Status Report

Mid-Year Project Status Report

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Team Members: | Hayley-Belle Cleverdon  | Vinicius Alves Ferreira | Karanjit Gahunia  | Seung-Kyu Jin  | Alex Lu |  |  | Client:  |Dr. Robin Hankin  Supervisor:  |Dr. Nikola Kasabov | Version 1.0  24 May 2017 |  |  |  |  |

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# Executive Summary

The following is an Executive Summary of the Progress Report for the Real-Time Online Scoreboard project, assigned by AUT and commissioned for by Dr. Robin Hankin on behalf of the Auckland Mathematics Association.

Progress so far has been slightly slower than expected, however this is due to research being crucial to carry forward with the project. The feasibility study was expected to be completed by 26th May, 2017. However, we have pushed this back to a later date to ensure we are providing the best quality report possible. The report will be indicative to the depth of the research conducted, proving a sound opinion on the best way to develop the system that has been requested.

The parts of the feasibility study that have been underway are the operational, legal and technical studies. The schedule, resource and financial studies rely heavily on our findings in the technical study. As a result, once those are finalised, the remaining studies are expected to be completed swiftly. Once the feasibility report is complete, we will present this to Dr. Hankin, as well as our supervisor for feedback, and either reconsider our findings or begin the design and development phases.

There have been three identifiable major issues so far in the project, all of which we are working towards solutions for.

The first issue is the lack of expertise all team members have in networking and unfamiliar technologies, the time we’ve spent doing research and contacting other experts for help has impacted the speed at which tasks have been completed. This issue will inevitably resolve itself as we gain more knowledge about the tools and technology we need to use.

The second issue is relying on external sources for information, we have contacted the MATHEX venue and are yet to receive a response. They hold information that is imperative to completing the feasibility study. We plan to contact the venue again to attempt to get a response.

The third major issue is a lack of meetings. This is mainly due to schedule conflicts and geographical dispersion. We try to remedy this by keeping in touch frequently over Slack, however, we are missing the benefits of face-to-face communication and sharing a workspace. To resolve this, we will schedule regular meetings and encourage all team members to attend, as was outlined in our communications plan.

We are confident in our quality assurance and project tracking, even though we are slightly behind schedule, the project remains very organised and we are prepared to move forward.

# Project Description

This project is a Research and Development project assigned by the Computing and Information Sciences Faculty of Auckland University of Technology (AUT). Dr. Robin Hankin, a lecturer at AUT, proposed the project on behalf of the Auckland Mathematics Association (AMA), who are key stakeholders in the project.

Dr. Hankin has asked that we provide an in-depth feasibility study and at least a presentable prototype for a real-time online scoreboard to be used during MATHEX events run by AMA. This scoreboard would be used alongside the current pen-and-paper system, and aims to improve the experience that audience members have during the event, by allowing them to view the scores of each team as the competition is underway.

The feasibility study, along with all other project documentation, should provide enough information that another group of students could carry on with the project at a later date. The prototype can be presented to AUT faculty to show evidence of our development skills, as well as provide a working version of the solution for the AMA’s consideration.

# Project Overview

## Project Objectives

Our project objective is to create and implement a Real Time Online Scoreboard System into the Casio MATHEX competition within 1 year and at a cost which does not exceed $20,000.

## Project Scope

Our project scope has two major sections. The first section aims to produce a feasibility report which investigates whether the production and implementation of the scoreboard within the one year time frame is achievable. If the feasibility report reveals that the project cannot be completed in a year then we will also produce a Project Roadmap which details the project processes and tasks necessary to design, create and implement the scoreboard successfully into the MATHEX competition in case of project hand off.

The second section aims to produce the hardware and software for the Real Time Online Scoreboard system. This system will improve the attendee and participant’s experience by making it easier to keep track of the competition’s scores as well as streamline the judging process. Initially, however, a prototype for the system will be produced which will attempt to showcase and incorporate as many of the client’s requirements as possible.

## Project Approach

Following the System Development Life Cycle we are still currently in the planning phase of our project. We completed the Concept/Initiating phase early on by gathering requirements from our client.

Our planning phase involves creating a feasibility study, which is a major deliverable requested by the client, thus we are spending extended time on it to ensure it is of high quality. We have no set methodology for this stage, as we only have one deliverable to produce that requires many different components.

