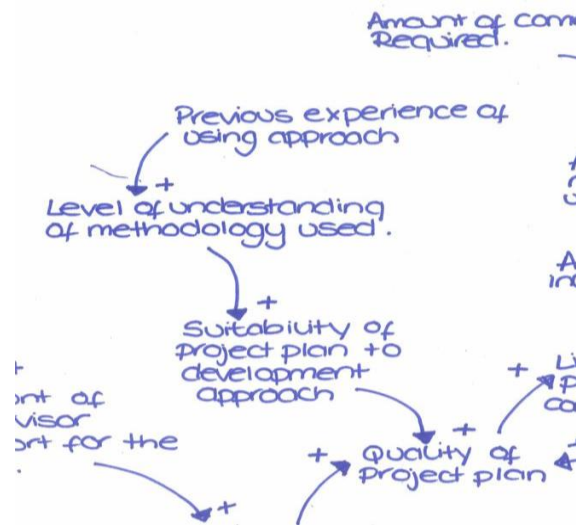
When the students begin to undertake the group project they are given little guidance in what type of methodology to use and what project management technique to use. The School of Computer Science and Informatics encourages agile methodology in software development but this choice is left to the students. It is important to ensure that the right methodology is chosen which not only suits the group but enables you to complete the project to specification and on time. Software development projects according to Chow, T & Cao, D (2007) are renowned for being unsuccessful resulting in delays, abandoned or failed software projects. It is of utmost importance to ensure that this module is successful and the client is satisfied. A well planned clear project will relate positively to a successful overall result. The type of planning chosen and in turn, the software chosen to use will result in a high quality plan leading to overall success so by clearly understanding the methodology and using it to it full potential is of great importance.

Agile by definition is something that is flexible and responsive(Versionone, 2012). So the project management tool developed must reflect this. The ability of the methodology must survive in an atmosphere of constant change and emerge with project success. This is detailed carefully in the values stated within the agile

manifesto in order to "respond to change over following a plan". During a study carried out by Chow and Cao (2007) one of the failure factors in software projects is the lack of project management competence and ill defined project planning. Even though the agile manifesto states to respond to change – there are elements of planning that need to be considered but strict Gantt charts may not be the answer.

When carrying out the initial survey within the project plan I discovered that the student's perception of project planning was strict Gantt charts and they did not really perceive other mechanisms of project planning. This shows that the students are not competent in the methodology they have chosen to use and only follow the norms that the university have set in only having Microsoft Project available as a formal project management tool.

The influence diagram shown above emphasises the need to fully understand the methodology and have experience of using it practicality in order to create a high quality project plan which can then lead to the success of the project. The methodology you choose to follow needs to have the full support of the team members and work effectively in your project in order for it to be succesful. Further research into agile methodology project management practices needs to be undertaken in order to understand best practice and create a project management program which can adhere to this to give the students a flexible change friendly environment.

Overall Quality of project plan
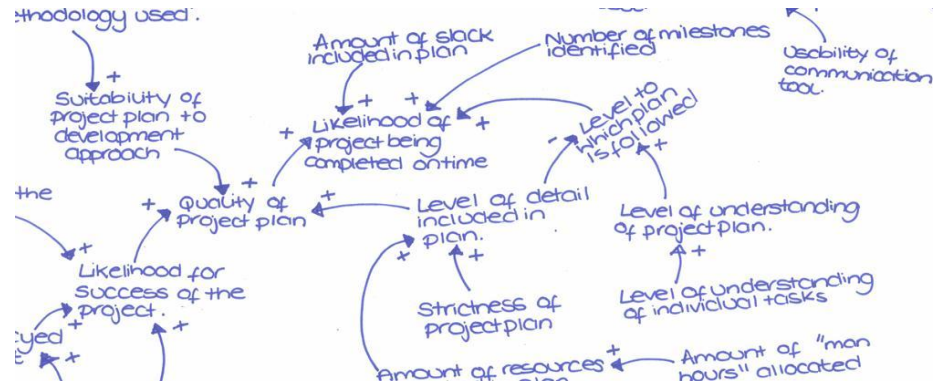
Within this influence diagram there was a central starting point. This originated from the quality of project plan which I believe effects all aspects discussed above. Importantly though quality can be defined as in operations as "a measure of excellence free of defects through adhering to a set standards" (Business Dictionary). In the context that I refer to quality is a measure of excellence which results in the successful completion of the project. My view is if the project is high quality and displays a consensus view from all team members then it will result in the successful fulfilment of the aims and objectives and the completion of the project.

