End of Project Report

SEG2012GP9

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# Notes to the Authors:

* *Max 20 sides A4 in total. This page limit excludes "wrapper" pages i.e. title page, contents page, document control page. Appendices will NOT be accepted; any appendices submitted will attract a penalty.*

Marks will be allocated as follows:

1. **20%** max - Presentation. High marks for
   * a well laid out document to house style
   * clearly written, spelling and grammar-checked narrative
   * well structured, clear charts and diagrams
2. **40%** max - Narrative account. High marks for
   * a comprehensive, appropriate, clear account
   * an account which correlates well with (i.e. explains) the other deliverables. Particular credit will be given for a strong account correlating with strong other deliverables. A weaker showing that still correlates will earn credit. Conversely, an account through rose-coloured spectacles will not match with other weak deliverables; this would reduce marks.
   * honesty - your account will be checked against your group supervisor's weekly reports and logbook marks. In extreme cases we would call logbooks in.
   * thoughtful reflection that shows what you've learnt about group process, and software development management in a group.
3. **40%** max - Project & time management accounts. High marks for
   * comprehensive, appropriate, clear accounts
   * an account which correlates well with (i.e. explains) the other deliverables.
   * an account of group members' contributions that correlates with the narrative project history account (above).

# Document Control

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| --- | --- | --- |
| **Version** | **Author** | **Changes** |
| 1 | ejfs1g10 | Initial document |
| 2 | onme1g10 | Formation and Dynamics |
| 3 | by2g10 | Added introduction |
| 4 | onme1g10 | Evaluation |
| 5 | by2g10 | Chronological narrative |
| 6 | ejfs1g10 | Reviewed and rewrote document |

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# Introduction

For all the members of the group, this was the first full software engineering group project taken part in, all the way from requirements analysis through to production and testing. Techniques learnt in previous courses we used: a strict software development lifecycle - the spiral model - was followed; and UML diagrams were used for communicating technical opinions and understandings.

Throughout the project, it was observed that working well as a team was more important than being able to work well individually. Weekly formal group meetings and more regular informal meetings enabled the team members to help each other and produce something far greater than could have been produced if they remained a mere collection of people.

This document contains a full narrative of the project, and reviews the project. There is also a time management account and a thorough evaluation of the project.

# 1 Project History

A complete narrative account of the project history

## 1.1 Formation and Dynamics

Group Nine was originally formed in October 2011 to work on COMP2007’s (Software Analysis and Design) group project. The task was to develop requirements and design documents for a fictitious GPS device. Considering the four stages of Tuckman’s stages of group development (Forming, Storming, Norming and Performing), the team began COMP2012’s (Software Engineering Group Project) project with the belief that ‘Forming’ stages has already taken place.

Each team member had the opportunity to show their strengths and weaknesses. The group worked hard to discover, and complement, the strengths and weaknesses of the other members. The previous project was also very helpful in terms of solving possible differences in working styles, personal drive and expectations. It was felt that the ‘Storming’ stage had already been visited on a few occasions before the ‘Runway Redeclaration’ project began.

When the project plan was created during the first two weeks of the term, all team members agreed on dividing the workload equally and fairy. Each member showed a strong interest in taking part in every stage and area of the process. Everyone took part in the documentation, development and testing of the final product.

Each team member had a similar level of experience using the tools and techniques required for the project. A similar level of programming ability existed and everyone was familiar with the Eclipse IDE. Because of the similarity in ability, each group member was able to take part in every area of work, gaining the best possible set of experiences from the project.

The drive and enthusiasm of everyone lead to a working environment where communication was the main ingredient, everyone felt confident to contribute their opinion, and every opinion was taken into consideration. The group worked together towards a common objective and goal as a single entity. The group functioned as a “gelled team”[[1]](#footnote-1) rather than a collection of individuals.

Throughout the project, very few, if any, memorable conflicts arose. Most decisions that the group made, were made amicably, with each group member agreeing that it was the best choice. Fortunately throughout the project most members held heterogeneous opinions, however the few times there were differences, we were able to conduct ourselves professionally and ensure nothing was taken too personally. Although there were no major conflicts surrounding it, the group did have to decide how the different Java classes would be separated out into model, view and controller. The team did initially have different opinions on this, but a compromise that everyone agreed was fair was soon reached.

Towards the end of the project, the team members became extremely busy with other coursework and their deadlines. This situation triggered stress and anxiety throughout the team. The fact that during the initial project plan, which was developed with little experience or knowledge of this kind of projects, the team failed to be accurate when assigning work hours to tasks, also resulted in an increased workload towards the final deadlines.