Currently we are following good agile practices around communication, version control and quality assurance. As well as utilising tools to aid us in these areas, such as Slack and GitHub. The GitHub project boards have been particularly useful for tracking tasks, and the repository provides a place to share all the notes we have gathered on different parts of the feasibility study.

It can be found here: https://github.com/Hayley-Belle/R-D

Once we have completed the feasibility study, we will be using Feature Driven Development to handle the design, coding and testing of the prototype that is to be developed.

## Major Milestones

## Project Deliverables

Possible project deliverables include:

* Real Time Online Scoreboard application or website. May be a prototype.
* Hardware which can set up a local Wi-Fi network. May contain additional components such as Wi-Fi extenders.
* Feasibility Report.
* Project Roadmap.
* Prototype of proposed system.

Project deliverables may change after the feasibility report is produced.

# Addresses to Recommendations

## Proposal Changes

A number of changes were made to the proposal based on the feedback we received, where any clarifications were needed or mistakes were found, we followed these up with corrections. More details about the changes made to the proposal can be found in the following section.

## Resources Provided

Many of these resources currently provide more information than we are prepared to utilize, as we will only be using one solution, it would be poor time management to upskill in areas that will be of no use to the project. Once the feasibility study is completed, we will have selected a single solution, and upskill in the areas required to develop the system.

## Framework Suggestions

Each team member has taken parts of the feasibility study to work on, and has made use of any relevant resources to aid in researching potential solutions for the system. This involves getting a general summary of the usefulness and application of each of the recommended tools and services.

These provided a great baseline for us to make decisions about how the project will go ahead, and allows us to give several options, compare them, and make the right decision.

## Questions

Most of the questions were points that required further clarification within the proposal. We have made edits to the proposal to better communicate the points we were conveying. More details about the changes can be found in the next section.

## Conduct and Presentation Suggestions

Some very good points were made.

We will be sure to send in a soft-copy to the supervisor of any prepared documents – unfortunately this was not an option earlier as we had not been assigned one.

We have better utilized GitHub, and are moving our Trello board over into the Project boards. We have upskilled to use TortoiseGit to upload our work to the repository.

We have good conduct in meetings, however the issue remains to get all team members to attend and we have a need to meet more frequently.

# Project Proposal Variations

|  |  |  |
| --- | --- | --- |
| **Section** | **Sub-section** | **Reason** |
|  | | |
| Terms of reference | Problem | Clarified unclear negative impacts of current pen-and-paper |
| Project objective | Updated to highlight real-time functionality to the proposed framework |
|  | | |
| Rationale | Rational for the project | Clarified benefits of proposed system over the current one |
|  | | |
| Scope and Objectives | Project Evaluation | Clarified project evaluation purpose |
| Stakeholders | Updated new stakeholders to the list |
|  | | |
| Communication management plan | Communication matrix | Updated the names accordingly |
|  | | |
| Project Approach | Plan by Feature | Added missing information about Kanban’s workload control and defined SDLC support headers |
|  | | |
| Project Plan | Project phase - planning | Clarified point 2 of the WBS, provided information on what will be done. |

The project proposal is under review and we intend to make the changes to the sections mentioned on the table above, some other minor changes have been disregarded and only the major ones are listed above. Each new change intends to add value to the project proposal, these variances will either add, clarify or update the current information, every alteration has their own reason or purpose as you can see on the table. Those variations have been suggested by the feedback received from supervisor, we aim to remove any unclear component of the project proposal.

# Project Status Summary

## Current Work

|  |  |  |  |
| --- | --- | --- | --- |
| Provisional Milestones | Semester | Proposed Finish Date | Actual Finish Date |
| Project Proposal | 1 | 30/03/17 | 30/03/17 |
| Project Proposal Presentation | 31/03/17 | 31/03/17 |
| Feasibility Evaluation | 26/05/17 | Incomplete |
| Project process analysis and review | 26/05/17 | 26/05/17 |
| Presentation to Client | 2/06/17 | - |
| Mid project progress review | 2/06/17 | - |
| Major Upskilling | 14/07/17 | Incomplete |

It can be seen above that so far we are behind schedule, as we underestimated the time it would take to complete the feasibility study, as well as the workload for other papers during the semester. However, we are working hard to get on track and the feasibility study is well underway.