The quality of the project plan has been influenced by many factors such as how detailed the plan is. Detail is important regardless of what methodology you decide to use as the plan needs to be understood and followed by the team members. In order to ensure detail it is beneficial to continue to be able to add resources and team members to tasks to still ensure accountability throughout within the new program recommended as accountability is extremely important. This view is supported by Johns, T (1995) who stated that accountability and ownership are important factors in a project so much that every task no matter how critical should be associated with a team member. We must also consider the level to which this detailed plan is now followed. If a plan is too complex at the beginning then the team members may be reluctant to follow it as they may

find it too daunting. It is important to put members at ease and ensure that planning is an activity they find beneficial and not an activity in which they feel they must do in order to gain extra marks.

I feel the main benefit to a high quality project plan will result in the completion of the project on time and to the client's specification. The plan delivered will need to be updated and changed throughout the course of the project and this is something that needs to be considered in the development of the project plan.

All considerations stated above will be described in further detail in the requirements section as the quality of the project plan I believe is of utmost importance.

Summary of Influence Diagram

From creating an influence diagram I feel I have managed to analyse all areas that may directly affect the project planning stage of a project. In order to provide a full solution I believe widening my scope from project planning to the full project itself was extremely beneficial. In the influence diagram I have considered influences which would be out of the teams control but still need to be adapted into a program. I believe this is where other project management programs have failed to meet these students needs previously due to the lack of understanding of a full project lifecycle and how a team would communicate and work together. I want to recommend a system that if developed would please all the students surveyed in the beginning and change their perception of project management. I can see from undertaking the literature research and from my own personal experience the benefits of having a plan and agreed methods of communication. From undertaking this influence diagram I feel I have all the information for the project in one concise diagram.

I really think this method has been beneficial in analysing the whole system so that I have been able to highlight key areas and create rich recommendations for a new system.

What makes good project management?

Deming's 14 point of quality management.

Good project management is difficult to define as everyone has their own methods of how to manage a project ranging from strict to extremely flexible. This is dependent upon many things such as Management style and methodology of development used. The teams in the group projects will be self managed as no specified project manager is allocated. It is up to the teams themselves in order to allocate roles. It is important that all management in the team is of a high quality so an understanding of what makes the management style high quality is required. In order to analyse management techniques that should be used I have decided to use Deming's 14 points of Management. I believe many of these points are transferable from general management to project management.

1. *Constancy of purpose*
   - *Ensure all team members have an agreed aim and consensus of the final goal not just the short term milestones.*
   - *Ensure plan enables them to achieve long term success so to pass the module not just delivery of a report.*

2. *The New Philosophy*
   - *Focus on ways to prevent rather than detect – is there enough time and slack for major activities? Do we have preventative methods in place to ensure we will not run over time or not meet specification?*
   - *Each activity has an owner who is responsible for the completion of that task. They can ensure that all team members are working on it so that it conforms to the deadline set and also check quality to ensure no work has to be redone or the client is dissatisfied.*

3. *Cease Dependence on Mass Inspection*
   - *In terms of project management – do not allocate time for quality checking at the end instead ensure quality is checked throughout. Each document*

before approval needs to be check for quality. Build quality into a product and not inspect it out.

