Project Proposal

Process Automation for Student Placements

School of Organisational Psychology
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Contents

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1. Identify the Problem

1.1. System Vision Document

1.1.1. Problem Description

The School of Applied Psychology at Griffith University offers an accredited postgraduate program in Organisational Psychology which requires students to undertake several placements. A placement can be described as an internship that is aimed at providing work integrated learning for the students. The Australian Psychology Accreditation Council mandates that a number of documents must be submitted to the university as student placements are undertaken, and copies of these documents must be retained by the university for a period of 10 years post-graduation of the students undertaking the placements (APAC, 2019). Currently the University fulfils these requirements using paper-based form processing. Students are required to submit these paper-based forms at different points during their placement, and they need to be approved and signed by their supervisor and the placement coordinator Approved forms are physically stored on campus for several years as required.

The current process is very time consuming for both Griffith University academic staff and also students. Time lost in organisation, travel and correction of paper-based form errors creates an inconvenience for students as well as supervisors and coordinators. The Placement Coordinator estimates that this process captures approximately 50% of her work time (as a full-time resource), and thereby limits the growth opportunities for the program.

The proposed solution involves the digitisation of the paper-based forms by developing web and app interfaces that enables form submission, review and approval. This new system will result in significant time savings for the stakeholders involved while leveraging additional opportunities that will arise from digitising form submissions, for example enhanced reporting capabilities.

1.1.2. System Capabilities

The proposed system will digitise the placement related forms and approval processes while remaining compliant with relevant regulations. This should be achieved by using tools or applications that are already available to Griffith University to the extent that this is possible, and by building the solution in-house.

The system that is proposed for implementation will include the following capabilities and features:

- **Digital interfaces (web and app) to submit forms**
    - Students will be able to submit their placement forms as structured data using a digital form that is accessible to them via computer and mobile devices.
- **Digital interfaces (web and app) to review submitted forms**
    - Students will be able to review previously submitted forms and see their current approval status and approver feedback
    - Supervisors will have the ability to review placement forms that were submitted by their students seeking approval
    - The Placement Coordinator will be able to review all student submissions

- **Electronic approval capability**
    - Supervisors and the Placement Coordinator can approve or reject the student submissions and provide feedback. This approval action will replace the paper-based signatures.
- **Reporting capability**
    - Reporting across all placements will be possible by aggregating the data that has been submitted, thus allowing for streamlined reporting capability.
    - Students will be able to see an aggregated view of their submitted placement information, which includes the total number of hours spent on placement.

1.1.3. Business Benefits

The implementation of this system will entail the following benefits to Griffith University:

- **Decreased labour cost:** Significant time efficiencies will be gained as Griffith Academic Staff will save time through the automation of processes and via reduced time spent on error correction due to data validation capabilities on digitised forms.
- **Decreased printing cost:** Printing and the use of stationery will become redundant if the system is digitised which represents a cost saving.
- **Positive effects on the environment:** It has been estimated that the current processes require students and staff to print a minimum of 20,000 pages of paper each year. Digitising this process therefore not only reduces printing cost but will also have a beneficial effect on the environment by avoiding unnecessary printing.
- **Increased physical space and safety:** The digitisation of forms will result in increased physical space that will be freed up by not having to store student documents on campus for several years.
- **Enhanced document retention:** Storing submitted forms in a digital manner will reduce the risk of documents getting lost or damaged (e.g. in case of a fire).
- **Increased student and staff satisfaction:** The new system will provide an enhanced user experience by facilitating form submission and offering 24/7 access. Students will be able to submit forms at any time, equally supervisors can review and approve or reject them any time and from anywhere. By avoiding the need to meet in person to obtain signatures, student and staff satisfaction with the processes of the placement program are likely going to increase.
- **New reporting capabilities:** The Placement Coordinator requires to compile a report for Griffith University including metrics that span across all placements over the course of each calendar year. Currently this is calculated manually, however the new system will allow for streamlined report generation and new reporting possibilities.
- **Enables program growth:** Currently the Placement Coordinator spends 50% of her time on processing these paper-based forms. This presents a limiting factor to the program growth due to time constraints. If time can be freed up by automating much of this process, the program could involve more students which may lead to increased student attraction and retention.

