
WasteID — RECYCLING ASSISTANT

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Executive Summary

The Australian public are confused about recycling (SBS News, 2018); marginal improvements in waste management project a GDP increase of AUD\$25 billion (DCCEW, 2019), education and behavioral change are pillars of Australia's waste management vision (DCCEW, 2019). Thus, we argue alleviating confusion will stimulate further engagement in waste management participation and in turn improve Australia's GDP. This report planned and investigated the efficacy of a recycling assistance mobile application that aims to reduce public recycling confusion using the following tools:

- Value proposition canvas
- Project Governance
- Stakeholder tools
 - Stakeholder Map
 - Stakeholder Register
 - Project team roles
- Project Business Model Canvas
- Swot Analysis
- Project Charter

WasteID shows considerable economic promise while improving the environment, the cost of development in relation to the potential benefits is minuscule; therefore, it is highly recommended that further action is taken to initiate development.



Synopsis

This report aims to explore and plan “WastelD: Recycling Assistant”. The project’s aim is to simplify recycling for consumers, thus improving outcomes for waste management and recycling facilities. The key project objective is to increase participation in recycling initiatives. This objective is achieved through the creation of the WastelD application, which aims to provide the public with advice about the appropriate disposal of consumer household waste using barcode detection and image recognition. The project is being carried out by Team 35 on behalf of the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW). By improving waste management, the Australian economy will realise greater returns on our resources while protecting our environment.

Introduction and Background

The evolving landscape of recycling creates significant challenges for waste management enterprises and the public. Up to 61% of the Australian public are confused about what can be recycled (SBS News, 2018). This uncertainty may contribute to citizens disengaging from responsible waste disposal practices or making mistakes when sorting materials, thereby producing and exacerbating existing challenges in sustainable waste management policy and execution. The DCCEEW’s National Waste Action Plan (2019) has ambitious targets focusing on reducing waste, improving resource utilisation, and recovery by 2030. They estimate a 5% improvement in material efficiency and recovery could increase the GDP by AUD\$25 billion. A pillar of DCCEEW’s 2030 strategy is “Knowledge sharing, education and behavioural change” (2019), where Australian society must fundamentally shift our perspectives and habits to create a circular economy that focuses on reducing waste in its entirety. To work towards DCCEEW’s vision, WastelD empowers consumers through an automated artificial intelligence assistant. By making the experience frictionless, more of the general population will contribute towards sustainable waste management, thereby leading to greater outcomes for the economy and environment.

Project Idea

Initially our group brainstormed 24 IT-related ideas that could be used for the project. These ideas were then analysed against the following criteria:

- Who are the customers and what are we offering to them?
- What are the potential revenue models?
- How is value created?
- Is the idea innovative?
- Is the idea achievable within the context of this project?

Excluding ideas that seemed unfeasible based on the above criteria, resulted in the following project ideas to choose from:

- A community reporting platform, whereby users can report early signs of possible bushfires, enabling a quick response throughout the affected area. (Challenge 1)
- Creating smart street lighting to adjust the power depending on the predicted/ live traffic/ time of the day, saving energy. (Challenge 3)
- App to identify which bin to put things in (scan barcode / scan ingredients (NLP), / looking at the object with image detection) (Challenge 3)
- Centralised database to store information about global environmental conditions to determine the most efficient soil and environment conditions per crop. This would allow for recommendation on what farmers should plant based on their own field conditions which are also to be uploaded to the database. (Challenge 7)
- Agricultural marketplaces as digital platforms to buy and sell agricultural products between farmers themselves or retailers and farmers, benefiting farmers to connect directly to retailers to reduce middlemen. (Challenge 7)

