Business School

School of Information SystemsTechnology and Management

INFS3703 TEAM PROJECT COVER PAGE

Title of Assignment: PetWorld App Development

Tutor Name: Rachel Lin **Tutorial Time: 6:00PM – 8:00PM**

Date Due: 29/07/24 **Date Submitted: 29/07/24**

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z5359975	Vinay Venkatesh	V.V	29/07/2024
z5419382	Tony Nguyen	T.N	29/07/2024
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Enterprise Analysis

Problem Statement

Petworld, a leading pet food and accessories retailer, is developing an app to enhance customer experience and improve sales. This app aims to offer features such as personalised recommendations, customer account management, and in-store pickup options. This aims to provide a seamless and convenient shopping experience for PetWorld's customers. Whilst the project was met with enthusiasm by both PetWorld and their development partner TechBuild, the project has faced several challenges that compromise its completion.

The project began in February 2023, initially outlining key milestones and the delivery of a prototype in May 2023. A beta launch would follow in July 2023, with a full public launch by September 2023. The September launch date was significant as it was publicly announced by PetWorld's CEO in investor relations and media documents. This fostered high expectations amongst stakeholders and customers, emphasising the significance of meeting this deadline.

As the project progressed, various issues emerged causing delays and increasing costs. Adding to these challenges, the Pet Data Protection Act (PDPA) will come into effect on December 1 2024, which will require significant changes to be made to data handling and storage. Currently, PetWorld's prototype which was released in June 2023 does not meet PDPA compliance, requiring a change request with an additional $300,000 to the budget. Whilst TechBuild has accepted the change request, they have expressed concerns about maintaining the original features and functionality.

Problem Domain

Key Challenges

Scope Changes

- Stakeholders are requesting additional features which are leading to scope creep, causing delays, and impacting the project timeline and budget.

Communication Breakdowns

- Fragmented communication channels have led to information silos.
- The project lacks a clear pathway for issues to be escalated causing delays in problem resolution.

Methodology Challenges

- TechBuild's agile approach has struggled to keep up with the project's increased scale and pace.

Resource Turnover

- Key team members left which has created knowledge gaps and onboarding delays.

Impact on Stakeholders

- The executive team is concerned about meeting the announced launch date
- The development team is suffering increased pressures to meet deadlines which have been heightened due to the announcement of the PDPA.
- The legal team needs to ensure that the app complies with the PDPA.
- Customers need to be adequately satisfied and any failure to deliver could be detrimental.

Project Management Approach

Project Charter

Project Purpose	• Petworld is aiming to scale its business through the development of an app to enhance customer experience and drive sales growth. The app will allow for delivery and pickup. The app is to comply with Pet Data Protection Act regulations.
Project Objectives and Related Success Criteria	• Launch the complete app by 30th September • Incorporate PDPA compliance features. • Keep the project within budget ($1,300,000).
High-Level Requirements	• User-friendly interface for product browsing, order placement, and management • Integrate with existing IT systems for inventory and order processing • The app complies with PDPA, users are able to access, correct, and delete data, and data is encrypted
High-Level Project Description, Boundaries, and Key Deliverables	1. Development of a mobile app with online shopping, order tracking, and customer support. 2. Exclude previous features and functions that will not comply with PDPA 3. Key Deliverables: a. Mobile app with core functionalities b. PDPA compliant features c. user manuals, and d. staff training
Project Risk	Risks associated with uncontrolled scope creep, regulation requirements, budget

Summary Milestone Schedule	Prototype completion: 1. High-fidelity prototype: June 2024 2. Beta launch: July 2024 3. Complete app launch: September 30, 2024

Table 1.1 Project Charter

Stakeholder Analysis

For the success of this project, it is imperative to outline the stakeholders and understand their pain points to address their concerns

Stakeholder	Key Pain Points
CEO	Worried about not having their solution rolled out by the announced September date. Requires a comprehensive review of the project to develop strategies to ensure compliance and avoid disruption to the planned launch
CTO	Teams involved with the project under their leadership are facing issues due to the expanding scope of the project. Expresses concerns about meeting regulatory compliance and wants to rework the app to facilitate this
CMO	Wants to include previously requested features and functions that may not be part of the original contract with Techbuild
TechBuild Team	With the expanding scope, they are struggling with quality issues and bugs. Deadlines have not been adapted to the increased scope causing employee turnover. Increased workload having to ensure the app is compliant with PDPA,
End Users	Issues with the app's stability and ease of use
Marketing, Sales, Customer Service	Started requesting additional features and this has led to the expansion of the project's scope. This results in delays and exceeding the budget.
Legal Team	They must ensure that the Petworld app complies with PDPA regulations

Table 1.2 Stakeholder Analysis

Expectations Management Matrix

To effectively manage stakeholder expectations, it is important to establish clear measures of success and prioritise them accordingly.

Measure of Success	Priority	Expectations	Guidelines
Scope	2	The scope is to be clearly defined following a robust product backlog.	Focus on features from the backlog. Exercise flexibility due to an expanding scope
Time	1	The time frame is to be realistic such that a high-quality app can be produced	Alert CTO of any issues that may impact the deadlines
Cost	2	Costs are to be carefully calculated and adequate funds are made available for the completion of the project. Ideally, completion of the project should fall within budget	Ensure the project does not exceed budget. Request additional funds if necessary
Legal Compliance	3	The app complies to PDPA regulation	Ensure the app is compliant with PDPA regarding data collection and processing of data. Encryption for stored data. User rights can be exercised and follow rules with data sharing

Table 1.3 Expectation Management Matrix

Power Interest Grid

The power interest grid categorises the stakeholders to provide a visual representation of how to engage them based on their power and interest in the project.

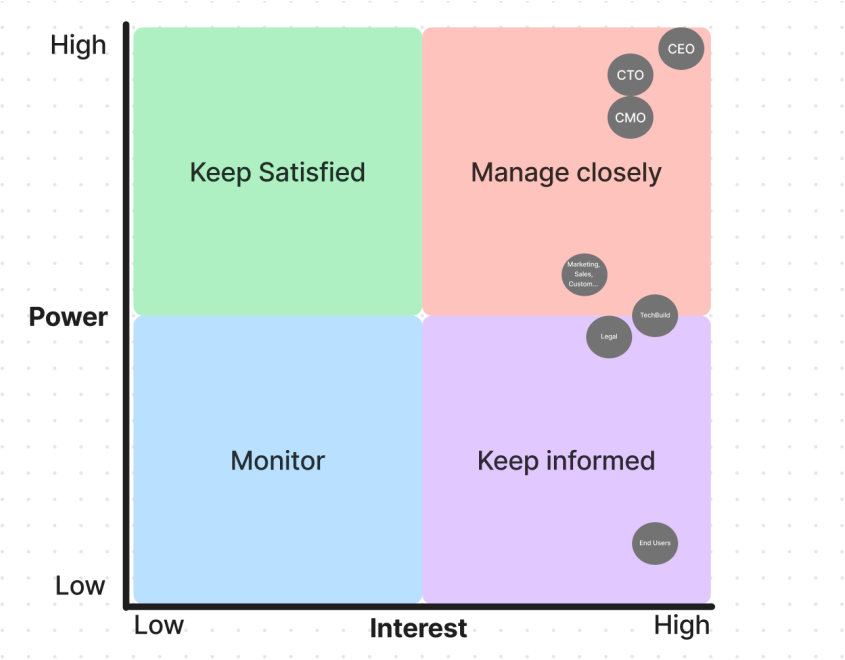


Figure 1.1 Power Interest Grid

Project Management Tools

Techbuild is working in an Agile environment which Jira can support through its ability to plan sprints, create product backlogs, and have standups. This is important given the dynamic scope of this project. An added benefit is that Jira promotes transparency, the CEO and CTO are able to monitor progress and make decisions based on it.