4. **End Lowest Tender Contracts**

   - *In relation to the group project – do not take the easy way out. As the work is not budgeted I am adapting this point to include time constraints. Do not do the easy tasks as the complicated tasks would require more effort and time. Do not let lack of good time management be the reason for missing information. Use other meaningful methods to assess the true benefit of using a particular methodology or doing a particular task.*

5. **Constantly Improve every process**

   - *If completing the same task on several occasions such as writing a weekly report – ensure that you are improving on the last one. Use past experiences to improve quality and productivity in order to improve the overall resulting product for the client. It is imperative to encourage others to learn from your shortfalls in order to improve as a group.*

6. **Institute Training on the job.**

   - *Ensure that everyone in the team is benefitting from completing the project. It is important that we utilise everyone's skills but give other team members the opportunity to develop new skills. Do not just give tasks to people who know how to do it encourage others to challenge themselves and work alongside someone who has already develop the skills in order to transfer learning. In terms of this project management tool ensure that main activities have more than person assigned in order to make the most of each individuals knowledge.*

7. **Institute Leadership**

   - *In terms of the group project module there is not one preset project manager. This means that everyone should be encouraged to undergo leadership. Assign a person to be responsible for each task ensuring that it is complete on time to reasonable quality.*

8. **Drive out fear**

- *Encourage effective communications to ensure working together effectively. In terms of the group project module – most team members would not know each other previously. This means that extra effort needs to be taken in ensuring good communication, opportunity to help each other and have strong team morale.*

9. **Break Down Barriers**

   - *Break down barriers with communication amongst other team members, the supervisor and the client. Tackle poor communication, ignorance of project aim and competition between team members. Need to ensure good team morale and a strong team which can lead to successful results.*

10. **Eliminate Exhortations**

    - *Do not encourage use of slogans or posters – encourage self management, appropriate methods and ensuring good quality. Don't waste time.*

11. **EliminateArbitary Numerical Targets**

    - *Do not focus on meeting targets instead ensure that all work is completed to great quality. Too strict targets on work encourage quick, poor quality work. Instead evoke responsibility of tasks to people so that it shows accountability and control over all work from the team members.*

12. **Permit and Encourage Pride of Workmanship**

    - *Encourage people to take responsibility and ownership of their own work and remove barriers that stop this.*

13. **Encourage Education**

    - *Encourage self education and improvement so ensure that tasks are given to people who want the opportunity to improve. Give everyone the chance to do something out of their comfort zone to ensure challenges and improvement. Ensure everyone gets equal opportunity to complete tasks.*

14. **Commitment and Action**

    - *Make sure everyone is committed to the project mission and to the success of the project and everyone is doing everything in their ability to ensure that this happens.*

Summary of Deming's Fourteen Points of Management

From analysing the principles of management as stated in Deming's 14 points I can see many areas which should relate to the good project management techniques and people management within the program. Some points are unrelated to the project such as slogans and exhortations but are useful to be aware of. Good project management in my view includes the scheduling of tasks, scheduling of resources and motivation of teams. Previous project management programs such as Microsoft Project only really considers formal scheduling of tasks but there is more to good project management than a plan. Communication and motivation of teams is extremely important and by using Deming's 14 points for management I can clearly see that time for self development, motivation for team and commitment is important.

The main areas I found from analysing these points is that there should be consideration in place to institute on the job training and leadership. It is important to assign a person to each task in order to ensure accountability within the team and it is important to know what skills the team members have and what they want to achieve.

From using these points of management I learnt the most about the good communication in the team in order to ensure commitment to the aims and an understanding of the purpose for the project. As shown by the influence diagram (See Appendix A), good communication within a team and the good understanding of what the client wants and the aims and objectives relates directly to the quality of a project plan and the overall success of the project.

These points for management gave me an alternative view on what good management is which I feel supports the findings in my influence diagram. I think with both these techniques I can clearly create a program which can help support what I have learnt from both these tools.

Herzberg 2-Factor Theory

According to Tampoe, M and Thurloway, L (2003) Motivational theories such as Herzberg's two factor theory suggest that staff is motivated by intrinsic factors

such as personal achievement, work involvement and responsibility as well as extrinsic rewards such as security and achievement of a grade. They suggest that by being aware of these motivational theories within project management you can improve the likelihood of success so these factors must be considered in the plans.

Herzberg divided the two types of factors into hygiene factors and motivational factors. Hygiene factors involve the removal of unpleasantness in the environments – this is extremely important within project management especially within the group project as everyone has the same motivator for undertaking the group project module which is to successfully pass the module in order to progress to the next year of study. The hygiene factors will establish good team morale and to ensure no one is left out. It is so important to ensure a good team is built in order to tackle all challenges that the project will throw at them. The team dynamics and roles must be established before a project plan is built and everyone must be given equal opportunity to have responsibility and develop. hygiene factors as an example include the quality of inter personal relationships within the team and the feeling of being involved in the work. It is important to share work equally and to communicate well in order to keep fulfilling these hygiene factors.