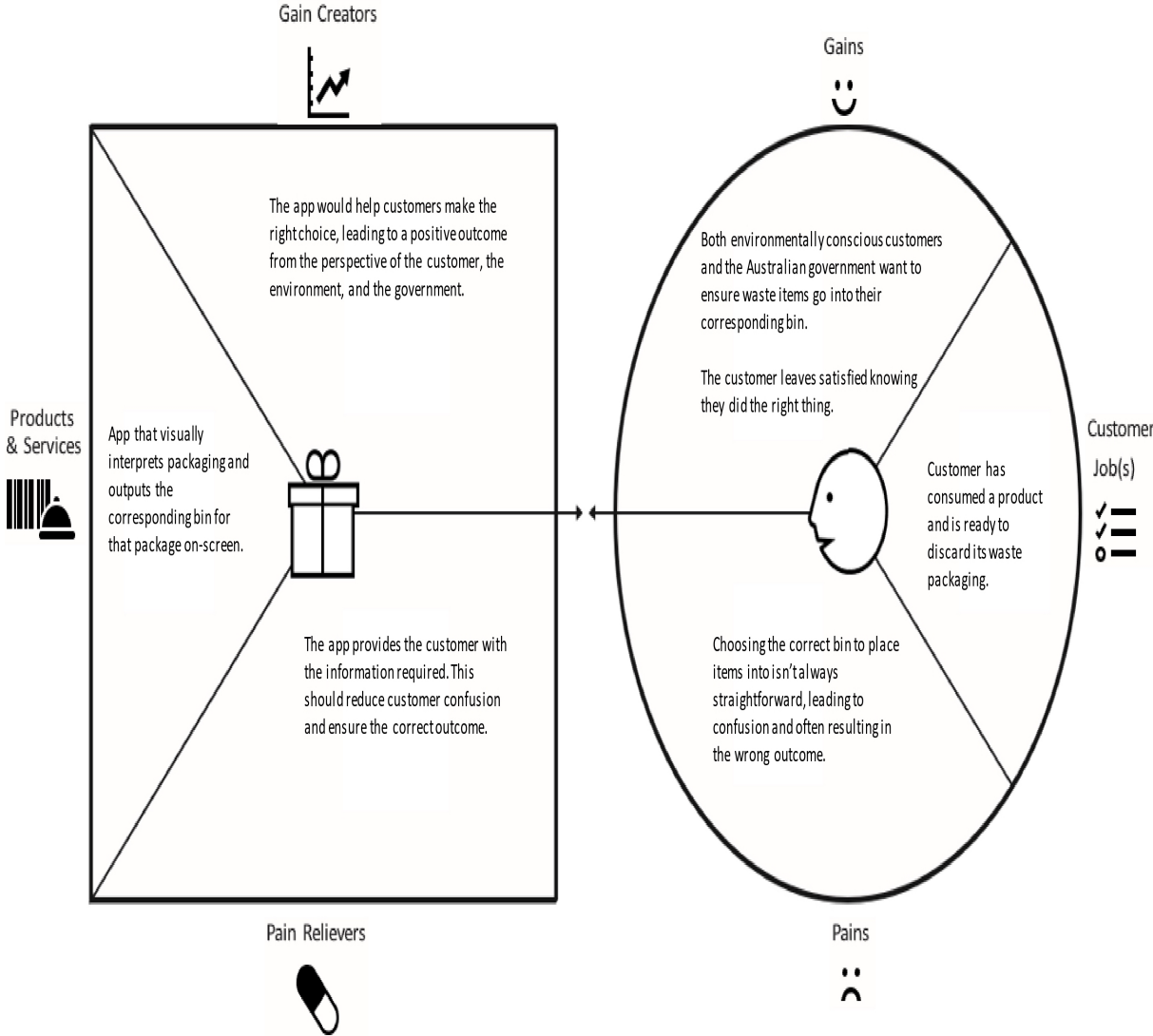
Excluding ideas that seemed unfeasible based on the above criteria resulted in the following project ideas to choose from (see Appendix for list of ideas).

Our group then collectively voted on the idea to move forward with, which was idea 3. An actionable problem statement was theorised, followed by a Demand/ Value Hypothesis and the creation of a Value Proposition Canvas for this idea, ensuring that before moving forward, we are able to align our value map with our customer profile.