2. Quantified Project Approval Factors

2.1. Estimated Project Completion Time

The estimated time required to complete this project is 7 weeks. Table 1 outlines this in more detail by listing the subsystems that together form the system that is to be developed. The subsystems are each mapped against the number of required iterations and estimated time required to develop each subsystem.

Estimated Time for Project Completion			
Subsystem	**Functional Requirements**	**Iterations Required**	**Estimated Time**
Placement database subsystem[1]	TBD	1	1/2 week (2.5 days)
Student form submission subsystem[2]	TBD	2	2 weeks
Supervisor form approval subsystem[3]	TBD	2	1 week
Placement Coordinator subsystem[4]	TBD	2	1 week
Reporting subsystem[5]	TBD	1	1/2 week (2.5 days)
Total Development Time			**5 weeks**
Testing	TBD	1	1 week
Final user acceptance testing	TBD	1	1 week
Total Project Time			**7 weeks**

Table 1 – Estimated Project Completion Time

[1] The placement database subsystem refers to the digital structure that will be created in order to store submitted information in an effective manner.

[2] The student form submission subsystem refers to the interface that allows students to submit the required information via a digital form and review their previous submissions.

[3] The supervisor form approval subsystem refers to the interface used by supervisors to review and approve submitted information. The estimated development time for this subsystem is shorter than the student form submission subsystem because components from the previous subsystem can be reused.

[4] The Placement Coordinator subsystem refers to the interface used by the Placement Coordinator who will be able to search and view all student submissions and their approval status. The estimated development time for this subsystem is shorter than the student form submission subsystem because components from the previous subsystem can be reused.

[5] The reporting subsystem involves the creation of a data analytics dashboard that will be used by the placement coordinator to report on placement related information and statistics.

2.2. Development Costs for Project and System

The total cost for delivering the new system is estimated to be $ 49,992. The primary expense category is wages, which is a result of building the system in-house while utilising tools and software that Griffith University already has available. Since the project team will be assembled by allocating current staff members to the project for a period of time, expenses such as cost of facilities and utilities are not applicable. Table 2 illustrates a breakdown of cost elements.

Summary of Project Development Costs		
Expense Category	**Amount (AUD)**	
Wages:		
Project Manager[1]	$	12,880.00
Business Analyst[2]	$	11,480.00
Developer (2x)[3]	$	20,160.00
Support staff (20%)[4]	$	1,624.00
Training[5]	$	1,500.00
Travel[6]	$	1,100.00
Equipment[7]	$	1,248.00
Total	**$**	**49,992.00**

Table 2 – Summary of Development Costs

[1] The project manager is responsible for managing the project, which includes the creation of the project budgets, schedule, plans, progress and the coordination of project team members. The average annual salary of a project manager is $95,000 and is equivalent to approximately $46 per hour (PayScale, 2019). Therefore, the cost calculation is $46 * 40 hours per week * 7 weeks of project duration and totals $12,880.

[2] The business analyst is responsible for supporting the project by creating project documentation and providing assistance when defining the requirements. The average annual salary of a business analyst is $85,000 and is equivalent to approximately $41 per hour (PayScale, 2019). Therefore, the cost calculation is $41 * 40 hours per week * 7 weeks and totals $11,480.

[3] The two developers are responsible for building the system and completing the testing. The average annual salary of a developer is $75,000 and is equivalent to approximately $36 per hour (PayScale, 2019). Therefore, the cost calculation is $36 * 40 hours per week * 7 weeks * 2 developers and totals $20,160.

[4] Support staff is anticipated to contribute to the project by assisting with meeting room booking, organising travel arrangements and venue coordination for client meetings. These activities are estimated to take up 20% of the work time in a full-time role. The average annual salary of a support role is 60,000$ and is equivalent to approximately $29 per hour (PayScale, 2019). Therefore, the cost calculation is $29 * 40 hours per week * 7 weeks * 0.2 = $1,624.

[5] Training will be required for one of the developers to upskill their abilities in working with Office 365 PowerApps. Therefore, they will need to attend a 2-day training course that is hosted in Melbourne which is priced at $1,500 (Eventbrite, 2019).