The second factor in this two factor theory is Motivating factors. These factors display an individual's need for their own personal growth.Types of motivating factors include stimulating work and opportunity for advancement. It is important as a team to ensure each individual is given equal opportunity to grow and develop. By challenging the members of a team we can ensure that they are stimulated and enjoying the work they do. Other motivating factors surround the need to succeed in this module in order to advance to the next academic year. It is important to not only bond as a team by adhering to the hygiene factors but also consider your own self development and plan to develop yourself and think of your own achievement and how to take the most out a project. Opportunities to support both these two factors must be supported within the program.

Requirements

Requirements Gathering

From undertaking all the analysis which is described above I now believe that I have the tools required in order to develop my final product which will be a detailed set of requirements alongside a list of recommendations. Armed with the students views and the evidence to back this up I can now begin to plan what this new system will achieve. To do this I split the requirements into two sections which were "High Level Detailed Requirements" which detailed functionality which solves the student's problems as well as project techniques surrounding the methodology they will use in their own group projects. These requirements will be the basis for strong recommendations which help portray a picture of what this system will achieve.

The second part of my requirements document will include more detailed requirements about the capabilities and restrictions that will apply to this system. To do this I researched previous software requirements documents and templates. From this I saw the extensive amount of requirements that need to be thought about in order to portray clearly what the system should do. My aim in going into so much detail was to ensure that the requirements I have detailed could be understood by developers if this project was to go into the next stage of the project lifecycle and be developed. Programmers need to understand just from that requirements document what I want portrayed.

Please see Appendix C for full detailed list of requirements.

Legal and Ethical issues with the new system

After defining the requirements, extra thought needs to be considered in the actual feasibility of this system being implemented and one way to assess this is its compliance with common legal and ethical issues to ensure that it is usable within the university environment as suggested. I have considered the recommended program against several legal and ethical issues as I believe it is important to understand these before development.

As stated by Garrett, R and Lewis, J (2009) not considering ethical issues can cause a large legal backlash so time should be scheduled to consider main ethical concerns

before development to ensure the feasibility of implementing a program. The British Computer Society(BCS) implemented a code of ethics which lays out professional standards for people within the IT profession. As a university department whose degrees are accredited by the BCS it is important that any program or activities that we promote to be undertaken within this program are ethically valid according to this code of ethics.

The first ethical factor is the public interest; this involves having concern for the public and their legal rights. Within the context of the projects that will be managed within the new program it is important for the students and the university to be aware that information held on this system may be data of the public that will relate to the subject of their project. It is important that this is kept internal of the program and it is not leaked to unauthorised parties without the public's consent. The second ethical concern is professional competence – this concerns the group projects by ensuring that any third party outside of the university that the student's contact are aware that they are students representing the university – supervisors and clients may have a duty when reading documents and communicating with the group through the program that they ensure the students are aware of this factor. The third ethical concern relates similarly to the one above of the duty to the relevant authority – this again is the concern of the supervisor and client to overlook that they are informing third parties of their intentions and are representing the university well. Details and restrictions for this could be described within the program when they communicate with supervisors or clients.

The final ethical and legal issues which I think has significant importance in the feasibility of this software program and will require future research and development into the legal implications of information held is the idea of property. Who owns the information that is placed on the program? If the students create working software products then do they still own it or is it and all its documentation the property of the university. This effects information ethics alongside laws such as the intellectual property law which concerns the property of creative works. Documentation needs to be established alongside the development of the software that defines property restrictions if questioned by the students in the future.

The development of any documentation and legislation alongside this program will all need to be considered within the future work needed after this project. I think it is important to avoid any legal confrontation to ensure that these issues are considered seriously and binding documentation is in place to assure these to the students and the staff members of the university.