Table 1: Problem Statement, Current Situation, and Demand/Value Hypothesis

Problem Statement	Current Situation	Demand/ Value Hypothesis
Recycling is important economically and environmentally. It is in the best interest of both citizens and government that as much waste as possible is recycled, and that it is recycled correctly.	Most Australian packaging comes with some indicator of preferred disposal method. However, many people simply do not understand these indicators. Recyclable packaging often does not get recycled or gets recycled incorrectly.	If an app was created to assist with identifying the preferred waste disposal method, environmentally conscious people will use this app to help them recycle correctly.

Figure 1: Value Proposition Canvas



Project Intiation

GOVERNANCE

This project will be under the internal management of the project manager, under the direct oversight of the Project Sponsor. The project manager will communicate project status to the Project Sponsor and present challenges, potential courses of action, and recommendations for their authorisation. This governance structure ensures cohesive decision-making, and progress assessment.

PROJECT LIFE CYCLE

The project will have five distinct lifecycle stages, each stage informing and building on the past stage. Every stage has clear objectives, deliverables, and success criterion (Sanghera, 2019). These measures will allow the project sponsor and the project team to monitor progress and assure alignment with organisational goals, principles, and quality.



Figure 2: Project Life Cycle (George Mason University, 20222)

This project will adopt the ISO/IEC 56000 (International Organization for Standardization, 2020) standard for Innovation Management to ensure the project’s implementation of fundamental and systemic innovation management principles throughout the lifecycle of the project, and to ensure organisational co-operability with partners and stakeholders.

PROJECT MANAGEMENT FRAMEWORK (AGILE)

The “WasteID” project will utilise an Agile framework to provide adaptability and responsiveness to the dynamic environment in which it operates. Waterfall was another framework considered; however, it lacks flexibility in response to change and the more iterative, user-centric agile approach was deemed better appropriate (Asana, 2022). This approach will enable us to evolve with changing requirements, capitalise on emerging opportunities, and consistently provide functional solutions throughout the lifecycle of the project. Within the Agile framework, organisational and functional roles will be tailored according to the business opportunity, specifications, and resources, allowing the organisation to adapt and grow as the project operations scale larger. The project will adopt the ISO/IEC 38500 international standards for IT Governance (International Organization for Standardization, 2022) to ensure guidance and adherence of the organisation’s governing body to standardised principles and practices, and to further accredit the project’s organisation for compliance with Australian governmental bodies and stakeholders.

PROJECT TEAM ORGANISATION

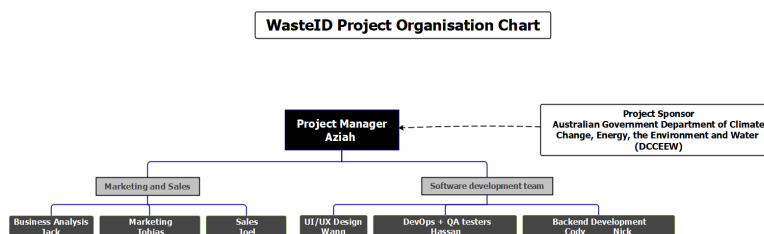


Figure 3: WasteID Project Team Organisation Hierarchy

ROLES AND RESPONSIBILITIES

Project Role	State Title	Responsibilities
Project Sponsor	the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW)	The Project Sponsor ensures funding, resources, and initiates the Project Proposal. They actively support the project, make key decisions, back the Project Manager, approve major deliverables, and oversee project phases.
Project Manager	Manager	Ensures team completion of the project, creates the Project Plan, oversees task execution, establishes compliance, and communicates with the Project Sponsor and Stakeholders.
Software Development Team:		
	Backend Developer	Software Engineering and backend design.
	DevOps Developer	Software Integration, Release Management, Security Management, and technology and AI embedment (Image Recognition, NLP).
	UI/UX Developer	User Interface and User Experience design.
	Quality Testers	Feedback testing and ensuring overall experience quality
Marketing and Sales Team:		
	Business Analyst	Market research, user requirements analysis, performance monitoring, and alignment of marketing strategies with project goals.
	Marketing Director	Marketing strategy and campaigns, user engagement, and brand representation to drive user adoption.
	Sales Director	Securing business partnerships, revenue generation, and driving adoption through strategic sales initiatives.