We also ended up doing some upskilling earlier than we expected, as we found it necessary in order to comprehend the tools and services we were recommended, as well as tools we are using to work on the project itself.

**Current Progress**

**Operational Study**

In this study, we will be considering how the system will change and impact the MATHEX competition, its attendees and participants and how we will evaluate this. So far the study covers how we will review the after effects of the scoreboard on the competition by means of user survey and feedback, contingency strategies should the scoreboard fail to operate at the competition and how we will handle resistance from stakeholders and users. We also discuss several methods of implementation which will be dependent on how we want to approach it or on other factors such as costs or time.

**Legal Study**

In this study, we are investigating legal matters with focus being put on the legality surrounding the MATHEX Venue and the licenses for the products we will use to develop the scoreboard. For now, we have closely examined the venue’s terms and conditions and while we do not find any conflicts with actions we have planned to do, newer operations in the future may. It is important that we stay in close contact with our MATHEX venue liaison, Mala Nataraj and that we have recorded solutions in case that situation arises.

**Technical feasibility study**

**Infrastructure Analysis and Recommendations**

Significant research was conducted to discover what would be necessary to provide the application to users. We have researched required devices such as routers, wireless access points and DHCP servers to provide information on what will be required in the venue. Also, questions were emailed to person in the venue to help understand their current equipment, terms of usage and usage limitations. However, we still await a response. Furthermore, we have sought help from the supervisor and a network engineer to assist us in this study. Our next step is to attempt contact with the venue person and explore AUT infrastructure for better understanding of networking and other arrangements.

**Hardware Requirements**

Several advances have been achieved in this study. With assistance of the supervisor, a PBTech sales person and persistent research we have managed to developed 3 solutions for the problem domain. So far, there are available quotations for hardware and better understanding of our options. Our next tasks are to review our solution and address the below:

* Disaster management
* Cost to run the equipment’s.
* Maintenance
* Durability
* What happens if there is a sudden power outage?
* Overheating of the servers CAN cause fire, what would you do if anything as such happens?

**Cloud Solutions**

We have reached the conclusion that there are two different approaches we can take for a cloud-based solution for this project.

The first is a series of static web pages for all necessary components of the system. A small database, consisting of one or two tables will store data. A user will access a web page which will send a request to the server, which pulls data from the database and displays it on the webpage. The judges will also be using a web page, but instead they will be sending requests for the server to transfer data into the database.

This solution requires that data about the competition is collected, such as what each question is worth in points, the teams and students who are participating. It may also be necessary to generate login credentials for judges to keep the database secure.

Technologies used for this solution are expected to be as follows:

* + Amazon S3: Web hosting.
  + Cloudflare: Web security and optimisation.
  + Amazon RDS: Database Engine
  + Languages Used: PostgreSQL, HTML and JavaScript OR Java(run on a Tomcat servlet).

Rationales for each technologies and languages chosen will be explored in the finished feasibility report, but generally, these technologies are all open-source, reliable, cheap (or free) and fast.

The second solution would be to develop an application that displays on the web, this application would need to have the same capabilities of the first, but it would also include ways for administrators to set up competitions. This application will take up significantly more data on the cloud server, but it will also be a dynamic way to set up competitions, as the front end will provide controls to create custom leaderboards.

Technologies used for this solution are expected to be as follows:

* Amazon EC2(T2): Web hosting
* Cloudflare: Web security and optimisation.
* Amazon RDS: Database Engine
* Languages Used: PostgreSQL, HTML and Java(run on a Tomcat servlet).

While this is a valid solution, it is unlikely achievable in the timeframe, and not entirely necessary for the project. There will be more detail about this in the feasibility report, in summary it is a recommended approach, however this is not the approach we will be taking because a simple prototype can easily be created and then built upon in future.

**Financial Analysis**

There is a cost estimate available that will be updated for each potential solution as we explore the costs further Once the technical research is complete new quotations and assumption of prices can be confirmed, therefore we expect to have this study complete as the technical study is completed.

**Resource & Schedule Feasibility**

In project proposal, we outlined the time in which this project must be completed. Through the analysis of feedback and continued research, we now have a reasonable indication of the resources required. However, to finalize this study, we must complete the other studies to define resources and schedule requirements adequately.