[6] The travel expense includes of the cost for the developer to attend the training in Melbourne. A return flight from Brisbane to Melbourne is priced at $570 and 2 nights for accommodation that are $410 in total (Quantas, 2019; Booking.com, 2019). In addition, it is anticipated that the project team will need to travel to the different campuses of Griffith University in order to meet with the client and other stakeholders. This cost is estimated to be approximately $100 in fuel and public transport fees (Translink, 2019; RACQ, 2019).

[7] The equipment that will need to be purchased includes an iPad mini for $599 (Apple, 2019) and an Android smart phone for $649 (Samsung, 2019). The iPad will be used to test how the apps function on iOS devices, and is also great to demonstrate the mobile view to the client. The smart phone will be used to test the mobile functionality on android devices.

2.3. Estimated Annual Operating Costs

The annual operating costs are estimated to be $ 15,835. As the solution will need to be supported internally the primary ongoing cost will revolve around the provision of operational support. In addition, training cost is considered on an annual basis in order to account for staff changes.

As a direct result of utilising tools and software that Griffith University already has available other expenses such as software license or equipment cost do not apply. Office 365 licenses are provisioned to all students and staff by default, therefore the deployment of this system would not incur any new licensing cost or maintenance fees, as those are already budgeted at a corporate level. Further, Office 365 is a cloud hosted solution, therefore the new system does not require server hosting or equipment renewals.

Summary of Estimated Annual Operating Costs		
Recurring Expense	**Amount (AUD)**	
Internal labour (Operational Support)	$	15,080.00
Training	$	755.00
Total	**$**	**15,835.00**

Table 3 – Annual Operating Costs

[1] IT Support Technicians will be responsible for supporting the new system operationally. The average annual salary of an IT Support Technician is $60,000 and is equivalent to approximately $29 per hour (PayScale, 2019). It is estimated that approximately 10 hours per week will be required to support this system. Therefore, the cost calculation is $29 * 10 hours per week * 52 weeks which totals $15,080 per year.

[2] Training will be required for both the Placement Coordinator as well as the IT Support Technician and should be provided by one of the developers who built the solution. An estimation of 5 hours of training will be required for each party. Thus, the total cost of training will be $755 per year, which is calculated as:

- Developer hourly rate $36 * 5 hours ($180) plus IT Support Technician hourly rate $29 * 5 hours ($145) = $325
- Developer hourly rate $36 * 5 hours ($180) plus Placement Coordinator hourly rate $50 * 5 hours ($250) = $430 for training.

2.4. Cost Benefit Analysis

2.4.1. Anticipated Benefits

The deployment of the proposed system will entail several anticipated tangible and intangible benefits, as listed below. Tangible benefits are quantitative benefits that are measurable and are often described in monetary terms. In contrast, intangible benefits are considered qualitative benefits that cannot be measured accurately against a specific monetary value.

Tangible Benefits

- Significantly decreased labour cost through time savings gained by process automation.
- Removed printing and stationary cost.
- Enhanced student and experience will lead to new student recruitment due to positive experiences and improved perception of Griffith University programs.
- Increased staff satisfaction can lead to reduced staff turnover and therefore reduced training cost.

Intangible Benefits

- Positive impact on the environment by significant reduction in printing requirements.
- Increased student and staff satisfaction with placement process.
- Ability to improve student program through trend analysis that will be enabled via new reporting capabilities.
- Increased physical space because student documents will no longer have to be stored on campus for several years.
- Reduced fire hazard in offices where paper based-forms are currently stored.
- More secure data retention by reducing the risk of documents getting lost or damaged.
- Improved compliance due to reduction of human error in form submission.

2.4.2. Estimated Annual Benefits

The tangible benefits that the new system is expected to provide are estimated to be worth $28,000 per year. Table 4 provides a summary of how the annual benefits were calculated.