In conclusion, and especially when reflecting on the project, this team has the capability of self-evaluation. Planning, in particular, is a skill that was felt to have been developed and improved. Most importantly, it is the team’s belief that the experience gained in this kind of team development of reliable, well tested and documented software products is not only very valuable but also very much necessary for a future of capable and experienced computer scientists and software engineers.

## 1.2 Team Member Review

### 1.2.1 In general

The amount of time that each member of the team contributed to the project is fairly similar. Unfortunately, there were times where everyone had fallen behind schedule, but as time progressed these hours tended to be made up for thanks to the commitment everyone felt to the group.

Since the Java skills of the team were fairly evenly distributed, all members invested time in programming. Oscar and Kelvin worked as a pair developing the model classes, this required them to have a good understanding of the problem domain, and translate this knowledge into code.

Kristian was working mainly on the visualisations, so also had to understand the logic of the model, and use this to create clear and concise visual representations of the information. Edward and Brian worked mainly on the Java Swing GUI, implementing the View components, and the Controller’s listeners.

Each individual member has put a lot of effort into the project, however there was a different pattern with respect to time for when the member puts the effort in and produces work. This is also reflected by the time expenditure graphs and SVN commit reports in the later sections of this report.

### 1.2.2 Brian

Contributed a lot of effort and work behind the scenes with Edward to ensure the GUI is well designed and polished. Throughout the project Brian ensured he understood the program so he could help the other members and offer advice. Near the end of the project, Brian shared implementing and tuning the Listeners and GUI classes with Edward. He also invested much of his time producing the reports.

### 1.2.3 Kristian

Effort and commitment was all dedicated to the visualisation aspect of View. Work on this began quite early but effort on this dropped in favour of other coursework near the middle of the project timeline. Work began again at the later stage of programming and showed rapid progress and improvement on the first visualisation. Although Kristian was often difficult to motivate to work, the contributions that he made to the project were of a consistently high standard. This work was done very swiftly and team members were pleased to see regular commits and better visualisations reflected by Kristian’s skill and effort. Kristian also had the role of producing and updating the Gantt charts that were used throughout the project.

### 1.2.4 Kelvin

Worked in tandem with Oscar to produce great quality Model classes. Lots of meetings with Oscar ensured work was done on time and to a standard everyone else expected of the Model code. At the later phase of GUI programming, Kelvin helped out by changing and adapting the core Model – getters, setter and the main data structure - to a good standard and communicated the changes clearly. He also took on the role of time manager, collating, analysing and producing graphs of the time spent by each member of the group. Kelvin did a good job of providing a constant level of commitment throughout the project.

### 1.2.5 Oscar

During the early phases of the project, Oscar was placed in charge of the user interface design; he produced the initial wire frames on which the applications interface was based. Along with Kelvin, developed the model code, thanks to frequent meetings, the two were able to produce good code that fulfilled its requirements. During the later phase of GUI programming, Oscar was always swift to make the necessary alterations to his code to ensure requested features were implemented.

### 1.2.6 Edward

Edward began work early and contributed a lot to the group ensuring that the project plan was complete and that the first presentation went smoothly. Under the weight of other coursework his input to the project decreased to very low during the Easter vacation and the weeks surround it.

Towards the end of the project, once other coursework was out of the way, Edward began working a lot harder on the project, quickly making up for the lack of progress during Easter. He spent large amounts of time on the programming and on the production of the reports. Edward conducted several code reviews, ensuring that the classes were well written, correct and properly documented, he also proof read, and reworded both D3 and D4 to ensure they maintained a consistent tone where necessary.

Although the consistency of the amount of work Edward produced on a week by week basis was fairly poor, throughout the project he contributed more than any other member of the group, acting as a key force in bringing the group up to a good level of progress.

## 1.3 Chronological Account

The project progressed like this

### 1.3.1 Week One

During the first week the group held both the first formal meeting and the first informal meeting; the first formal meeting was the first time the group met its supervisor, during this meeting it was decided that the weekly meetings would take place every Friday at 15:00, as long as everyone was available. The group chose to rotate the chair and recorder each week to allow each member to get an equal experience

The project plan was discussed and jobs were allocated to every members of the group. Predictions were made on the time each task would take to complete. The team held a casual skills audit to decide which tasks should be assigned to which member - this generally agreed upon by all members, in the cases where this was not true, compromises that were deemed satisfactory by the group were made.

Decisions were also made about which tools to use. These choices can be seen in the Analysis, Design and Testing Document. The group also made high level plans about how the application would be implemented.