Table 2: Project Roles, State Titles, and Responsibilities

SECURITY

For the security of the public’s data, the project will use information security management standards and external audits to ensure compliance. The following standards will provide a framework to ensure adequate management of security risks, security techniques, effective controls, and security measures:

- Storage Security - ISO/IEC 27001 (International Organization for Standardization, 2018)
- Information Security Management System - ISO/IEC 27040 (International Organization for Standardization, 2015)

PRIVACY

WastelD is committed to safeguarding user privacy and data integrity. Users will be provided with a comprehensive privacy policy outlining how personal information is collected, used, shared, and protected. Furthermore, WastelD will implement ISO/IEC 20889:2018 privacy data de-identification techniques to ensure the protection of user data and as a proactive measure to reduce risk in the event of unauthorised access.

STAKEHOLDERS

The key stakeholders identified have been inserted into a stakeholders register (Table 3), connection map (Figure 4), and power/interest map (Figure 5). The register provides categories, expectations, and communication practices for effective collaboration. The stakeholder maps provide a visual element to show which areas of the project are related, and each stakeholder’s level of influence and interest in the project. The stakeholder register, in Table 3 (below), is built upon the (Igberaese, 2022) framework.

Table 3: Stakeholders Register

Group	Roles	Category	Interest	Influence	Expectations	Communication Requirements
End Users	Individuals	End User (E)	High	Medium	User friendly, accurate bin identification	App updates, feedback portal, marketing
	Businesses	End User (E)	Medium	High	Corporate collaboration	Regular updates, partnership opportunities
Project Team	Business Analysis	Business Requirements (I)	High	Medium	Understand business requirements	Regular requirement gathering sessions & project update meetings
	Marketing	Marketing (I)	High	Medium	Drive user adoption, brand representation, and awareness	Marketing strategy sessions & reviews
	Sales	Marketing (I)	High	Medium	Secure business partnerships, drive revenue	Sales updates, strategy sessions
	UX/UI Design	Software Dev (I)	High	Medium	Create user-friendly interface	Design reviews, user feedback sessions
	DevOps	Software Dev (I)	High	Medium	Ensure successful deployment, manage infrastructure and integration	Deployment reviews, system status updates
	BackEnd Dev	Software Dev (I)	High	Medium	Robust and scalable backend systems	Code reviews, project update meetings
	Project Manager	Manager (I)	Very High	High	Manage project milestones, resource allocation, and stakeholders	Regular project status updates, stakeholder meetings
	QA Testers	Quality Assurance (I)	High	Medium	Apps quality and functionality meets expectation	Test result reviews, bug tracking meetings
Project Sponsor	Investor (Government)	Financial (E)	High	Very High	Return on investment, project progress & completion	Regular financial and progress updates
	Local Council/Gov	Regulatory & Partner (E)	High	Very High	Compliance with local waste management regulations	Collaboration meetings, compliance checks and confirmations
	Environmental Groups	NGO & Advocacy (E)	High	Medium	Environment-friendly solutions, public endorsement	Monthly updates, collaboration through outreach & marketing
	Waste Management Companies	Service Provider (E)	Medium	High	Accurate categorisation, efficient coordination	Monthly meetings, feedback on waste categories
	Retailers and Manufacturers	Supplier (E)	Medium	Medium	Accurate product categorisation, potential branding opportunities	Project updates, collaborative marketing programs
	Regulatory Bodies	Regulatory (E)	High	Very High	Compliance with waste management standards	Regular compliance checks and updates
	Data Providers	Technical Partner (E)	Medium	Medium	Accurate data, regular updates on usage	Monthly data reports, feedback on data quality
	Marketing & Distribution Partners	Business Partner (E)	Medium	High	Increased adoption, shared marketing efforts	Joint marketing campaigns, quarterly reviews
	Educational Institutions	Academic (E)	Low	Low	Educational content, student engagement	Semester-wise updates, collaborative events
	Technology Partners	Technical Partner (E)	Medium	Medium	Integration support, application support	Technical reviews, integration updates
	Feedback & Community Groups	Community (E)	Medium	Low	Regular updates, community engagement	Online forums, feedback sessions, online polls
Legal & Ethical Advisors	Advisory (E)	Medium	High	Compliance with laws, ethical considerations	Legal updates, quarterly reviews	