Future Work

This project has discussed many issues and I now believe I have a good understanding of what project management entails. Project management deals with the communication and assigning of tasks to team members, the planned tasks throughout a project, the milestones we need to achieve and the documents which aid the achievement of these milestones. From the requirements document I believe I have developed enough requirements so that a system could be developed. Before development could begin however – requirements need to be agreed upon by all the stakeholders. A large stakeholder within this system would be the students themselves but also the university as the requirements state the system should be internal to the university and run over their network similarly to the e-mail system already in place. The requirements need to be perfect before development can begin. I have noticed when creating the requirements document that there seem to be some inconsistency in some of the requirements I defined which need to be refined during future work. It is important that the requirements are clear and that there are no confusion surrounding them. Each requirement needs to be checked alongside the stakeholders to remove any inconsistency and ensure everything is agreed upon.

Other future work will involve the completion of the project lifecycle from design of the system which will involve the production of prototypes, user testing and release into the university environment. If after spending the time developing a system which meet s the students needs it is important that the student views are still supported once this system goes into development. One way to ensure this is to periodically release functionality of the system for a set of students in order to begin user testing early. I think prototyping of the system is imperative in ensuring testing is completing early as the objective of introducing this program was to improve the usability and without users involved a

unusable program may be developed once again. I would like this project to be taken into development and more functionality be added if the students deem necessary as I feel this should be a product made for them directly.

Reflection on the Project

I chose this subject as my final year project as I felt it most related to a subject which I would like to explore further past university. I believe it is important to take this opportunity to undergo extensive research and analysis on a subject which I found interesting as I could enjoy the project more and develop more accurate and coherent findings. I also had a past experience within the subject as I had previously studied a group project module and could understand and sympathise with the thoughts and opinions of the current second years. Within my second year group project we had the same issues as expressed by the students by only completing a Gantt chart to get extra marks and never using it again. This is not effective project management and we often had to rush to meet milestones and did not have very good effective time management ability.

From the project brief given to me I initially was unsure where to begin and what tools I have used previously within other modules which could benefit me. The brief was quite vague and just stated that recommendations should be suggested for a new suitable project management tool to be used within School of Computer Science and Informatics. I felt the best place to begin with this project was to investigate whether what my supervisor had perceived about project management inflexibility and students requirements not being met. To do this I initially used a survey, I began to issue the link for my online survey via the Cardiff university e-mail system. Unfortunately I had very little respondents and did not see this as very beneficial. I had to ask myself why I had little respondents - where the questions being understood and how much effort did it take for the students to complete. It is important that the students are motivated to help me. Ways to ensure this are to give a reward for doing so which for me was not financially feasible or make it easy and quick to complete that it will not interrupt their day. I felt my survey was short but did not have enough multiple choice quick questions. I decided to redo the survey in order to ensure that the survey was quicker and the

questions could be easily understood quickly in order to gain maximum response. I also had to determine how to reach these second years effectively without clogging up their email system with more links annoying them and making them more unenthusiastic to assist me in this project. I decided to use facebook and this was the first moment in which I realised how much facebook can aid the students in their university workload. By posting the link onto the second year students facebook page I immediately saw a rise in the number of respondents and even had several emailing me regarding the offer of extra help which was extremely beneficial to me. I think the survey enabled me to get many views quickly and effectively meeting my aim for the survey. I managed to collate the data and develop an understanding of the initial problems quickly. I think the survey was extremely beneficial in completing as I felt the amount of insight gained made the foundations for me to begin further analysis. My only criticism is that I could of gathered more information by asking more multiple choice questions. The survey consisted of only 7 questions in the end and only 5 were multiple choice where the rest where optional. By asking more questions and planning the survey better I could of gathered more beneficial information which could have supported my findings. Also after seeing the benefits that this survey had I could have utilised this tool to gather information from other audiences such as the clients and supervisors. Instead I used emails and asked several questions but gained information that could not easily be collated together to gain a consensus view. If planned better I believe that I could have utilised this tool to its full potential and gathered lots of useful information. If I was to undertake a similar project like this within the future then I would definitely utilise this further.