### 1.3.2 Week Two

Kelvin was appointed as the time manager, this role required him to ensure time is logged correctly by each member of the group, and kept up to date. He is also responsible for analysing the timesheet data, and producing reports, charts and graphs.

The role of Document Manager was assigned to Edward, his duty was to ensure that the documents submitted by the group were well presented, neatly structured and were easy to read. The group found that creating one document that was only edited by the Document Manager ensured consistent styles and tone.

The Project Plan (deliverable 1) was handed in promptly on the morning of the deadline day. It was proof read in full by three members of the group the day before the hand in and printed by the Document Manager as agreed. By handing the document in with plenty of time, the group felt that it was good that there was no frantic rush or panic to hand the document in.

The use cases of the software were identified, and the most important classes of the system were specified.

### 1.3.3 Week Three

The group decided upon a folder structure for the SVN repository – it was intended to keep the repository organised ensuring that the files team members were looking for could be easily found.

Working pairs were appointed: Kelvin and Oscar were assigned the Model, they were concerned with the classes that model the problem domain. Kristian and Edward were given the task of implementing the View, both the visualisations of the runway on the screen, and the Graphical User Interface. Brian was assigned the Controller, mainly implemented using action listeners.

Architectural design and HCI design was discussed in formal and informal meeting as a group. UML diagrams were used extensively to help communicate the various aspects of the project. The group learned how valuable diagrams can be for conveying an argument.

The working pairs held frequent gatherings to discuss and design their parts to encourage progress. But there was a very limited amount of communication between the pairs. The group was kept updated about the progress each pair was making, but the inner workings were not discussed.

### 1.3.4 Week Four

The actual coding of the Model and View classes began. The respective working pairs worked almost completely separately. Communication and discussion between the pairs about the design of their parts was still essentially non-existent. The formal group meeting was used to review progress on the code.

The View was at first implemented by hand, but then after to a suggestion from the group’s supervisor, Google Window Builder Pro was used to create the GUI instead. The menu items that would appear in the finished product were agreed upon during an informal meeting.

A small demonstration of what the Model and View code was capable of was presented in the formal group meeting.

Brian, who was unable to begin implementing the Controller before the Model and View code had been produced began helping out with View offering design consultancy.

### 1.3.5 Week Five

The group began discussing ideas for the presentation (Deliverable 2). An all-day session was booked in a library room to allow the group to agree on the content of the presentation, produce the slides and rehearse the material. Neat versions of UML diagrams were produced to be included in the slides for the presentation.

The atmosphere of the group during week five was very relaxed; the members were all getting on well together and being very productive. A middle Gantt chart was produced, to help understand how well the budget had been stuck to, and allow a new estimate of how long each task would take to be produced.

The group rehearsed the presentation a few times, but in hindsight, more rehearsals would have been better. A rehearsal in front of a small audience might have helped some of the team members with their presentation skills.

The group agreed to freeze the code after this week in preparation for the application demo for D2. The amount of non-presentation work that was contributed during the fifth week was quite low due to conflicting coursework deadlines.

### 1.3.6 Week Six

The agreed code freeze for the demo was put into action the day before the presentation. On the day of presentation a final rehearsal took place before the presentation of D2. The final rehearsal was held during an informal meeting an hour before the presentation to ensure everyone knew what they are presenting and the material was fresh in their minds.

Everyone was satisfied with how the presentation went in terms of the performance and the immediate feedback from RJW. The mark for the project plan was also received and all members of the group were reasonably satisfied with the grade.

After the presentation a small amount of coding took place within the pairs.

### 1.3.7 Week Seven

The progress of the coding was reviews and the group realised it was a little behind where it should ideally be. The group blamed this on conflicting coursework. Since the View has still not been completed, Brian began helping by producing some dialog boxes. From this the group learned that it needed to be more specific about that tasks that needed to be completed.

The group began work on deliverable 3, the Analysis, Design and Testing document; a template was created for the document and small amounts of notes were added to it. Only a small amount of progress was made on this document before the Easter break.

Marks for the presentation (d2) were received and the members of the group were generally satisfied with the marks. The group entered the Easter vacation possibly a little bit over confident about the project.

### 1.3.8 Easter Vacation

Due to a large amount of coursework set by other modules, and the fact that the group members had been split up geographically, the group did not plan to do a large amount of work over the Easter vacation. The group did in fact make very little progress during these weeks. Fortunately the group had not allocated large amounts of work to be done during the Easter break, so the impact of the lack of contributions was not severe; finishing the other coursework during the holidays also gave the group more time to be spent on the project once they returned to Southampton.