Confluence creates a centralised documentation space which is especially useful given how document-heavy the project is with change requests, project-related documents, design requirements, and legal documents. It can also facilitate knowledge retention as documents are stored in a singular platform which is convenient due to the high turnover rate of Techbuild.

Communications and Cadence

Information should be communicated with formal language to facilitate communication between Techbuild and PetWorld, containing user needs, requirements, and expectations. *(Koskinen. K.U, 2004*). To deter project delays, a set timeframe of response should be established with at least an acknowledgment within 24 hours. Communication should also be limited to two channels, encouraging information transparency. Weekly meetings should be standardised, with discussion points being chosen beforehand. Furthermore, these talking points would be allotted with specific time slots to prevent bloating, keeping the meeting focused.

Inconsistent messages from stakeholders were a relevant issue, thus PetWorld should nominate specific individuals to be authorised to release feedback. Those chosen would participate in stakeholder meetings to provide focused feedback towards Techbuild. In the event of indecisiveness, a clear escalation process should be available, to facilitate the decision-making process (*Unger-Aviram, E., Zwikael, O. and Restubog, S.L.D, 2013*). Teams should have the opportunity to present any issues to upper management for diagnosis and resolution.

Agile Methodology

Agile methodologies offer flexibility and iterative development, crucial for managing PetWorld's app project challenges. Adopting an Agile framework will help manage complexity and align multiple teams across the project *(Rasnacis, A. and Berzisa, S. 2017).*

A robust product backlog and formal change control will handle additional feature requests and compliance needs without affecting delivery dates. Regular Scrum meetings and collaboration tools like Jira and Confluence will enhance communication and transparency. This comprehensive plan enables PetWorld to manage scope, maintain quality, and meet the September 2024 launch deadline while ensuring PDPA compliance.

Scope Management

Planning Scope Management

Scope Management Plan

The Scope Management Plan ensures the project scope is controlled, documented, and defined throughout the lifetime of the project.

Project Scope Description	PetWorld is developing a mobile app to enhance customer experience and drive sales through online capabilities. It will feature secure account management, real-time order tracking, advanced search and filtering, loyalty programs, and secure multi-payment options, all designed to be PDPA compliant.
Deliverables	1. Mobile app with user account management, loyalty program, order tracking, payment processing, and customer support features. 2. Implementation of encryption standards, user consent forms, and data access logs as required by PDPA. 3. Project management reports, compliance documentation, and marketing materials.
Project Exclusions	The project will not include the development of hardware devices, integration with third-party logistics not contracted within the scope, or any features not specified in the RFP unless approved by the CCB.
Constraints	● Budget at $1,300,000 ● Launch publicly by September 30th, 2024. ● Strict adherence to PDPA guidelines affecting data handling and user privacy
WBS Creation	1. Define core app functionalities 2. Integrate PDPA tasks (encryption, consent etc) 3. Decompose into a top-down hierarchical structure. 4. Assign resources and set milestones.

WBS Management	1. Assign roles for PDPA compliance. 2. Schedule regular reviews to monitor progress on PetWorld's app features. 3. Update stakeholders on compliance and functionality changes.
Product Analysis	1. Product Breakdown: Decompose the application into manageable packages as per WBS. 2. Requirements Analysis: Detailed analysis to ensure each feature meets business needs and PDPA standards. 3. Systems Analysis: Evaluate current systems to integrate new app functionalities efficiently. 4. Value Analysis: Assess each feature for value addition vs. cost implication.
Assumptions	● Budget and personnel are sufficient for project execution within scope. ● Existing technology is sufficient to support the development and operation of the mobile app. ● The project scope defined in the RFP and curveball will be adhered to, with changes controlled through formal processes. ● Stakeholder availability for regular feedback and approval processes.

Table 2.1 Scope Management Plan

Requirements Management Plan

Requirements Activities	● Produce a requirements management plan outlining key PetWorld features and specific characteristics (refer to Methods in appendix) ● Include PDPA requirements like data encryption and user consent throughout the framework. ● Use Jira for progress tracking on both core app features and PDPA compliance tasks.
Configuration Management	● Establish a process for managing changes in product functionalities, ensuring changes in-app features and PDPA-related adjustments are tracked and reported accurately. ● Ensure that changes aim to enhance customer experience, improve sales growth, and comply with PDPA.

Prioritisation Process	● Evaluate and prioritise requirements based on stakeholder impact, feasibility, and strategic objectives. ● Employ a traceability matrix to ensure all requirements are prioritised and ranked according to their importance.
Product Metrics	1. Set metrics to assess the performance, stability, and usability of the app 2. Metrics will evaluate core functionalities and adherence to PDPA, ensuring to meet PetWorld's quality standards.
Planning, Tracking, and Reporting	● Plan detailed sessions to accurately document requirements from all stakeholders, with a focus on integrating PDPA requirements seamlessly with core functionalities. ● Continuously track the integration of PDPA requirements using Jira, ensuring compliance throughout development phases. ● Report updates to stakeholders on both PDPA compliance and core feature development progress.
Traceability Matrix	● Implement a traceability matrix that captures requirement attributes, product features, test cases, etc. ● Use matrix during development and testing phases to verify that both PDPA requirements and app functionalities are being implemented.

Table 2.2 Requirements Management Plan

Collecting Requirements

Requirements Documentation

Business Requirements (Objectives)	• Enhance customer experience with a seamless online ordering system • Drive sales with loyalty programs • Ensure PDPA compliance
Solution Requirements	Functional: Include account management, loyalty programs, real-time order tracking, secure multi-payment options, customer support via live chat, and advanced search and filtering capabilities.
	Nonfunctional: App response times, uptime, data encryption standards as per PDPA, and adaptability to handle high-traffic volumes
Quality Requirements	Conduct: • Usability tests • Security audits • Obtain compliance certifications.

Table 2.3 Requirements Documentation

Product Features

Delivery & Pickup	Home delivery or in-store pickup, including real-time package tracking, standard/expedited delivery, and scheduling for pickup.
Search & Filtering	Advanced search capabilities with suggestions, auto-complete, and filters for brands, categories, price ranges, etc.
Recommendations	Intelligent recommendations system utilising machine learning to suggest products based on user's purchase history, managed wish lists, etc
Accounts	Secure account creation and management, an integrated loyalty program with a point system, and auto-checkout features.
Payments	● Support multiple payment options ● Ensure all transactions are encrypted per PDPA guidelines ● Implement fraud detection systems.
Discounts & Promotions	Manage special offers, and coupon codes, and promote upcoming sales through online channels.
Customer Support	Build a customer support system with a live chat interface and feedback rating system to assist users in real time.