Estimated Annual Benefits		
Benefit / Cost Saving	**Calculation**	**Amount (AUD)**
Reduced labour cost[1]	10 hours per week (50$ per hour)	$ 26,000.00
Reduced printing and stationery[2]	100% of current expenses	$ 2,000.00
Total		**$ 28,000.00**

Table 4 – Estimated Annual Benefits

[1] The majority of work is currently undertaken by the Placement Coordinator who is an Organizational Psychologist. Reportedly 50% of her full-time role is spent on administering the placements (20 hrs per week), and it could be suggested that the new system will reduce the time required by 50% minimum (10 hrs saved per week). The hourly salary rate of Organisational Psychologists within Australia is approximately $50 dollars per hour (PayScale). Thus, the cost savings per year are 10hrs * $50 * 52 weeks = $26,000

[2] This benefit has been calculated by considering the total amount of printing that is currently required, which will no longer be necessary if the new system is implemented. In the past there have been approximately 200 students completing placements per year, and each placement involves 10 different forms with 5 – 15 pages each. This means that 200 * 13 * 10 pages per form (average) = 20,000 pages are printed per annum. If we consider the general cost per page to be $0.10 then the total printing cost equates to $2,000 per year.

3. Risk and Feasibility Analysis

3.1. Organisational Risks and Feasibility

The current process has been in place for a long time and oftentimes paper-based signatures are considered 'safe' for compliance and may be perceived as more legally binding as compared to digital approvals. Supervisors trust the current system and are familiar with it. Therefore, changing to a digital system can cause resistance and concern among the supervisors which may constitute a risk to the project and Griffith University.

The following organisational risks exist when implementing the proposed system:

- Reluctance to change to a new system due to unfamiliarity and aversion to new processes.
- Perception that digital approvals are less valuable or less legally binding when compared to paper-based signatures, resulting in lack of trust in the new system.
- Perceived loss of control over processes as they will be automated which may lead to concerns regarding the integrity and reliability of the system.
- Fear of system failures.

These organisational risks can potentially be mitigated in the following ways:

- Highlight the benefits that new system will deliver.
- Ensure that user interfaces are self-explanatory and easy to use.
- Offer employee training to generate confidence with using the new system.
- Involve the end users in the system analysis phases to ensure the new system will address their requirements.
- Involve end users in the development phase of the new system to increase commitment.
- Present backup plans and contingencies if system failures occur to offer reassurance.

3.2. Technological Risks and Feasibility

The following technological risks exist when implementing the proposed system:

- As the goal is to utilise the O365 cloud platform there exists the possibility for cloud configuration changes that affect frontend interfaces and may cause errors.
- System failures would have a significant impact and therefore pose a high risk, especially if these failures are not detected immediately (e.g. student realizes at the end of their placement that their submissions were not captured).
- Continued monitoring may be required which could exceed the time savings that are gained for other staff.
- Using relatively new technology means that it is impossible to predict how reliably the system will work when used simultaneously by large groups of people and over extended periods of time.
- It is difficult to predict how much support time will be required therefore the estimated annual cost might be higher than anticipated.

These technological risks can potentially be mitigated in the following ways:

- Involve a consultant or expert opinion to predict system performance under different conditions (e.g. many users using system at once).
- Complete frequent system back-ups to reduce risk of data loss.
- Schedule maintenance and system checks to ensure the system remains functional.
- Involve IT support teams during the development and testing phases of the project so they have the ability to troubleshoot and fix the system in case of system errors.
- Ensure sufficient support time is included in the annual ongoing cost estimate to ensure business continuity.

3.3. Resource Risks and Feasibility

The following resource risks exist when implementing the proposed system:

- Using new technology to deploy the system creates the risk that the skills required to develop and support the system are not yet common in the workforce, so it may be difficult to find replacements when staff leave the project or the university.
- Project team members may not be available full time throughout the project duration which could delay project schedule estimates.
- The amount of required system support is difficult to predict, therefore there is a risk of not having allocated enough operational support staff to support the system.
- Staff turnaround could post a risk to retaining system knowledge and skills that are required to ensure continued development and support.

These resource risks can potentially be mitigated in the following ways:

- Provide training for the operational support staff to ensure they have the capability to support the system.
- Anticipate that project team members might leave the project or the organization and offer incentives for them to stay until the project is completed.
- Identify skilled staff members or qualified external resources who are available on short notice as potential back-up in case project team members leave the project or the delivery workload is larger than expected.