### 1.3.9 Week Eight

During the first week back, a very small amount of work was carried out by the group. This was due to more urgent (Note: no necessarily more important) coursework. From this the group realised that the members need to learn to plan their time more effectively, important tasks should have been taken care of before they became urgent tasks.

The file structure of the SVN repository was altered to help facilitate the integration of the View and the Model code via the creation of the Controller code. A few Action Listeners were implemented to act as the controller.

At the end of the week Edward performed a code review on the Model, and produced javadoc style comments for the classes.

### 1.3.10 Week Nine

As the final deadlines came closer, and noticing that he was way behind in terms of hours Edward began putting a lot more effort into the project. He attempted to motivate the group into putting more hours in, but they were hard at work with the large amount of other coursework.

The group found that with the integration (as they had been warned), the interfaces has not been thoroughly thought out, and so were slightly clumsy to use. Together, Brian and Edward came up with the solution of using the Observer Pattern[[2]](#footnote-2) to ensure that the required functionality was implemented in the neatest was possible.

The group learned from this that they need to spend more time specifying the programs design and ensuring that the various interfaces are published, and will all the desired functionality.

Edward continued to work hard on the project throughout the week, and by the end of the week was joined by the other group members in a final sprint towards finishing the project.

### 1.3.11 Week Ten

Every evening of Week 10 Edward and Kris met in the undergraduate labs and worked hard to finish the coding. The GUI code was completed along with the model. By the end of the week the group was left with a product that could pass the User Acceptance Test, and also implemented a few extension features. By this point Edward had ranked up a lot more hours on his timesheet than the other member of the group.

Kelvin, Brian and Oscar had focused more on the End of Project report which was due to be handed in on Thursday, coding only when bugs were found, or features that had been omitted were requested. Kelvin and Oscar also spent a large proportion of the week testing their code.

The group was very glad that an extension was issued on this deliverable as it enabled a far more polished and complete document, that really reflects our ability, to be produced. The group did however decide that to prevent the reports from interfering with revision, the two deliverables would be submitted on the same day as the presentation.

### 1.3.12 Week Eleven

This week hasn’t happened yet, so I shan’t write about it yet, but I sure do hope it will be as much of a blast as week 10!!!!!!!

## 1.4 Evaluation

As in every formal and professional project, evaluation is a very important process. Keeping an objective point of view, being able to recognize mistakes and suggesting new ways to approach previous issues is a vital part of learning. The team believes it is a very positive and necessary task, therefore, when the project is close to reaching its end, the team members of this group self-evaluated and peer-reviewed their work and participation. Each team member reached similar conclusions about the project.

Firstly, as the project progressed the group began to realise the importance of thorough, methodical planning. A better planning process at the beginning of the project would have helped the group avoid stressful situations. The teams project planning tended to be less than accurate in many areas; this was more due to inexperience in estimating time cost, than it was to do with a disregard, or unwillingness to create a plan. The miscalculations in the initial project plan substantial – For example, too many hours dedicated to programming, and not enough were allocated to testing.

Fortunately once the project had begun, the group realised these issues and set out to resolve them. New Gantt charts were produced at the middle of the project to reflect the current estimations for the time required to complete each task. These charts did not completely resolve the problem, and the estimations were still not perfect. Unforeseen circumstances such as very heavy loads of coursework from other modules ended up getting in the way.

If the group repeated the project, it is agreed that they would put more effort into planning their time. It is believed that this, in combination with the experience gained from this project would have helped the entire process become more organised.

The other big aspect of the project that the team realised could have been done better is the initial design of the code. The group did plan at a high level how each subsystem would function, but not enough planning was done to fully understand how the various parts of the program would work together. The group found that when it came to joining the code together, it didn’t quite fit, and as such modifications had to be made to both parts of the system.

It wasn’t until these problems arose that the team fully understood the importance of good design. The group agrees that the interfaces for each class should have been thoroughly discussed, and then defined. The interfaces should have been designed to offer all the functionality that that class needs to offer, so would never need altering. Good interfaces, represented on a good class diagram which has a good level of detail is very necessary in order to improve a later integration of the modules of any project.

Had the design been performed to a lower level, more detailed design; for example having each method written in pseudo code before any coding began; the whole process would have been much simpler and less painful for each member of the group. The group believed that the work generating by not being specific enough in their designs, lead inefficiencies in the programming section, and therefore more time was spent than could have been.