Table 2.4 Product Features

Requirement Traceability Matrix

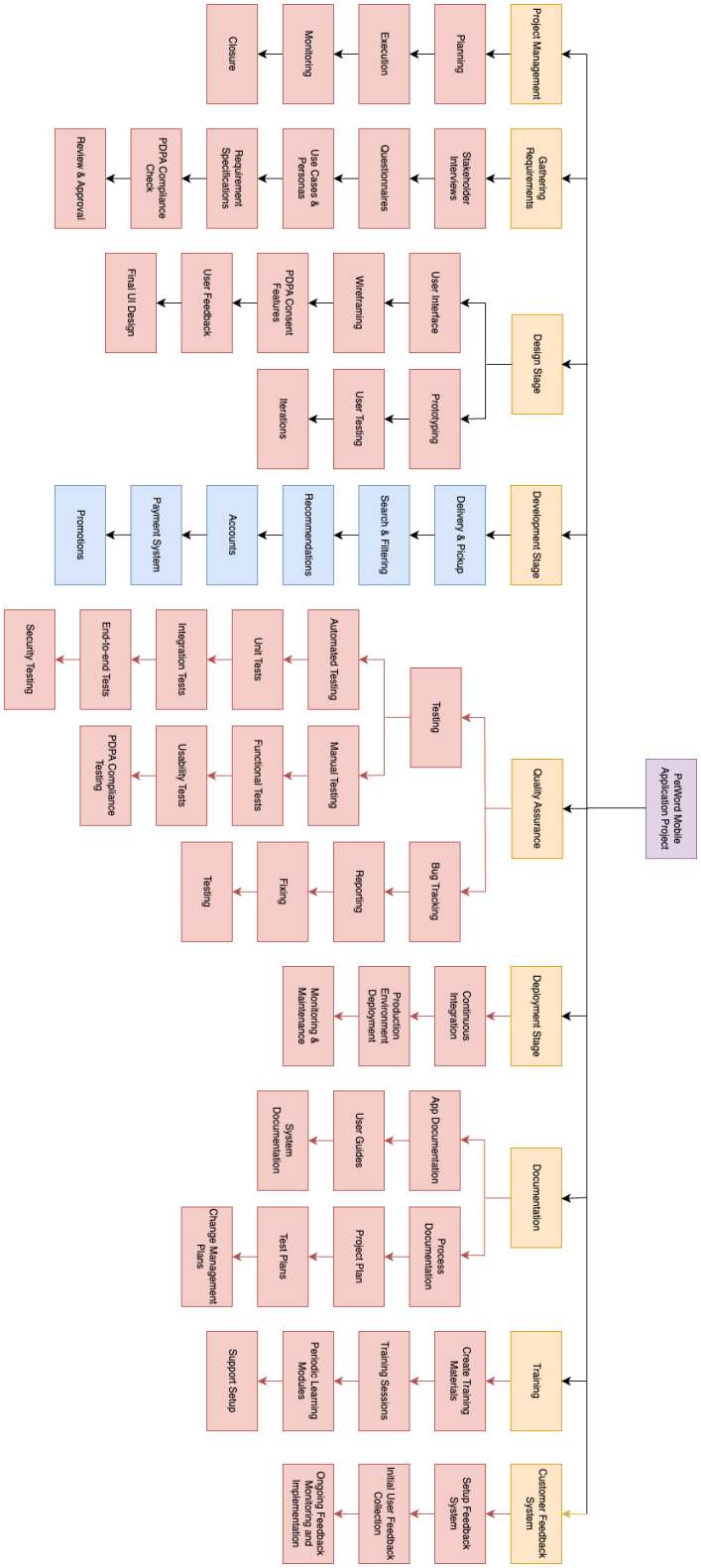
ID	Requirements Description	Business Requirements	WBS Deliverables	Product Design	Test Cases
1	Account Management	Enhance customer experience with seamless online ordering	User account features including login and management	Secure login flow, user data encryption	Usability tests for account management
2	Loyalty Programs	Drive sales with loyalty programs	Loyalty program features	Points accumulation system, rewards catalogue	Test point accumulation accuracy, functionality testing
3	Real-time Order Tracking	Enhance customer service	Delivery and order tracking module	Integration with delivery services, real-time updates	Manual and automated tracking functionality tests
4	Multi-payment Options	Secure transaction processing	Payment processing system	Payment gateway integration, PDPA compliance	Security tests for payment systems, PDPA encryption checks
5	Advanced Search and Filtering	Improve product accessibility	Search and filtering capabilities	Search algorithms, filter options	Testing search accuracy and speed
6	Delivery Options (Standard & Expedited)	Enhance delivery services	Delivery system design	Logistics integration, scheduling options	Test standard and expedited delivery processes
7	Intelligent Recommendations	Personalise shopping experience	Recommendations engine	Machine learning algorithms for user behaviour	Validate recommendation relevance and accuracy
8	Customer Support System	Improve customer satisfaction and support	Customer support and feedback system	Live chat integration, feedback collection	Usability testing for customer support features
9	PDPA Compliance: Data Encryption and User Consent	Ensure compliance with PDPA	PDPA compliance features	Data handling protocols, consent forms	PDPA compliance checks, security audit tests