(E) = External, (I) = Internal

Stakeholder Connection Map

In Figure 4 (below) is a connection map of the various stakeholders listed in the stakeholder register in Table 3 (above). Seen in red are the core stakeholders, those that operate within the project on a day-to-day basis. In blue are the direct stakeholders, those directly affected by the project. Lastly, in green are indirect stakeholders, which indirectly have an interest in the project. These stakeholders have been connected to represent the relationships between them.

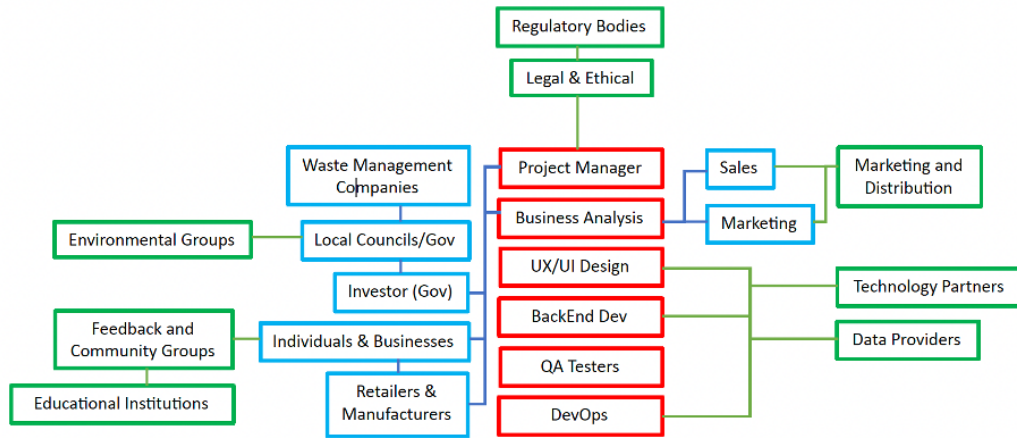


Figure 4: Stakeholder Connection Map

In Figure 5 (below) is the stakeholder power and interest map. This map visually shows which stakeholders have what level of power and interest in the project. This helps to understand how each stakeholder is involved, to what level, and how to respond to each entity. This chart is based upon (Sanghera, 2019).



Figure 5: Stakeholder Power and Interest Map

Business Case

PROJECT BUSINESS MODEL CANVAS

Preparation of our business model canvas allows the identification and definition of our project's target audience, key partners, relationships, and activities to confirm that our venture is worth pursuing. This Project Business Model Canvas is based on Osterwalder and Pigneur's (2009) Business Model Canvas.

Key Partners	Key Activities	Value Proposition	Customer Relationships	Customer Segments
Target key partners for this app would be the Environment Protection Authority and non-for-profit environmental based organisations.	Integrating a database to match product barcodes to their proper disposal method as well as utilizing AI image detection to identify the product or material and devise the best disposal method.	The app is intended to interpret packaging to assist in the proper disposal of waste products, allowing for an increased efficiency to the waste disposal management system, and increase the general populations education / desire to correctly dispose of waste products.	The customers would want the ability to communicate new waste packaging that is not identifiable by AI detection or stored in the database so it can be updated to facilitate the new waste product.	The intended audience are the environmentally conscious citizens and the generally uninformed population who are looking to identify the proper disposal method of their recently created waste.
Key Resources	Channels			
A server to host the product barcodes or access to AI image detection research. Technology and programmers would be required to develop the app and Advertising would assist in the rollout of the app.	Advertisements on disposable waste packaging and engravings on any newly printed bins which councils will aim to deploy and replace the current bins being used are the intended methods to reach the target audience.			
Cost Structure	Revenue Streams			
The costs of this app would be very low as if the app utilized AI image-based technology it would not incur any ongoing costs and would only require upfront development costs. If there was a server used for database storage, the running costs would be low for the server space, but development costs would be low also.	Revenue will be generated via the newly created efficiency of waste management services. Decreased improper waste management will allow for waste disposal companies to reallocate resources away from organizing improperly disposed waste.			