3.4. Schedule Risks and Feasibility

The following schedule risks exist when implementing the proposed system:

- The system requirements and complexity of the solution may be unclear upfront which may result in incorrect schedule estimates.
- One of the developers needs to upskill before they can assist in the project. Training courses are only offered at specific times, which might constitute a delay to the project schedule.
- There is a risk that the system scope changes during the project as new requirements are identified, which will increase development times.
- It is important to complete the new system before a specific due date that aligns with the university's program schedule. If the system is not deployed before that date, then the system will not need to be used until the following year.

These schedule risks can potentially be mitigated in the following ways:

- Develop a proof-of-concept solution to ensure common understanding and detect any hidden complexities upfront.
- Estimate and include the time to upskill team members in the project schedule.
- Review leave requests of project team members before commencement of project to get a realistic understanding of the resources that will be available during the project.
- Obtain confirmation of team members that they will avoid any short notice absences during the project as much as possible.
- Involve the Business Analysist to review the project schedule before commencement of project.

4. Project Environment

4.1. Captured Information

The project team will require the ability to capture a variety of information throughout the duration of the project, and they will need to utilise different electronic tools and software to achieve this. A summary of the tools that will be used is outlined in Table 5, which also describes the type of information that will be captured, as well as the associated user access permissions.

Information Repositories and Tools		
Information Captured	**Electronic Tool**	**User Access**
Project Business Case	MS Word	Project Manager (edit), other project team members (view)
Requirements Analysis	MS Word	Project Manager and Business Analyst (edit), Developers (view)
Project schedule (Gantt Chart)	MS Project	Project Manager and Business Analyst (edit), Developers (view)
Project status and progress	Atlassian Jira	Project Manager and Business Analyst (edit), Developers (view)
Use case diagram	MS Visio	All project team members (edit)
Class diagram	MS Visio	All project team members (edit)
Risk Register	MS Excel	All project team members (edit)
Errors and issues log	MS Excel	All project team members (edit)
Progress reports	MS Word	Project Manager (edit), other project team members (view)
Sample forms from the client	SharePoint Online	All project team members (view)
Wireframes and design specifications	MS Excel	All project team members (edit)
Project team communication	MS Teams, Outlook	All project team members (edit)
Project team meeting notes	MS OneNote	All project team members (edit)
Placement Data Database	O365 SharePoint Online	Developers (edit), Project Manager and Business Analyst (view)
Web/app interface code	O365 PowerApps	Developers (edit), Project Manager and Business Analyst (view)

Reporting dashboards	O365 Power BI	Developers (edit), Project Manager and Business Analyst (view)
System version control log	Atlassian Bitbucket	Developers (edit), Project Manager and Business Analyst (view)
Test cases and user acceptance test results	MS Excel	Developers (edit), Project Manager and Business Analyst (view)

Table 5 – Information Captured

4.2. Work Environment

It is important to establish of a work environment that allows the project team members to collaborate and work productively towards achieving the project goals. The main areas that were considered in the creation of such work environment includes hardware and software components, office space as part of the physical environment, as well as support staff to assist the project team where required.

4.2.1. Hardware/Software

The hardware that will be made available to the project team members includes a computer or laptop for each team member, whereby specifically the developers might need multiple screens. Other hardware includes the iPad and the smartphone that were purchased to test the system's mobile functionality on different operating systems.

The software that will be provided to the project team members primarily includes Microsoft applications that are available as part of the Office 365 suite (Office 365, 2019). As a cloud service, Office 365 offers both the tools needed for collaboration and document project works, as well as the tools to build the system itself. The team will utilise MS Word, Excel, PowerPoint, and MS Teams to collaborate and documentation, whereas applications such as SharePoint Online, Power Apps and Power BI will be used to develop the system. Additional licenses for MS Project and Visio will be available to assist with project scheduling and the creation of diagrams (MS Project, 2019; Visio, 2019). The project progress and identified issues will be tracked using the project management software Jira (Jira, 2019). Finally, the code management and code version control will be completed by utilising the code management system Bitbucket (Bitbucket, 2019).

4.2.2. Physical Environment

The physical work environment for the project team will involve two meeting rooms within the Griffith University office space at Nathan Campus. The larger meeting room will be utilised as a common work area for the project team members to facilitate collaboration. The smaller meeting room can be used for meetings or phone calls to avoid disrupting the other team members. It also includes a whiteboard that may be used for brainstorming exercises. The two rooms will be booked for the duration of the project. As the physical work environment will be hosted within the existing office space of Griffith University, amenities such as a kitchen, toilets or printers will be available to the team members.