Table 2.5 Requirements Traceability Matrix

Defining Scope

Work Breakdown Structure

Figure 2.6 WBS



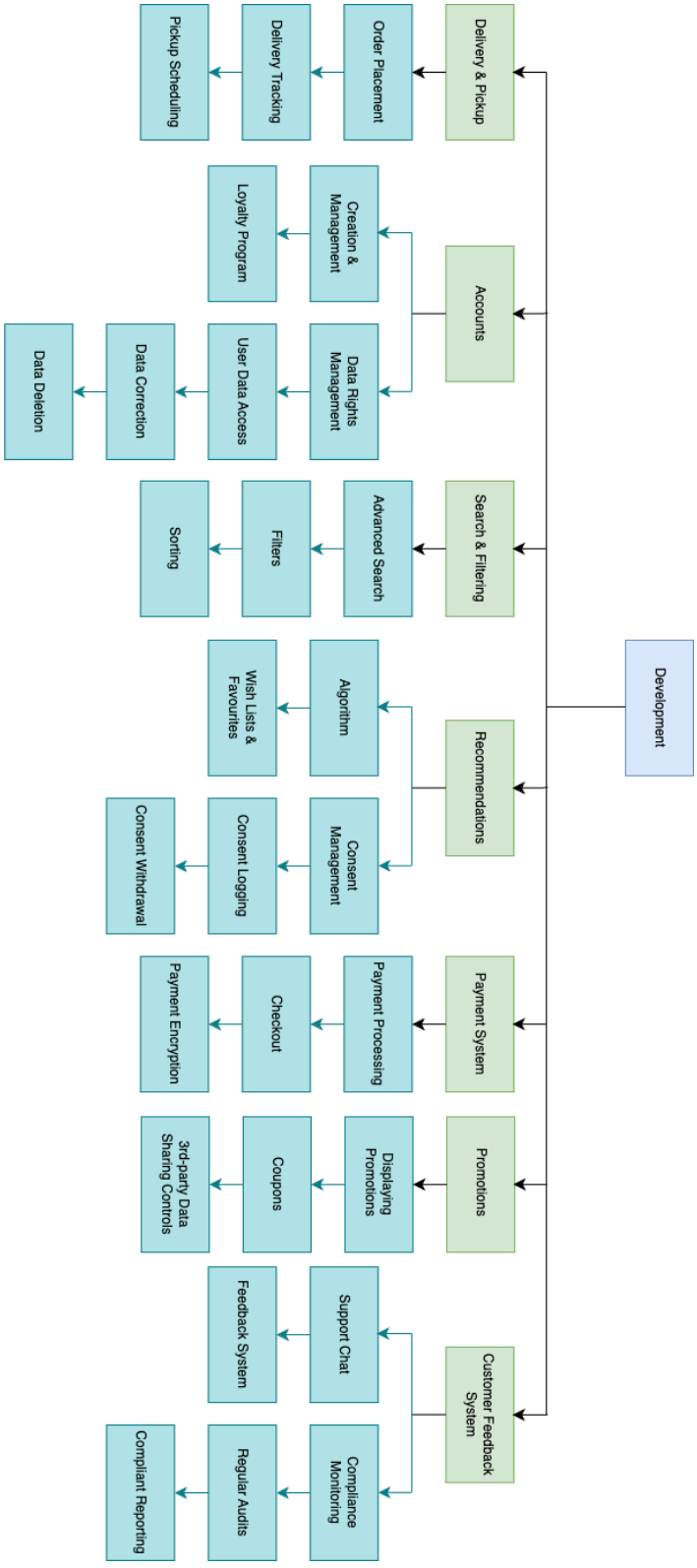


Figure 2.6.1 WBS - Development

Validating Scope

Purpose	To prevent scope creep and ensure deliverables align with PetWorld's objectives and PDPA compliance.	
Acceptance Criteria	Criteria are based on the original SOW, as well as the expanded scope due to PDPA regulations. The deliverables must demonstrate compliance with all PDPA standards regarding data and consent while adhering to time and budget constraints.	
Acceptance Process	1. Identify Deliverables	Identify all deliverables, including those requiring PDPA compliance, and submit them to the PetWorld team.
	2 . Testing Deliverables	Test and validate the functionality of deliverables, performance, usability, and compliance with PDPA. Document outcomes and any discrepancies.
	3. Feedback and Iterations	Evaluate results and incorporate stakeholder/user feedback to revise features, continuing testing until all criteria are satisfied
	4. Formal Acceptance Sign-off	When deliverables meet acceptance criteria, obtain formal sign-off from PetWorld and other stakeholders to confirm validation with scope.

Table 2.7 Scope Validation

Controlling Scope

Purpose	To control and validate changes to the PetWorld app development lifecycle, ensuring all deliverables meet the app's functional requirements and PDPA requirements.	
Change Control Board (CCB)	CCB will consist of key stakeholders from both PetWorld and TechBuild. They will review and approve change requests, particularly those impacting project deliverables. The CCB ensures changes are feasible within the project's constraints of time, budget, and PDPA compliance. This is assessed using Work Performance Information (WPI) (refer to appendix).	
Change Requests Process	1. Change Request	Change requests, such as changes for PDPA compliance during audits or testing, are submitted to the CCB.
	2. Evaluate Change Request	CCB assesses each change request based on its impact on project timeline, budget, and overall integration, with considerations to PDPA compliance. CCB may request further information depending on difficulty/risk.
	3. Implement Approved Changes	Approved changes are carefully implemented and updated within the relevant project document, to keep all stakeholders informed
	4. Monitor Changes	WPI is continuously monitored to ensure seamless integration and compliance with PDPA. The change request can be closed.

Table 2.8 Scope Control

Schedule Management

Schedule Management Plan

The Schedule Management Plan outlines how the project schedule will be monitored, developed, and defined. Ensures set deadlines are met.

Project Schedule Model Development	This project will utilise an agile approach that implements the waterfall methodology for high-level planning, tracking major milestones, and managing detailed development tasks. **Scheduling Tool**: ● **Jira**: For managing Agile sprints, user stories, scheduling, tracking, milestone management, and daily task tracking.
Release & Iteration Length	**Releases**: ● **Beta Release**: July 26, 2024 ● **Final Public Launch**: September 30, 2024 **Release Cycles:** ● The Alpha, Beta, and final deliverables will be released in two-month gaps. **Iterations**: ● Sprints every 2 weeks. ● Time-boxing ensures that essential features are developed first, with additional features added as time permits.
Level of Accuracy	There will be a +/- 10% level of accuracy for estimating activity durations. This will account for contingencies and uncertainties *(Kwon and Kang, 2019)*.

Units of Measure	**Time Measures**: ● **Staff hours:** Tasks ● **Staff days:** Deliverables ● **Weeks:** Milestones
Organisational Procedures Links	Refer to Figure 2.6.1.
Project Schedule Model Maintenance	**Status Updates**: The project schedule will be updated weekly in Jira to reflect current status and progress. **Progress Recording**: Team members will log their hours and progress in Jira. This ensures real-time visibility into project status.
Control Thresholds	**Variance Thresholds**: ● **Schedule Variance:** +/- 10% ● **Cost Variance:** +/-5% ● Deviations beyond these thresholds will trigger a review and corrective action to promptly address any significant delays or advancements *(Jim W, 1993)*.
Rules of Performance Measurement	**Earned Value Management:** ● **Metrics** ○ Earned Value ○ Actual Cost ○ Planned Value ○ Schedule Performance Index = EV/PV ○ Cost Performance Index = EV/AC ● The 50/50 rule will be implemented to denote half of the project is completed when started and finished when the project is launched *(Larry P. Leach, 1993)*. ● Schedule Performance Measures:

	○ Schedule Variance = EV - PV ○ Schedule Performance Index = EV / PV
Reporting Formats	● Weekly reports will include progress, issues, and upcoming tasks. ● Monthly reports will include a high-level summary of major achievements, mitigation techniques, and risks. ● Milestone reports will include progress against the baseline schedule, variances, and corrective actions related to any issues.

Figure 3.1: Schedule Management Plan

Project Document

Milestone List	Activity List	Dependency	Activity Attributes
Core Features Development	1.1 - Home Page	None	● Identify and categorise products, implement search and filtering features, link to detailed product pages, and thoroughly test the product catalogue functionality.
	1.2 - Shopping Basket Page	None	● Design a user-friendly shopping cart, develop add-to-cart and checkout functionalities, integrate payment gateways, and conduct comprehensive testing.
	1.3 - Profile Management	None	● Build secure registration and login, enable profile updates, add security features, implement order history tracking, and ensure all features are tested for security and usability.

	1.4 - Order Tracking Page	None	● Create an intuitive order-tracking interface, implement real-time updates and notifications, integrate with delivery options, and conduct thorough testing.
	1.5 - Delivery and Pickup Options	None	● Configure delivery methods, develop in-store pickup and delivery scheduling functionalities, implement location-based services, and ensure all functionalities are tested for accuracy.
PDPA Compliance Implementation	2.1 - Data Handling and Storage Adjustments	None	● Review and update data handling practices, implement anonymisation techniques, ensure PDPA compliance, and validate adjustments.
	2.2 - User Rights Management	2.1	● Develop consent management, enable data access, correction, and deletion functionalities, and test for compliance and functionality.
	2.3 - Data Encryption Implementation	1 & 2.2	● Evaluate and enhance encryption methods to meet PDPA standards, and verify through rigorous testing.
	2.4 - Controlled Data Sharing Mechanisms	2.3	● Establish data-sharing policies, develop controls for managing external data sharing, ensure PDPA compliance, and test controls.
Testing and Quality Assurance	3.1 - Unit Testing	2.4	● Create and execute detailed test cases for individual units, and document results to track and fix issues.
	3.2 -	3.1	● Develop and conduct integration tests

	Integration Testing		across modules, and document results to ensure seamless module interaction.
	3.3 - User Acceptance Testing	3.2	● Create realistic test cases, facilitate stakeholder testing sessions, and record feedback to make necessary adjustments.
Documentation and Training	4.1 - User Manuals and Training Materials	3.2	● Develop comprehensive user manuals and training materials, and conduct training sessions for end-users and support staff.
	4.2 - Technical Documentation	1, 2, & 3	● Document system architecture and APIs, and prepare compliance reports and audit trails.
Final UAT and Public Launch	5.1 - Final UAT	3.2 & 4.2	● Conduct final UAT sessions, address feedback, and secure formal stakeholder approval.
	5.2 - Public Launch	5.1	● Develop launch materials, execute the public launch plan, and monitor post-launch performance to address immediate issues.