## Issues

We are a team of developers that are yet to explore different technologies to solve problems, as we have mostly only been exposed to tools and services required by our studies. Learning about a few new tools is taking more time than we could have anticipated.

We wanted to organize a meeting with the MATHEX venue staff much earlier, however they have been away and we have not been able to get information from them yet.

There are many different potential solutions for the system, we are risking overlooking better solutions due to our limited knowledge on networking and infrastructure, as we are all software development majors.

There is a dependency on external sources, for instance to get quotations for hardware or to meet with AUT infrastructure team. Moreover, to be able to provide solutions and compare them we need to understand their benefits and downfalls, such require significant research.

Although the client is our main stakeholder we must consider other stakeholder’s conditions. For example, ASB stadium may have terms and conditions to use their network or to implement any new system, MATHEX may have their own system which also will have complications to use. These examples highlight that our research must consider all stakeholder’s requirements and conditions.

We have trouble all meeting at the same time due to several schedule conflicts, we miss out on benefits of face-to-face communication and sharing a workspace because of this.

# Team Reflection

To more quickly gain knowledge of certain tools and services, we should seek out people whom have experience with those technologies. They should be able to provide a more comprehensive guide to them that can be more easily translated into the project.

We should more persistently contact the venue and AMA, and ensure we have our questions well prepared and any follow up questions should be asked as soon as possible.

Perhaps we should get in touch with more networking and infrastructure experts, to gain their opinion on what approach we should take for the project. Perhaps presenting our findings to them before we pass them along to the client.

We need to set a weekly meeting time, and if not all members can be present, we should make an effort to call over Skype or be active in Slack chat during the meeting to ensure we know what is going on. Nightly communication over Slack may also be necessary, with more frequent updates on the work each member is currently doing.

# Member Contributions

**Hayley-Belle Cleverdon**

So far I have spent a lot of my time researching the various technologies suggested in our proposal feedback. As a person who is constantly in contact with a lot of industry professionals who use cloud-based applications to run a business, I elected myself to research this as a potential solution.

I have spoken to colleagues to gain their opinion on how to approach the issue, and they have provided very simple solutions based on the experience and knowledge of our team. Thus, I have been able to path a very realistic approach to completing this project, as well as contribute to the feasibility report that is of high importance to the client.

Before I started on the feasibility study, I spent a small amount of time preparing a paper-prototype. However, I have not yet had time to complete it before the feasibility research became a priority.

I have also spent time refreshing my knowledge of GitHub and adopted TortoiseGit, which I passed on to the rest of the team so we can use effective version control. Additionally, I transferred our Trello board over into GitHub projects for easy accessibility and convenience. And, in Slack I have integrated a bot to update the team whenever a push, pull, merge or issue is made.

In the cases where parts of the proposal I had written had suggested edits in our feedback, I have edited them. Lastly I created the Status Report, added a few of the sections to it, and shared it with the team to work on together.

**Alex Lu**

For this project, I have been working on many of the tasks assigned to me by the group. For the project proposal document, I mainly worked on the Cost Estimate, Risk Management Plan and contributed to other parts of the proposal such as the Terms of Reference and Project Scope section. Usually I am responsible for contacting external parties for matters such as booking for the Project Presentation, contacting the client or communicating with the MATHEX association. Before the feasibility report, I had done some research on the technologies involved for this project, more specifically, RESTful API and Spring framework.

For the feasibility report, I was assigned to work on the Operational Study and the Legal Study along with Jin. So far, for the Operational Study, I have researched into how we will review the scoreboard effects on the MATHEX competition, contingency strategies should the scoreboard fail and how we handle stakeholder and user resistance. For the Legal Study, I have mostly been analysing the ASB Venue’s Term and Conditions and whether it clashes with our project. So far, the Operational Study and Legal Study are making good progress.

**Karanjit Gahunia**

For the project proposal, I mainly contributed to the Rationale, Stakeholder Register, Team Agreement, and the Terms of Reference as well as proofreading duties. I am also responsible for creating meeting summaries for each meeting and posting it to Slack. For upskilling, I have been experimenting with various web languages and technologies such as PHP, JavaScript, JSP, and Java Servlets.

I am assigned the technical feasibility study and my focus is on the venue’s infrastructure. Vini and I have sent a list of questions to Mala Nataraj, our contact for the ASB Stadium and have requested to schedule a visit to the venue.