4.2.3. Support Staff

The project team will require support staff to assist with administrative exercises. For example, they will be able to support the project team by booking travel arrangements such as flights and accommodation for the training in Melbourne that will be attended by one of the developers. Other tasks include the processing of the training registration, payment and organising client meeting venues.

4.3. Processes and Procedures

4.3.1. Reporting & Documentation

The project relevant documentation as outlined in Table 5 will be primarily captured by the Project Manager and the Business Analyst. More specifically, the Project Manager will be responsible for documenting the project business case utilising MS Word and outline the estimated delivery cost, annual ongoing cost and benefits using MS Excel. Further, the project schedule and progress reports will be captured by using MS Project.

The Business Analyst will be responsible for documenting project meeting notes, client feedback and system requirements in MS Word. Design layouts will be captured using MS PowerPoint, and any diagrams and flowcharts will be captured using MS Visio.

The Developers will maintain the system version control using Bitbucket. In addition, document errors or issues will be recorded in MS Excel, and test cases and user acceptance test results will be captured using MS Word. They ill also be responsible for updating the status of each system development related task in Jira.

The project team will use MS Teams for informal communication which automatically stores all conversations. Further, all project team members will have the ability to update the risk register. Finally, all project related documents will be stored within the document library of a SharePoint Online site that will be created for the specific purpose of documenting project related files.

4.3.2. Programming

The programming and system development related work will be divided into smaller individual tasks and captured using Jira (Jira, 2019). The Project Manager will assign the tasks to the developers by allocating them within Jira. Each developer will complete their assigned tasks individually (single programming) as the system does not allow for multiple people working on the solution at the same time (pair programming). Further, the developers will be able to update the task status in Jira and add comments regarding their progress.

4.3.3. Testing

The Jira software allows for each task to be assigned a certain status, which enables the developers to record whether a task is in progress, ready for testing, or has been completed. Therefore, tasks are identified as ready for testing by updating their status within Jira to ‘ready for testing’.

Programming test cases will need to be defined by the Business Analyst and executed by the developers. The test results will be recorded by the developers, and any errors or failures are captured in the issues log. Further development may be required after the programming tests are completed in order to fix any identified issues.

User acceptance tests will be completed at the end of each iteration by the client, who will test the end user experience of working with the system and provide feedback on its functionality. New issues that may be identified by the client will be captured and addressed by the developers. The goal of user testing is for the clients to provide a final approval on the system or component that has been developed.

4.3.4. Deliverables

The project deliverables for the new system are comprised of the sub-systems that have been identified in Table 1, as well as the project documentation. The system deliverables include the placement database, several web interfaces to digitise the form submission as well as the review and approval processes, and the reporting capability. Further, deliverables also include the provision of all project related documentation and access permissions required for the client to operate and own the new system after project closure.

These deliverables will be handed over to the client at the end of the project, after all system tests have been completed successfully and user acceptance tests have been approved by the client. The handover will involve a demonstration of the completed system, where any outstanding questions that the client may have will be addressed and the requirements for ongoing operational support will also be discussed.

4.3.5. Code & Version Control

The system's programming code will be controlled via Bitbucket in order to prevent conflicts and to maintain version control (Bitbucket, 2019). Any identified system errors or issues will be captured as a task in Jira, and their resolution will be coordinated by the project manager assigning the tasks to one of the developers.

The system related deliverables will be released at the end of the project once the client has approved the system for release by completing and signing off on the user acceptance tests. The release of the system will involve the provision of access permissions for the client and all business users, and to the operational support team who will be responsible for the ongoing system support.

5. Project Work Schedule

5.1. Work Breakdown Structure

The work required to deliver a new system has been broken up into different project stages as well as individual tasks associated with each project stage. Within a Work Breakdown Structure (WBS) each task is assigned to a unique task ID and the estimated time effort to complete the task is added. Further, each task may depend on other tasks to be completed before the respective task can begin. Therefore, each task is associated with a predecessor task, which serves as a basis to create a project schedule and the Gantt chart displayed in Figure 1.