Figure 3.2: Project Document (Activity List)

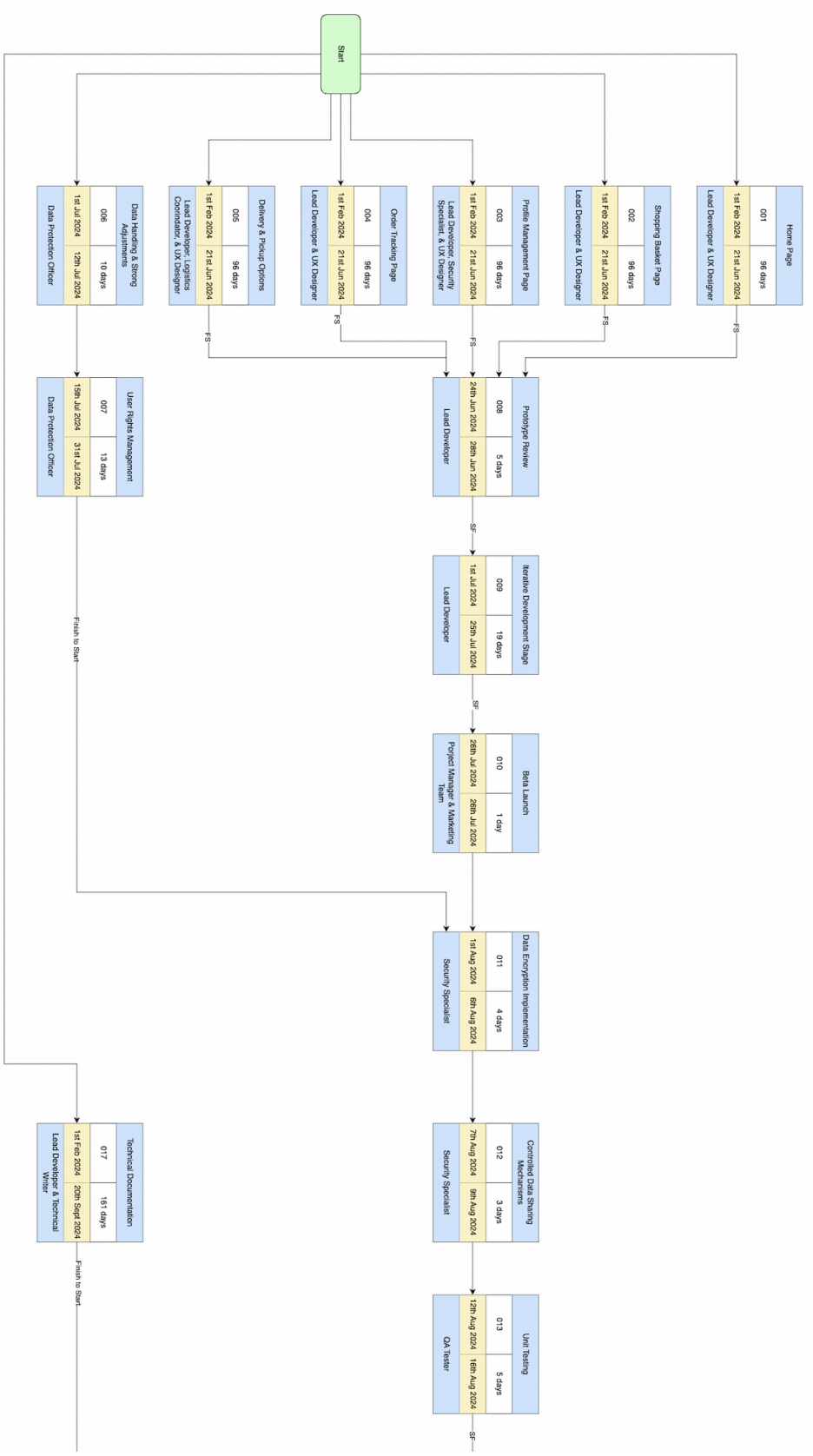
Assumptions

Earned Value Management (EVM) metrics will be used to measure project performance. A +/- 10% level of accuracy for estimating activity durations will account for contingencies and uncertainties.

Milestone	Date
Core Features Development	February 2024
PDPA Compliance Implementation	June 2024
Testing and Quality Assurance	August 2024
Documentation and Training	August 2024
Final UAT and Public Launch	September 2024