While we wait for the venue visit to be scheduled, I have been researching local area network solutions that could accommodate for many users in a relatively small space. Also, I have been investigating the database and the transactions that would occur. This would allow me to understand how much traffic our local network must accommodate for and what internet connections may be utilised if a cloud based approach is implemented.

**Seung Kyu Jin**

For the project proposal, I worked mainly on producing the documents for the Skills and Knowledge involved, Communications Management Plan and Communications Matrix. During this project, I have been upskilling by getting familiar with many of the new technologies that we may use for developing this project such as PHP and JavaScript as well as researching the technologies our supervisor recommended for us to look at.

For the feasibility study, both Alex and I are working on the Operation study and the Legal Study. So far, I have been researching the different types of open source licencing available (Mozilla, Apache, MIT, the different GPL’s) and seeing which one is the most suitable in our circumstances. I have also reviewed the ASB Venue’s Terms and Conditions to look for any terms that may get in the way of the project.

**Vinicius Alves Ferreira**

|  |  |  |
| --- | --- | --- |
| **Activity** | **Time(hours)** | **Description** |
|  |  |  |
| Lecture | 20 | Approximated time on lectures. Main goal Upskilling |
| Register to Logbooks and minutes | 10 | This includes time spent every week to update logbook, create minutes, communicate with the team through slack and other tasks that was minor to be recorded. |
| Meetings | 20 | Group, supervisor, client, external meetings |
| Project Proposal | 26 | Includes all activities\work done towards the project proposal |
| Planning phase | 16 | Includes research\ production of report\ questions\ communication with external part. |
| Upskilling | 10 | Time spent on learning new skills\ tools\ research of new technologies. |
| Total | Approx. 102 | Time of **10 Weeks** |

**Note:** The table above is only a summary for 10 weeks. A breakdown of activities for each week is available at request or you can find it online <https://github.com/Hayley-Belle/R-D/tree/Mid-Year/Mid-Year> . Due to its length, it has not been included.

**Learning achieved**

The R&D project has been very challenging from the very start and it has tested our team’s patience, organizational and communication skills. Although, It is a paper that involves several technical components as it is expected to there has being so far a significant demand for adaptation and proactivity in order to deliver.

From the very start we have had one full-time worker and a part-time worker who is me and all team member leave considerable far distance from town. It then points out the difficulty to organize meetings or anything if not with much notice prior any event. By the first week the team had met and attempted to contacted the supervisor which was only available in an acceptable time on week 2. On our meeting with the supervisor we learned that she would not be our supervisor anymore and did not know who would. Consequently, we were only presented to our supervisor in week 5 as we presented our project proposal.

Because of the facts presented, I have learned the importance of recording any or all events that happen in the project and understood its benefits. I realized that in some real environment project we could simply not have enough information and yet you must ensure you can present work and be prepared for when it comes. Out of necessity I took the leader role to guide the team and assist with delegating tasks. Soon I noticed that it is harder than I expected, there was some reliability that I would know what to do and who should do what as well as maintain track of progress.

Moreover, in our planning phase the amount of research and introduction to new technologies were just overwhelming. I have had a change to explore technologies such Google App Engine, learned about servlets and JSP, explore the use of Tomcat server, introduced to GitHub project manager, got to use the tortoiseGit tool which we have used to keep version control of this report among others such OneNote. However, the biggest challenge has been understanding infrastructure needs such networking devices and how it works, for instances routers, wireless points and DHCP server.

For the hardware requirements, I am currently researching options that support the requirements for the project in proposal. So I was required to research about servers and implementation strategies to come up with solutions but only after understanding the purpose of reverse proxy server, application server and database and how to fairly be able to know what specifications these ones must hold to satisfy demand. I am still deepening my knowledge into virtualization and much more is still to be developed in this area of the project.

To conclude, the flexible scope or this project allow us to explore many areas of technology, apart of what mentioned above there is much more I could learn about Iaas, Paas and Saas. But for now enough have been explored, to add some more to my list we have got familiarized with Feature driven development(FDD) and Kanban, Slack and even seen how a project plan is useful for instance. This journey has been frustrating due to my unexperienced and limited knowledge but little by little we have achieved our goals.