Table 6 displays a WBS for the student form submission subsystem. The student form submission subsystem was estimated to be delivered within 2 weeks according to Table 1. Considering that the project team will not work during weekends, the total number of days to complete this subsystem is 10 work days. As each work day consists of 8 hours, the total delivery timeframe is 80 hours.

The total number of hours in the WBS exceeds 80 hours as some tasks can be completed simultaneously by different project team members, and not all task depend on previous tasks to be completed before they can be commenced. Further, the time effort for each task represents an estimate based on the current understanding of the system components and complexity and were projected for a team of 4 people including the project manager, business analyst and two developers.

Work Break Down Structure: Student form submission subsystem			
Task ID	**Task Description**	**Effort**	**Predecessor**
Project Planning			
1	Initial meeting with client	3 hrs	0
2	Document system requirements	4 hrs	1
3	Create project schedule	4 hrs	2
4	Project team meeting	2 hrs	3
5	Confirm project schedule with client	2 hrs	4
Analysis Tasks			
6	Create & distribute stakeholder questionnaire	4 hrs	5
7	Analyse system requirements	4 hrs	5
8	Define and Analyse Use Cases	6 hrs	7
9	Client approval of requirements	2 hrs	8
System Design Activities			
10	Define system components	3 hrs	9
11	Identify system classes and methods	3 hrs	10
12	Design placement data subsystem	5 hrs	10
13	Design students form submission subsystem	5 hrs	12
14	Design supervisor form review subsystem	5 hrs	12
15	Design Placement Coordinator subsystem	5 hrs	12
16	Design draft reports: Reporting subsystem	4 hrs	12
17	Confirm system design with client	3 hrs	13, 14, 15, 16
Build Activities			
18	Build placement data subsystem	8 hrs	17
19	Build students form submission subsystem	12 hrs	18
20	Build supervisor form review subsystem	12 hrs	18
21	Build Placement Coordinator subsystem	12 hrs	18
22	Build Reporting subsystem	6 hrs	19, 20, 21
Testing			
23	Compile test cases for all subsystems	4 hrs	22
24	Perform tests on all subsystems	4 hrs	23
25	Perform acceptance tests with the client	2 hrs	24
26	Report system test results	1 hr	25

Table 6 – Work Breakdown Structure

5.2. Gantt Chart

The Gantt chart shown in Figure 1 displays the tasks that were outlined in the Work Breakdown Structure both in a table format as well as a chart format visualizing the task durations on a timeline. The Gantt chart below was created using the Microsoft Project application.

The table section within the Gantt chart includes the task descriptions and task IDs, the estimated amount of time needed to complete each task, the start and end dates, and the task predecessors. The other component of the Gantt chart can be described as a chart with horizontal bars that altogether represent the project schedule. The chart shows a bar for each task and visually displays them on a horizontal timeline. The length of each task bar represents the time spent on the respective task, and lines connecting the bars display the dependencies.

Finally, the chart also highlights the critical path which is an important part of the Gantt chart. All activities or tasks that must stay on schedule for the whole project to stay on schedule are part of the critical path. It is therefore considered critical because if one or more of the critical path tasks is delayed, it will result in the project being delayed. The critical path is highlighted in red color within the Gantt chart.