Figure 3.3: Cost Baseline

Project Schedule Network Diagram



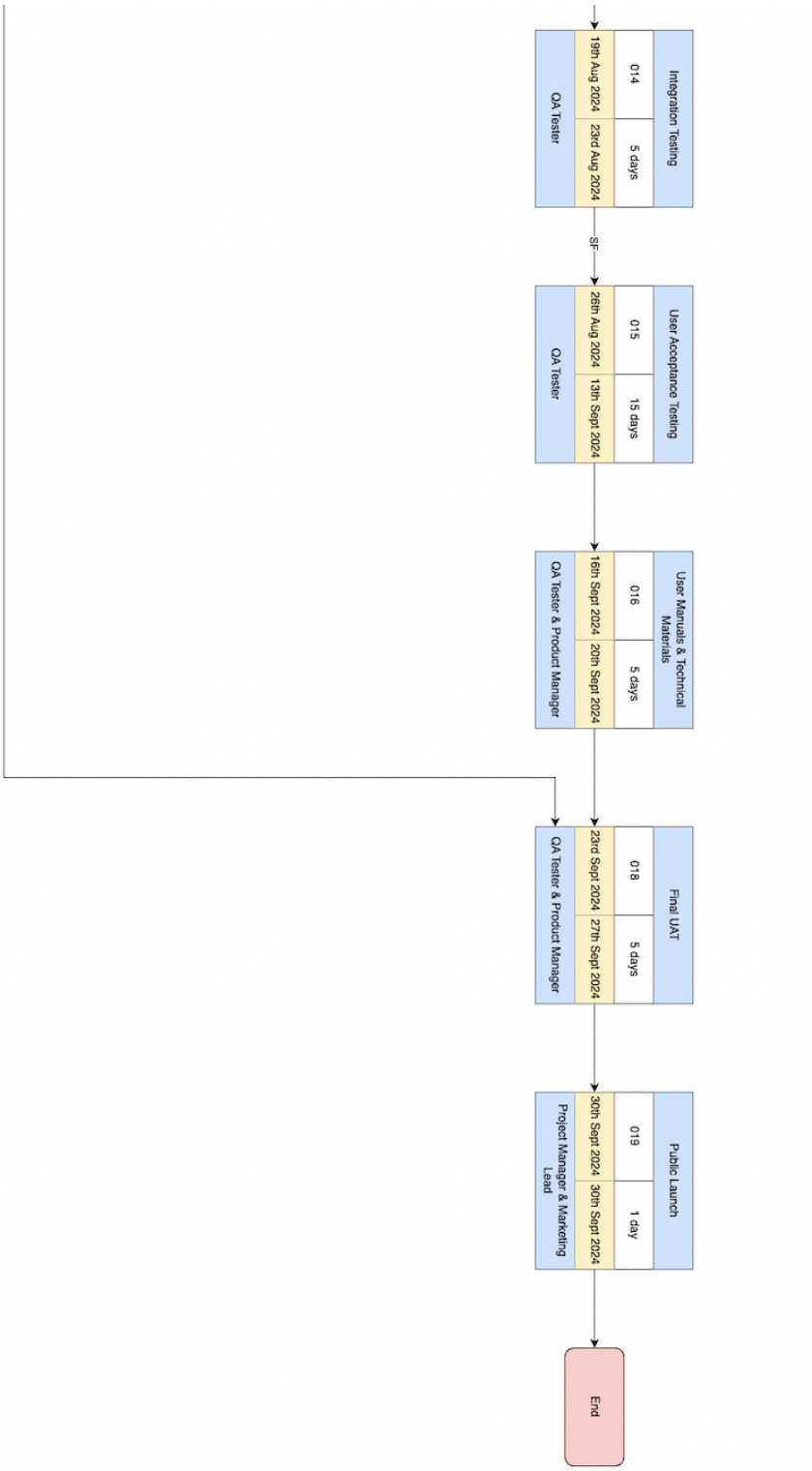


Figure 3.4: Project Schedule Network Diagram

Gantt Chart

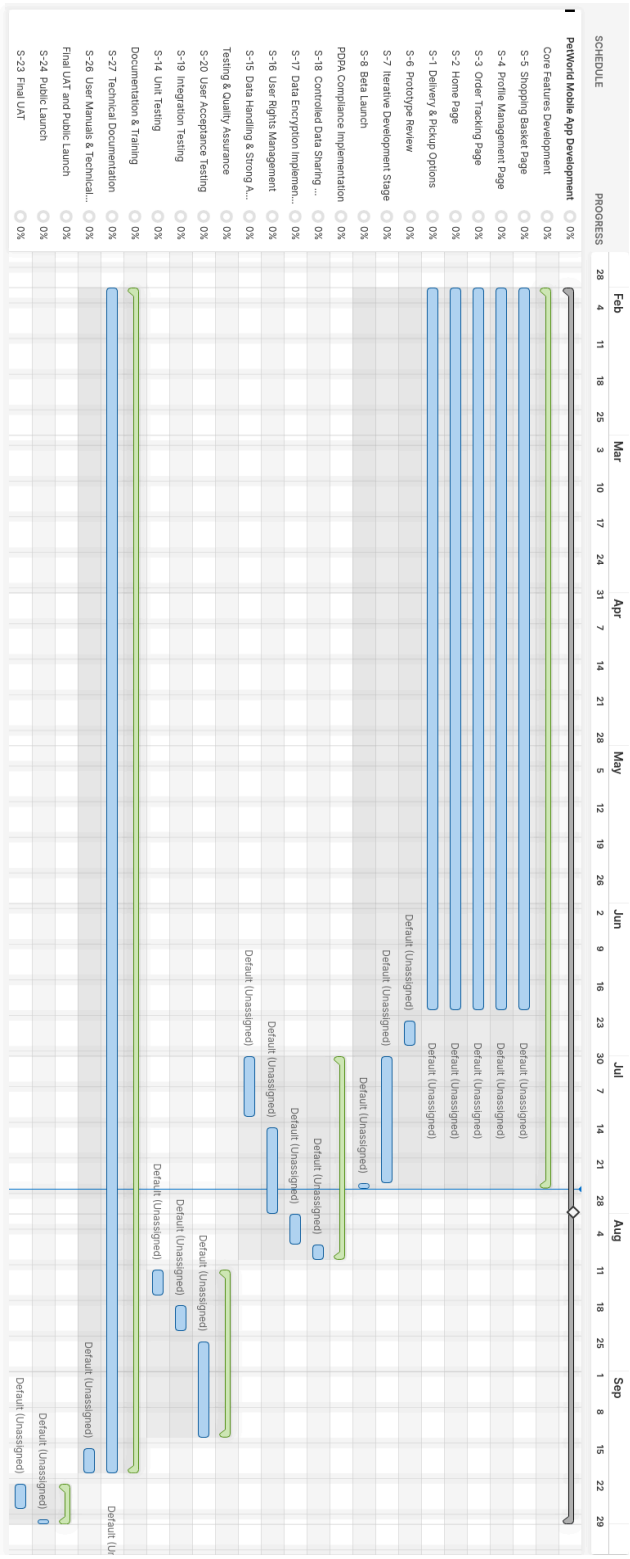


Figure 3.5: Gantt Chart

Resource Calendar

Resources	Feb	March	April	May	Jun	Jul	Aug	Sept
Project Manager								
Lead Developer								
Product Manager								
UX Designer								
Security Specialist								
Backend Developer								
Logistics Coordinator								
Data Protection Officer								
Database Administrator								
Integration Specialist								
QA Tester								
Technical Writer								
Trainer								
Marketing Lead								
End Users								

Figure 3.6: Resource Calendar

Justifications

Schedule management is designed on the assumption that requirements activities and configuration management are completed beforehand, and the cost management for the development process must be rescheduled.

Cost & Quality

Cost Management

Due to the complexities of the project and the introduction of the PDPA, an effective cost management approach is crucial for managing and controlling project costs.

Assumptions

- **Composition of Project Team:** Two Financial Analysts, two Risk Managers, one Business Analyst, one HR Specialist
- **Hourly Rate:**
    - Project Manager: $125/hr *(metapm, 2020)*
    - Other Members: $43.20/hr *(PayScale, 2024)*

Cost Estimate

The ‘definitive estimate’ method for cost estimation was selected due to its bottom-up approach which ensures reliability and accuracy (Gray and Larson, 2020). For PetWorld, the actionable tasks outlined in the WBS can be estimated and collected to calculate the overall cost of the project.

	Hours	Cost ($)	Subtotal
1. Project Management			
Project Manager	800	250	$200,000.00
Other Team Members	4,800	43.2	$207,360.00
2. Requirements Definition			
Gathering Requirements	425	150	$63,750.00
3. Design			
System Design	450	200	$90,000.00
User Interface Design	550	250	$137,500.00
4. Development			
Frontend	700	300	$210,000.00
Backend	700	300	$210,000.00
Testing and Quality Assurance	200	150	$30,000.00
Technical Documentation	483	150	$72,450.00
5. App Release			
Preparation	70	250	$17,500.00
Release	50	300	$15,000.00
6. Contingency			**$46,440.00**
Total			**$1,300,000.00**

Figure 4.1: Cost Estimate

	Month								
	Febuary	March	April	May	June	July	August	September	Total
1. Project Management									
Project Manager	$25,000.00	$25,000.00	$25,000.00	$25,000.00	$25,000.00	$25,000.00	$25,000.00	$25,000.00	**$200,000.00**
Other Team Members	25,920	25,920	25,920	25,920	25,920	25,920	25,920	25,920	**$207,360.00**
2. Requirements Definition									
Gathering Requirements	63,750								**$63,750.00**
3. Design									
System Design	30,000	30,000	30,000						**$90,000.00**
User Interface Design	45,833	45,833	45,833						**$137,500.00**
4. Development									
Frontend	52,500	52,500	52,500	52,500					**$210,000.00**
Backend	52,500	52,500	52,500	52,500					**$210,000.00**
Testing and Quality Assurance	7,500	7,500	7,500	7,500					**$30,000.00**
Technical Documentation	14,490	14,490	14,490	14,490	14,490				**$72,450.00**
5. App Release									
Preparation						8,750	8,750		**$17,500.00**
Release								15,000	**$15,000.00**
6. Contingency	5,805	5,805	5,805	5,805	5,805	5,805	5,805	5,805	**$46,440.00**
Total	**323,298**	**259,548**	**259,548**	**183,715**	**71,215**	**65,475**	**65,475**	**71,725**	**$1,300,000.00**

Figure 4.2: Cost Baseline

Budget

To determine the budget, it is crucial to collect the estimated costs of individual tasks and develop a cost baseline. Figure 4.2 demonstrates time-phased budgets that can be used to measure and monitor cost performance. With a total project cost of $1,300,000, the baseline details the distribution of costs over the project lifespan.