After gathering the survey's I knew I needed to establish long term communication with the second year students so that they could help throughout the duration of the project and not just at the beginning. With all my requirements and findings I wanted to support that they were coherent with the students view so by having consistent contacts I could do this quickly and easily and as they were willing to help and it would cause minimal frustration to them at a time in which they were busy actually undertaking the group project I have discussed. To do this I utilised a sample group made of 9 students. These students willingly offered to help throughout my project by bringing any project management or communication issues to my attention and answering any questions I

felt were important to the deliverables of my project. This was really useful having people that were consistently willing to help with my project. By having them as a source of support and knowledge I felt that every decision I made I could check and ensure that it was the feelings of the students. I made an assumption that these students would have views to similar to the other students. I was lucky in the fact that in this group there were a mixture of degree schemes but other personal factors could influence that the full sample set of second years was not taken such as gender. The sample group was complete with 9 males; there are often noticeable gender differences in the way people work so to sample what females thought could have been beneficial to me. I still believe that having a sample group was extremely beneficial to me but I feel that more than one would have helped me further. To have a larger sample set would have made their views stronger and ensured that every decision made was supportive of these. By having a larger sample set all requirements would have been more accurate and if I was to do this again I would not use the same group throughout the duration of the project for risk of bias views or lack of views which meet the consensus of the majority of the second year students.

After communicating with the students I then began the analysis in order to support what they communicated with me. It was important to include a large range of analysis techniques in order to understand the whole process rather than just parts and support the student's views with as much evidence as possible. The first analysis technique I used was Heuristic evaluation which is the test of the usability within the chosen program from the completion of certain tasks. I chose this technique due to the project brief stating that there was perceived inflexibility within project management techniques being used within the group projects. I wanted to understand where this inflexibility occurred and how severe was this to the total usability of the program. This method was extremely helpful as it allowed me to undertake the same tasks the students would need to regularly and view firsthand what these problems were. It was a cheap and easy method which involved no real user participation yet when checked with the students about the accuracy of my results they supported what I had found. The only limitation I found with this method is the amount of time it would take to analyse a complete program. The amount of usability problems you can find is endless due to the scope of

Jakob Nielsen's heuristics and it is difficult to know when to stop when there is so much functionality incorporated into one program. In order to limit the workload to a sensible level I implemented another analysis technique to work alongside the heuristic evaluation so that I could concentrate my efforts on areas which the groups would utilise and benefit from the most. This was called a Hierarchical Task Analysis which took tasks that would be used regularly by the students to plan their project and broke them down into small simple steps which could be followed alongside Nielsen's heuristic principles to spot usability problems. I felt this gave me a focus on only the useful functionality of the program. This was extremely useful due to some of the programs being used not being academic programs in which project management is the sole purpose such as facebook. To analyse the whole of facebook would have unfeasible and unrelated to the main aim so the task analysis allowed me to focus on key areas and develop a coherent detailed heuristic report. I found these analysis techniques when grouped together extremely beneficial and would use these again in any usability tests I do in the future. I think in the real world, these alone would not be enough to test usability in a new system and should be coupled with user testing as both have their advantages and neither should be ruled out.

After understanding the usability problems expressed by the students I needed to understand the complexity of what they are trying to manage. Academic group projects often differ from the project companies like Microsoft expect you to do when utilizing their program. They are often more complex due to the other commitments of the students and more difficult to plan in advance.

In order to create a program which removes the usability problems but meets the aims of the students I need to understand the whole process and not just what they use the original programs for. To do this I used systems thinking in the form of influence diagrams. Influence diagrams are diagrams which show the factors which concern your main aim in development of the program and how they link together. I found creating an influence diagram the most beneficial analysis technique used. This is because it allowed me to not only consider areas which I had already thought of like the quality of a plan but also areas outside of the students control which without consideration through

this influence diagram I believe I would have forgotten completely. I think the influence diagram allowed me to group the whole project together by linking my extensive research into journals regarding project management with the usability analysis to gain a "full picture" of what the students need to achieve with this new system I propose. I would suggest to anyone creating a complex system to undergo this method as it definitely allowed me to think outside of my comfort zone and now I feel this project and the requirements I have developed all fit together and represent the areas I described in this diagram.