Finally, this team has truly learned the importance of fully understanding the whole situation or problem the team is trying to be solved, beforehand. The importance of having a very clear understanding of what the team is dealing with is higher than the team initially thought. It is important that every team member is comfortable with every aspect of the situation so that during meetings and discussions every team member’s contribution becomes a solid, informed opinion about the matter.

In conclusion, this team believes that, despite any mistakes or errors, despite overlooked areas of work, despite any differences within the group, and despite any stressful situations that could have been generated; this project, taught each of the members many important lessons. All member of this team will face similar situations throughout their career.

Each member learned the importance of many areas and stages in the development of a serious software product. The team knows that, the experience gained through taking part in the project will be of great benefit in later life. The experience will help not only with future university projects, but also it will have a deep and beneficial impact on each team member’s careers as professional and proficient computer scientists or software engineers.

## 1.5 Individual Views

### 1.5.1 Brian

“The group was generally great to get on with but people held their views on design quite strongly and took a lot of time for small but important decisions to be made. My opinion on not having proper interfaces done earlier on is that people felt it was too complicated to figure one out as a group (in a meeting setting or otherwise) which meant that people had to do a lot of running around to find things which should, really, have been agreed at the design stage especially me as I am in charge of the controller part of the code. This strategy is not ideal or efficient and would scale badly to larger projects.”

### 1.5.2 Edward

“Our group works well together and I feel we are able to be very productive. Unfortunately I don’t feel that we put enough time into planning the inner workings of the system in the early stages of the project and as such met slight problems when it came to the integration of the project. We were able to produce a system that works well for a project of this scale, but if it were to grow substantially then a slight refactor would probably be needed - I don’t think this would be a huge task, but it would probably require us to step back and rethink some of our strategies.

On a whole our group managed to get the work done, however I do feel that I put more time into the project than the other members of the group; this is however probably mainly to do with the fact I am somewhat of a perfectionist. I feel that this project has been a great learning experience, as I have learned what I am good at, and what I need to improve at.”

### 1.5.3 Oscar

“In my opinion, despite any differences or difficulties we might have came across, the value of this project as a learning tool is of great proportions. I value and thank those moments were the stress was obvious amongst every team member, those moments when I had to stay up late or working way to many hours on row in an effort to catch up where we fall behind, when we thought we were in trouble; I treasure all of those because I know as a fact that tomorrow, when I face a similar real life situation, when I start working on a project with a new team and we are designing a project plan, when I have free time and I do not feel like doing some work; it is in those situations when I will put to use what I’ve learnt today.

I believe that all of us should feel the same way, and I will finish this project happy and pleased.”

### 1.5.4 Kristian

“I am Kris and I love working really hard”

### 1.5.5 Kelvin

“I am Kelvin and I love working really hard”

# 2 Project Management Account

Introductory spiel.

## 2.1 Gantt Charts

Chat about what Gantt charts are and why they are helpful?

### 2.1.1 Start Gantt

Date Created, The chart itself. One side A4

### 2.1.2 End Gantt

Date created, the chart itself . One side A4

### 2.1.3 Reflection

reflection on the transition from start-midway-end, i.e.,

how estimates of cost and timescale for each activity changed over time.   
What did you learn about planning these activities?   
Did your estimation accuracy improve?   
How far out were your initial estimates?   
How well did you manage the project and what, with hindsight, would you differently?  
Mention the middle Gantt chart.

# 3 Summary of Time Records

(2 sides A4 max) Summarize as a table, with group members on one axis and week number on the other, the time spent per activity/ member/ week. Don't worry if this report doesn't agree exactly with the end-project Gantt chart, although the two shouldn't be TOO different.

Not sure if this section needs an narrative since that seems to be covered in the next section.

# 4 Time Management Account

## 4.1 Changes in Estimates

Based on the summary report. A clear account of the initial activity/ time estimates and how these changed over time (over to you to avoid overlap with 2. above).

## 4.2 Analysis

Graphs as floating figures, discuss what they mean in the narrative.

Analyses (graphic and narrative) of time spend by week/ activity/ member. Discussion of any time management decisions requiring departure from the 100 hours budget, e.g. choice to overspend to add value to the product, or the choice to spend the "ghost" budget of an absent (ill or dropped out) group member.

## 4.3 Reflection

Reflection on the effectiveness of time usage and management.

# 5 Conclusions

Again a non-specified section, but RJ will probably not mind if we summarise everything here ;)

1. Peopleware: Productive Projects and teams. [↑](#footnote-ref-1)
2. Design Patterns: Elements of Reusable Object-Oriented Software [↑](#footnote-ref-2)