Controlling Costs

Regularly monitoring any cost deviations will ensure that the project will remain within the approved budget. Large deviations may trigger a review and a potential reallocation of resources. A total reserve of $46,440 is distributed evenly across the project lifespan to address any unforeseen circumstances and act as a buffer.

Quality Management

Quality Planning

Quality Requirements	
Functional Requirements	All required functionalities
Performance Requirement	Must be able to handle user load whilst being responsive
Usability Requirements	User-friendly and intuitive
Compliance Requirements	Compliance with industry standards and regulations, particularly the PDPA.

Quality Metrics	
Customer Satisfaction	Feedback and Surveys
Usability Metrics	App reviews, error rates

Quality Assurance

Monitoring	
Tests	Test plans to verify functionality
Defects	Develop a tracking system to identify any defects or issues
Inspections	Inspections of deliverables will help identify defects early on

Quality Control Activities	
Testing	Unit testing, user acecptance testing, integration testing
Issue Tracking	Track and resolve any issues during testing and inspections
Risk Management	Risk assesment and mitigation strategies

Quality Control Tools	
Raid	Log for documenting and manging risks, assumptions, issues and dependencies throughout a project
Probability/Risk Matrix	Likelihood and impact of risks to determine which risks should be prioritised

Quality Control

Monitoring	
Tests	Test plans to verify functionality
Defects	Develop a tracking system to identify any defects or issues
Inspections	Inspections of deliverables will help identify defects early on

Quality Control Activities	
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Quality Control Tools	
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Risk Management

With the introduction of the Pet Data Protection Act (PDPA), implementing a risk management plan is crucial for PetWorld and Techbuild to complete the project within a sustainable timeline and budget. When defining the general approach towards risk, we concluded that PetWorld should aim to manage risks proactively where possible.

The plan will be outlined through 3 stages, with the first stage being the risk register. The risk register showcases the risks ranked by their likelihood and impact. An assumption that we had was since the risk mitigation strategy aims to resolve issues, it can be assumed that some risks will not incur additional risks after resolution. The departure of key members is likely due to the expanding scope. Feature and function issues are certain, as with any software development. Insufficient budget is also likely because an increased scope may result in higher costs.

Our second stage involves performing a qualitative analysis to rank based on their probability and impact. Risks were ranked primarily within 3 levels, low, medium and high. These risk levels were calculated using a numerical scale based on impact and likelihood. This is used to develop strategies for mitigation and implementation

When looking at the matrix, some risks shared similar scores.

Although risks 2-5 share the same risk score, they are still positionally ranked as we felt that there were still marginal risk factors differentiating them.

After analysis, these risks can then be evaluated for risk responses. These response strategies would be personalised towards each individual risk to increase success rate, ranging from creating plans to avoid risks entirely and mitigation strategies for other occurrences. However, it must be noted that certain risks such as budgetary risks, may lead to risk acceptance where the possibility of eliminating the risk isn't possible. Following implementation, these risks would then be monitored to determine their effectiveness and if any new possible risks could be created or remain.

Risk Register

The risk register showcases the risks ranked by their likelihood and impact.

Ranked	Risk	Description	Implications	Category	Response	Likelihood	Impact
1	**Non-compliance with PDPA**	Failure to comply with PDPA regulations	-Legal consequences - Heavy fines - Reputation damage	Legal	Risk Avoidance	3	5
2	**Techbuild's inability to adapt an agile approach to expanding scope**	Sole reliance on a third-party vendor creates potential communication issues and unpredictability	- Potential communication issues that can hinder scope alignment - If Techbuild were to suffer organisational instability, Petworld would be burdened	Operational	Risk Mitigation	4	3
3	**Key Members leaving the project**	Loss of key members working on the project	- Deadline delay - Loss of morale - Potential budgetary pressure	Resource	Risk Mitigation	4	3
4	**Insufficient Budget**	Not enough funds available for the project	- Exceeding the proposed budget for the project	Resource	Risk Acceptance	4	3
5	**Communication breakdown between Techbuild and**	Communication deteriorating as a result of unclear	- Errors in work - Misalignment of tasks and deadlines	Operational	Risk Mitigation	4	3

	Petworld	communication channels in place and	leading to delays				
6	**Feature and functionality issues**	Bugs/Glitches with features and functions	- Lack of user satisfaction - Rework required leading to potential delays and additional workload for developers	Technical	Risk Acceptance	5	2
7	**Uncontrolled Scope Creep**	Unable to control an expanding scope due to implementing further features and functions	- Deadline delays - Budgetary pressure - Misallocation of resources - Loss of team members	Scope	Risk Mitigation	2	4
8	**Team Conflict**	Conflict as a result of differing opinions	- Loss of team morale - Team members leaving the project	Conflict	Risk Mitigation	2	3

Table 5.1 Risk Register

Probability/Impact Matrix

The probability/impact matrix evaluates the risks using a numerical scale based on impact and likelihood (Jaffrey, 2023). This is used to develop strategies for mitigation and implementation

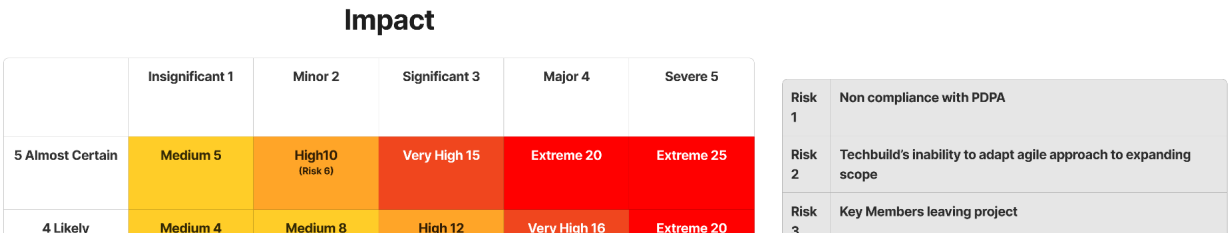

Table 5.2 Probability/Impact Matrix

Risk Response, Implementation, Monitoring Plan

Risk	Response	Planning	Implementation	Monitoring	Additional Risks
Non-compliance with PDPA	Risk Avoidance	The app is unable to launch if there is non-compliance with PDPA Inform all members of new PDPA regulations Monitor and audit software regularly to determine compliance	Schedule meetings with all stakeholders and brief them on regulations Have weekly audits on software	Number of members informed of PDPA Audit results	
Techbuild's inability to adapt an agile approach to expanding the scope	Risk Mitigation	The agile structure should be adapted to better suit the larger workload.	Conduct regular meeting Host joint workshops Offer additional training in response to a change in the agile structure	Performance reviews Number of milestones completed/missed	Secondary: Resistance to change as they believe the previous structure is a tried and true method
Key Members leaving the project	Risk Mitigation	Monitor key members, garner feedback and discuss if there are any persisting	Conduct regular meetings to shed light on possible workload issues.	Review turnover rate Survey results	Residual: Replacement members may struggle to adapt to the workload left

		issues.	Key members should document their work and processes so that in the event that they leave, key information is preserved for a replacement.	Meeting results	behind by leaving members
Insufficient Budget	Risk Acceptance	The project scope could expand, thus the team must be ready to adapt the budget as necessary. Be open to allocating additional funds Monitor the budget and make adjustments when necessary	Have a formal request process in place where a board decides if additional funds should be allocated and how much After every milestone, review the budget and make adjustments accordingly	Number of budget increases Budget increases relative to the original budget	Residual: Exceeding the proposed budget may go against company goals
Communication breakdown between Techbuild and PetWorld	Risk Mitigation	Have clear communication channels in place for both parties Have regular meetings	Limit communication platforms to 2 channels to avoid losing important information. (Phone, email,) Have meetings every week to align on project goals	Surveys between teams to determine communication success. Meetings results would determine whether teammates had been successfully divulging information	