A supportive analysis technique that was also used was Deming's 14 points of management which concerns the quality of management in achieving a goal. I felt analysing this within the group project setting was useful to understand the priorities of management and how these may relate to the students. I found this useful as it allowed me to define requirements relating to accountability and responsibility as well as self learning. I wanted to understand how important these factors were and how they could be implemented into the program. A limitation of this however was that Deming's 14 points do not directly relate to project management in a group setting therefore had to be adapted in order to fit the setting. I still found this useful as it made me think of areas which without using this tool would have been forgotten such as the idea of self learning and development. As this is a university project the students should develop theirselves in undertaking this so opportunities to do so should be encouraged within this project. I think if the suggestions within the 14 points were to be implemented within the new program then not only will the students have a great way of planning but they will also understand their own strengths and how they can develop making it extremely beneficial to use. If undertaking this project again I would continue to use Deming's 14 points due to their ability to allow me to think outside of my comfort zone and assured that the students best intentions were considered in the development of the program.

The final analysis technique I used supported Deming's 14 points in the idea of self development and accountability which was Hertzberg's Motivational theory. This concerned the motivators that would encourage the students such as the achievement of a high grade and the feeling of being needed and having responsibility. It is important

that these motivators are accounted for within the plan otherwise the team is demotivated and unwilling to participate. This is where you achieve delays on the plan and client dissatisfaction. I felt by using Hertzberg's theory I could really understand what the needs of the students are and how they could be factored in the plan. The group project is a project in which all students are equal and will have the same experience and marks when finished – it is important to keep everyone motivated to ensure fairness and a good mark. By incorporating this into the plan you can ensure that these motivators are catered for. Again by using these quality techniques I thought about areas which before I had not considered important and these techniques supported areas which I had highlighted within my influence diagram.

From these analysis techniques I felt I was now in a position to create detailed requirements for the new system which would meet the student's needs. I began by looking at the project brief and what problem these requirements needed to solve. The areas I highlighted were the inflexibility of the program, the requirements of the group project module and the methodology they were using. I decided to first look at the detailed requirements of how they could plan using agile methodology by reading the manifesto and identifying the key areas which would relate to the group project and ensure functionality in the program could account for these areas. I then looked at how to make the program more flexibility by considering the students situation and the views discovered from the initial surveys. After creating the detailed requirements I knew this was not enough to create a system and therefore wanted to finish this project with the possibility of my requirements being used for development so they need to be detailed enough so that my vision is communicated clearly to a developer. I decided to create a high level requirements document which looked at more technical function such as data requirements and reliability requirements. By looking at more detailed areas in my requirements document I felt a detailed picture of the system was created which I feel confident a developer would understand and be able to understand well. Before completing this project I did not really understand what to include in a requirements document – I understood that they had to be detailed but did not really know where to start. I researched previous software requirements documents and templates and found this very useful and I was surprised by the complexity included in these documents but

mimicked complexity in mine. After completion I really saw the benefit as I had a better understanding of my system and thought that this was communicate well in short statements under detailed headings.

Overall I felt this project was extremely beneficial for me to complete. I did meet some challenges such as time management as other commitments did overshadow the project in some stages but I learnt not only how to improve the second years project management techniques but also mine. I knew that every time I let other commitments overshadow the project I had to find time to complete the work further down the line. I learnt that plans do work but not necessarily strict Microsoft Project ones like I completed at the beginning of this project. My project management technique was setting myself milestones that needed to be completed each week. I felt this worked well for me but a downfall was that I often ignored how close the milestones were and often stressed moments occurred. I think it's really beneficial to undertake a project like this as you manage yourself and your own time but also have to please a client – I think it stimulates real world projects and I feel that I could manage my own time better after completing this project. If I was to complete this project again I would change the areas discussed above but I feel overall I did a good job and completed the task set to me.

Conclusion

I was given the task to assess whether software project management tools available within the School of Computer Science and Informatics where flexible and usable enough to satisfy the student's needs as well as deal with a variety of different process models. From first analysis of the tools available I felt there were minimal resources available to the students within the university and that the students were forced to use Microsoft Project. When querying the students about my first opinion this was supported and they expressed issues about the inflexibility of Microsoft Project and displayed a large lack of enthusiasm towards project management. Project management is extremely important and is often one of the main reasons why software projects fail. According to Haughey, D (2000), software projects fail because of many reasons but most of these relate back to effective project management such as not enough time, insufficient resources, insufficient budget, poor communication and never reviewing

project process all of these factors relate back to a lack of effective project management. It is so important that project management is considered to assure the success of a project.