ID	Task Name	Duration	Start	Finish	Predecessors
1	Initial meeting with client	3 hrs	Mon 6/01/20	Mon 6/01/20	
2	Document system requirements	4 hrs	Mon 6/01/20	Mon 6/01/20	1
3	Create project schedule	4 hrs	Mon 6/01/20	Tue 7/01/20	2
4	Project team meeting	2 hrs	Tue 7/01/20	Tue 7/01/20	3
5	Confirm project schedule with client	2 hrs	Tue 7/01/20	Tue 7/01/20	4
6	Create & distribute stakeholder questionnaire	4 hrs	Tue 7/01/20	Wed 8/01/20	5
7	Analyse system requirements	4 hrs	Tue 7/01/20	Wed 8/01/20	5
8	Define and Analyse Use Cases	6 hrs	Wed 8/01/20	Thu 9/01/20	7
9	Client approval of requirements	2 hrs	Thu 9/01/20	Thu 9/01/20	8
10	Define system components	3 hrs	Thu 9/01/20	Thu 9/01/20	9
11	Identify system classes and methods	3 hrs	Thu 9/01/20	Fri 10/01/20	10
12	Design placement data subsystem	5 hrs	Thu 9/01/20	Fri 10/01/20	10
13	Design students form submission subsystem	5 hrs	Fri 10/01/20	Fri 10/01/20	12
14	Design supervisor form review subsystem	5 hrs	Fri 10/01/20	Fri 10/01/20	12
15	Design Placement Coordinator subsystem	5 hrs	Fri 10/01/20	Fri 10/01/20	12
16	Design draft reports: Reporting subsystem	4 hrs	Fri 10/01/20	Fri 10/01/20	12
17	Confirm system design with client	3 hrs	Mon 13/01/20	Mon 13/01/20	12,13,14,15,16
18	Build placement data subsystem	8 hrs	Mon 13/01/20	Tue 14/01/20	17
19	Build students form submission subsystem	12 hrs	Tue 14/01/20	Wed 15/01/20	18
20	Build supervisor form review subsystem	12 hrs	Tue 14/01/20	Wed 15/01/20	18
21	Build Placement Coordinator subsystem	12 hrs	Tue 14/01/20	Wed 15/01/20	18
22	Build Reporting subsystem	6 hrs	Wed 15/01/20	Thu 16/01/20	19,20,21
23	Compile test cases for all subsystems	4 hrs	Thu 16/01/20	Fri 17/01/20	22
24	Perform tests on all subsystems	4 hrs	Fri 17/01/20	Fri 17/01/20	23
25	Perform acceptance tests with the client	2 hrs	Fri 17/01/20	Fri 17/01/20	24
26	Report system test results	1 hr	Fri 17/01/20	Fri 17/01/20	25

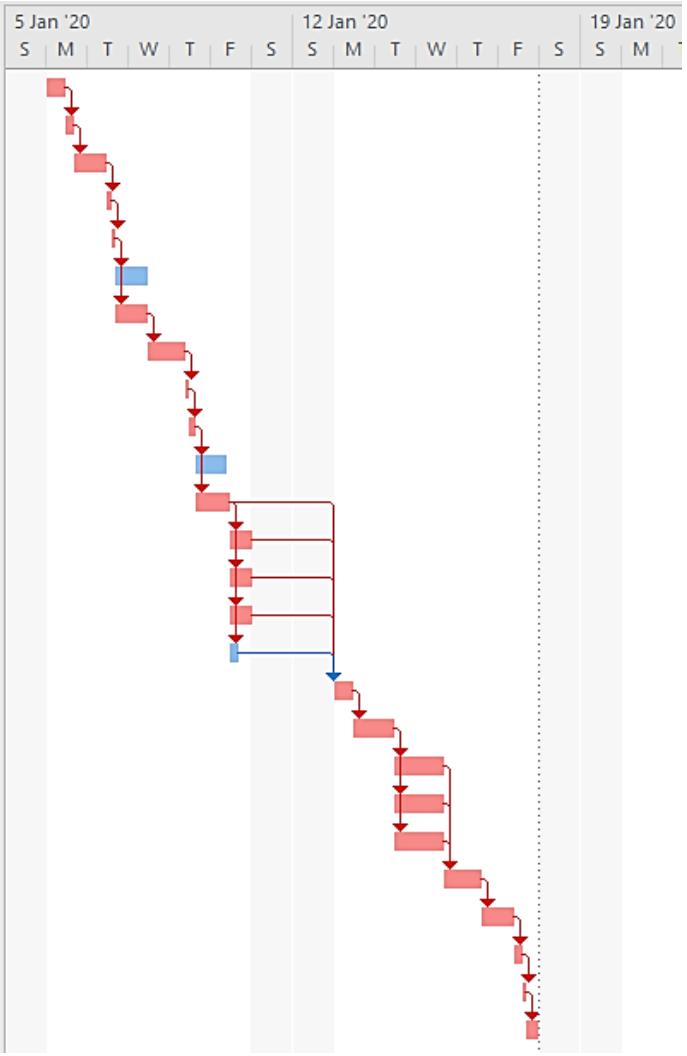

Figure 1 – Gantt Chart

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