Feature and functionality issues	Risk Acceptance	All software projects should accept the possibility of functions and features not working Have a buffer period in anticipation of issues	After every milestone, implement a bug-tracking system to locate issues and debug	The number of technical issues resolved Number of active bugs/glitches	
Uncontrolled Scope Creep	Risk Mitigation	Change requests should be collected and submitted to the control board for review. These requests should be conducted through an official change log.	A control board should be created, with representatives from key teams. The board would vote on submitted change requests, based on change impact analysis.	Number of change requests submitted. Ratio of change requests approved and rejected.	Secondary: Conflict between board members when voting on change requests
Team Conflict	Risk Mitigation	Conflicts should be defused and mediated between team members. If issues persist around project issues, there should be an escalation process.	An escalation process should be implemented, allowing members to raise issues with key stakeholders. Members would be offered to escalate problems during weekly meetings.	Number of conflicts registered Number of conflicts resolved	

Table 5.3 Risk Response Plan

Assumptions & Justifications

Since the risk mitigation strategy aims to resolve issues, it can be assumed that some risks will not incur additional risks after resolution. The departure of key members is likely due to the expanding scope. Feature and function issues are certain, as with any software development. Insufficient budget is also likely because an increased scope may result in higher costs. Although risks 2-5 share the same risk score, they are still positionally ranked as there are marginal risk factors differentiating them.

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Appendix

Scope Management

Methods

Data Gathering	Targeted interviews with identified PetWorld and TechBuild stakeholders to capture specific needs to understand specific requirements for the app's functionality and PDPA compliance needs.
	Utilise questionnaires to gather quantitative data on user preferences and expectations for the app's interface and features. Collect feedback on data privacy concerns related to PDPA.

Processes Requirements

Development Cycle	● Utilise Agile sprints focused on PetWorld's core functionalities, integrating PDPA tasks like encryption. ● Daily stand-ups ● Retrospectives adjust strategies.
Prototyping	● Develop wireframes and interactive prototypes emphasising user interactions at shopping cart and account settings, including PDPA consent options. ● Conduct user testing to refine functionality.
Testing	Automated tests for key functions such as payment processing, alongside manual testing for UX and PDPA compliance.
Deployment	● Employ continuous integration and deployment to streamline updates ● Perform final testing

	• Monitor app performance and PDPA adherence post-launch.

Documentation

Product Documentation	User manuals that provide detailed instructions and guides for end-users.
Technical Documentation	Detailed documentation covering the app architecture, database schema, and code comments to support future development and maintenance.
Process Documentation	• Project plans • Sprint plans • Test plans • Change management plans

Work Performance Information	Work performance data for the PetWorld app project is analysed using variance and trend analysis to track deviations from the scope baseline and assess impacts on the September 30 launch and $1.2 million budget. This data may be referred to before and after changes are implemented, to monitor how changes are affecting project constraints.

WBS Dictionary

WBS Item Name	Definition
Project Management	Planning, execution, monitoring, and closure of the project to meet PetWorld Business objectives.

Planning	Develop a project plan outlining objectives, resources, constraints, and risks.
Execution	Implement the project plan, allocating resources, and managing stakeholder communications.
Monitoring	Track project progress, metrics, and make adjustments.
Closure	Finalise all project activities, obtaining stakeholder sign-offs and documenting.
Gathering Requirements	Identify and document the needs and expectations of stakeholders through interviews and questionnaires.
Stakeholder Interviews	Conduct interviews with key stakeholders to gather detailed requirements.
Questionnaires	Distribute surveys to collect requirements from a wider audience.
Use Cases & Personas	Create scenarios and personas to understand user interactions and needs.
Requirement Specifications	Document detailed functional and non-functional requirements.
PDPA Compliance Check	Ensure all gathered requirements comply with PDPA regulations.
Review & Approval	Obtain stakeholder validation and approval for the documented requirements.
Design Stage	Create user interfaces, prototypes, and gather user feedback through testing and iterations.
User Interface	Design the visual and interactive elements of the app.
Wireframing	Develop low-fidelity models of the UI.

PDPA Consent Features	Integrate features to obtain and manage user consent following PDPA guidelines
Prototyping	Create functional models of the app for testing and user feedback.
User Testing	Conduct usability tests to gather user feedback on the prototype.
Iterations	Refine the design based on user feedback through iterations.
Final UI Design	Finalise the UI design after incorporating all feedback and iterations.
Development Stage	Build and integrate app features below
Delivery & Pickup	Implement features for order delivery/pickup options.
Search & Filtering	Develop search functionalities and filtering options for users.
Recommendations	Create algorithms to allow for personalised recommendations.
Accounts	Implement user account management features.
Payment System	Integrate secure payment processing systems.
Promotions	Develop features for managing and projecting promotions.
Quality Assurance	Conduct thorough testing to ensure application quality.
Testing	Perform various testing activities to ensure the app meets quality standards.
Automated Testing	Use automated tools to perform repetitive testing.
Manual Testing	Manually execute test cases to identify problems.
Unit Tests	Test individual components of the application.
Integration Tests	Ensure different modules work together as intended.

End-to-end Tests	Validate the flow of the application from start to finish.
Bug Tracking	Identify, record, and manage bugs.
Reporting	Generate reports on testing outcomes and bug status.
Fixing	Address and resolve identified bugs.
Usability Tests	Address the application's ease of use by real users.
PDPA Compliance Testing	Ensure the application adheres to PDPA requirements.
Security Testing	Test the application's security features to protect against vulnerabilities.
Deployment Stage	Prepare the application for production, including continuous integration, deployment, and monitoring.
Continuous Integration	Implement practices for continuous integration and automated builds.
Production Environment Deployment	Deploy the application to the production environment.
Monitoring & Maintenance	Conduct monitoring and maintenance of the deployed application.
Documentation	Create documentation for the application, this includes test plans, system documentation, user guides
App Documentation	Document the application's usage and if it's functional
User Guides	Create guides to assist navigation and using the app
System Documentation	Document the design and system framework
Process Documentation	Record processes for deployment and development.
Project Plan	Document the project plan
Test Plans	Create detailed plans for testing

Change Management Plans	Document ways to manage change throughout the project's lifetime
Training	Develop and deliver training materials and sessions to ensure users and administrators are proficient in using the application.
Create Training Materials	Develop training materials to support users
Training Sessions	Conduct training sessions for end-users and administrators.
Periodic Learning Modules	Develop ongoing learning modules for continuous guidance.
Support Setup	Establish user support systems for the post-application deployment

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