I felt I not only needed to recommend a new project management program which is more flexible but ensure its features encourage the students to use it and remove the frustration they experienced from other programs. I felt the biggest problem in changing the connotations associated with project management was defining it better than just a Gantt chart. There is so much more to it than that. Project management is defined as the methodological approach of guiding project processes from start to finish according to CIO (2004). This is more than a project plan – it concerns the allocation of resources, assigning of tasks to the team, tracking progress of tasks, ensuring quality of tasks and communication progress to the team members. There is not a program available which allows for all these features at once. The students understood the need to do most of the tasks described but the processes were dispersed among many programs such as assigning tasks over the group function of facebook or editing documents over document sharing site such as Google Docs. The students often did not know where to look to complete tasks and many missed important information. My aim was to understand what the benefits are of the functions of all these programs and understand how usable they are in a group project setting and then see if these can be implemented into one program which aids the students to do everything they need to.

I first analysed the usability of the programs the students identified by using a Heuristic Evaluation and found that with each program I could perceive the benefits of why they used the program but found important usability errors within it. It was important to also note the severity of these errors and how they would be for the students. Microsoft Project was the biggest offender of usability errors as I found it to be very inflexible making simple tasks require an excessive amount of time to complete. Obviously the idea of planning and linking tasks which Microsoft Project provides is extremely important however it could be displayed and performed more effectively. Usability errors within Facebook, emails and Google Docs were not as severe but were still present. However, I must consider that their primary use is not project management so I can

sympathise why the students adapted themselves to use these programs. From my own experience using these programs for a small space of time I could already see the difficulty in knowing what information was stored where and how to access it with several different logins and websites to access. This cemented my initial thoughts to integrate all functionality associated with effective project management into one program.

My objective was to create a program that would work effectively within the group project module so I had to understand what they needed to do and how they would manage their own projects. To do this I used several analysis techniques to help me think about the wider system. I think it was important to consider constraints outside of project planning to help me understand what the students would want to do within the system. I used influences diagrams to understand the linking factors of the whole group project module and how each factor relates back to project management and links to each other (see Appendix A). This allowed me to not only consider factors inside the students controls such as amount of tasks included in the plan but also outside of their control such as supervisor contact time. By understanding all factors I felt I understood the whole process from start to finish and wouldn't be drawn into the students initial thought that the plan would take place at the start and then be forgotten about. I wanted to understand the whole process and how that plan would be used throughout the whole duration of the project. I also analysed the quality of the project management that would be encouraged through this new program and what the students would want to achieve by undertaking this module. I ensured that these factors were considered throughout in the development of the requirements for the new program by analysing the group project module against Deming's 14 points of management and Herzberg's motivational theory.

From the analysis I undertook, I felt confident in defining recommendations in which I felt would create a flexible working environment for the students regardless of what methodology they choose to use and how they want to plan. Everything they would need to manage a project from start to finish would be in one program. I recommended a system in which the plan can begin high level detailing clearly the milestones to the

students and informing them when the deadlines are closer but where more detailed phases can be embedded underneath so each milestone has an embedded phase where more detailed tasks to complete these can be viewed. By embedding it under a high level plan the students can view this information when required and ignore it once complete ensuring that the plan is simple and easy to follow as well as flexible in adding and removing tasks to these phases. Each student will have a unique login to the system where they will have responsibility for tasks assigned to them and reminders when their assigned tasks deadline is approaching. They can communicate with the team in a private environment where supervisors and clients cannot witness but can also communicate in the same system with the supervisor and clients by marking them as having the privilege to read. They can also submit drafts of work and sign them in and out of the system for editing allowing only one student to edit one piece of work at once to avoid versioning but leaving all documents available as read only when being edited so no information is out of reach. Finished work can also be submitted via this system and viewed by the supervisor or client by the students marking it as complete and available. Everything the students need within this project is defined clearly within the one program eliminating the need for several cross functional programs.

With a detailed requirements document, alongside detailed recommendations which meet the students needs the system would be usable within the group project module and could be developed within the university and released to the students.

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