Table 4: Project Business Model Canvas

SWOT ANALYSIS

The SWOT Analysis will allow us to identify key Strengths, Weaknesses, Opportunities and Threats of the pursuit of our business venture. The analysis being presented weighs up the Internal and External, Beneficial, and Harmful factors whilst we are in pursuit of the project resolution and after the project's post-deployment factors. The following analysis is based on the Australian Government: Business (2021) SWOT analysis template:

Group	Beneficial	Harmful
	Strengths	Weaknesses
Internal Factors:	Relatively low development difficulty with low ongoing cost. Government backing for the app allowing for government department interconnectivity producing more targeted resolutions. Better internal problem overview available due to government being a key partner resource.	Low revenue income and mainly used to increase efficiency of other jobs. Not many waste management programs facilitating the same goal meaning that we do not have a reference for success structure. Gap in AI recognition could cause overestimation and underdelivered application.
	Opportunities	Threats
External Factors	Intended as assistance for third party non-for-profit / government recycling sector help which is currently under assisted. Positive media coverage due to the targeted outcome of the project. Environmentalist backing for the app.	App not easily streamlined and under threat of becoming underutilised. Change to structure of current waste management system could heavily influence the apps.

Table 5: SWOT Analysis

Project Charter

The project charter (Figure 6) was completed in a collaborative environment, built as a sample describing the key points of the overall project initiation. Creating this document provides an at-a-glance understanding of the WastelD project for the various teams involved.

Project Charter				
Project Title	WastelD: Recycling Assistant		Description	
Purpose		Team		Key Stakeholders
A mobile app will be developed to assist citizens in proper waste disposal of purchased goods. This app will reduce the amount of improper waste disposal in households and reduce costs of local council waste management.		Title	Role	Internal Staff
Scope		Success Criteria		
The scope is to research, strategically plan, develop and test a user facing waste categorising app.	Criteria	Metric	AI Dev Team	Create and Train AI Model
	App Dev Team	Create App	Local Councils / Government	Waste Management Companies
	Planning Developed	Planning stage completed	UI/UX Team	Design the Interface of the app
	Application Developed	Dev stage completed	Quality Assurance Team	Testing all parts of the app
Application Deployed	App tested and deployed	Marketing Team	Creating consumer and Investor Interest	Data Providers
Resources		Milestones		
Estimate Time to Completion	10 Months from Initiation	Stage	Estimated Budget	Duration
Estimated Cost	\$650,000	Project Planning	\$50,000	1 Month
		Database Development	\$200,000	3 Months
		Mobile Application Development	\$200,000	3 Months
Required Resources	<ul style="list-style-type: none"> Staff Funding AI Training Data Market Researc 	Mobile Application Deployment	\$200,000	3 Months
		Details such as actions and milestone deliverables on attached gantt chart		
Deliverables				
<ul style="list-style-type: none"> Design documents of the AI Model, Database Schema, Mobile Application UI/UX Fully trained AI Computer Vision Model Populated product barcode Database Functioning Mobile app that meets the purpose and description of the project 				
Constraints	Risks	Users	Result	
<ul style="list-style-type: none"> Time constraints Budget constraints Resource constraints 	<ul style="list-style-type: none"> Loss of funding Loss of staffing Scope creep Stakeholder demands change 	<ul style="list-style-type: none"> Home occupiers with various bins and access to a mobile phone Business owners / managers responsible for waste disposal 	Deploying a functional application, capable of product waste identification and disposal advice	

Figure 6: Project Charter

GANTT CHART

A Gantt Chart was created to detail the various stages of the project development:

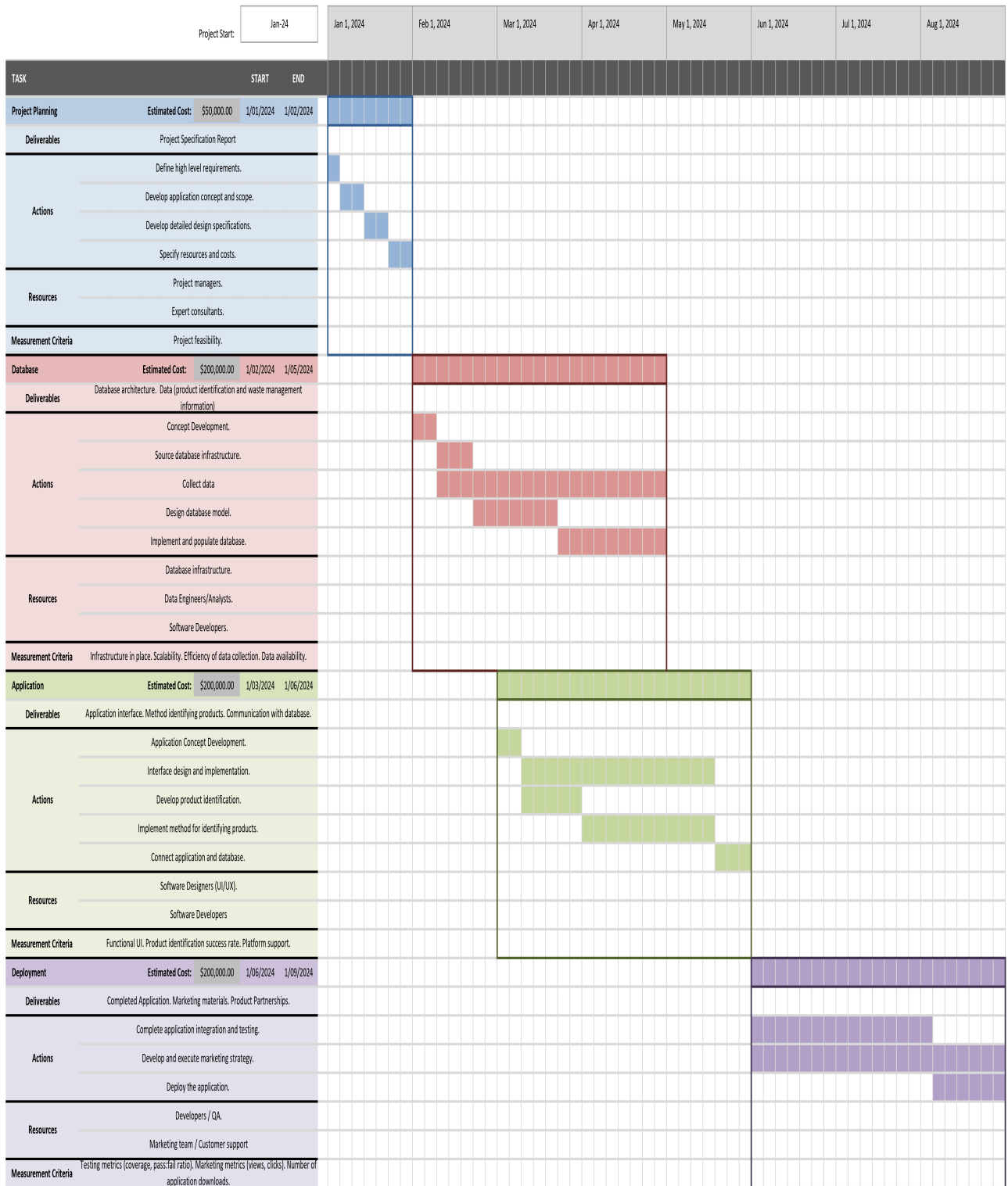


Figure 7: Project Timeline Gantt Chart

Appendix

List of Potential Ideas to Move Forward with Before Final Decision:

- A community reporting platform, whereby users can report early signs of possible bushfires, enabling a quick response throughout the affected area. (Challenge 1)
- Creating smart street lighting to adjust the power depending on the predicted/live traffic/time of the day, saving energy. (Challenge 3)
- App to identify which bin to put things in (scan barcode/scan ingredients (NLP)/looking at the object with image detection) (Challenge 3)
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