



ULSTER UNIVERSITY

BSc (Hons) Computing System

2025-2026

SOFTWARE PRODUCT AND PROCESS

MANAGEMENT

COM435

Module Tutor: Vishnu Ajit

Module Coordinator: David Herzog

Submitted by: Group E

Submitted date: 2025

Contents

Overview	3
Team Distribution & Responsibilities	5
Main Three Features	8
Ungroomed backlog User Stories	9
Spikes stories.....	33
Needs and Risk Assessment.....	39
Stage 1 Conclusion	42
Stage 2 Overview	43
Minimum Viable Product (MVP)	44
Justification of story points	46
SPRINT 1 (RELEASE 1)	46
SPRINT 2 (RELEASE 1)	48
SPRINT 3 (RELEASE 3)	50
Story Mapping.....	52
Development Tasks	56
TEST TASKS	62
Stage 2 Conclusion	69
References.....	70
Appendix	71
Trello QR	71
Wireframes	72
Website QR	76
Meeting	77

Overview

This assignment tries to develop a web and mobile-based sustainable lifestyle platform that will motivate individuals and organisations to shift towards a sustainable lifestyle (OECD, 2021). This web and mobile-based sustainable lifestyle platform will help users measure their respective carbon footprints, handle eco-goals, participate in sustainable challenges, and use eco-verified businesses, based on existing sustainable lifestyle metrics (UNEP, 2020). This proposed design will enable users to lead a sustainable lifestyle based on tracking carbon footprints, community aspects, and including business components in it.

The targeted products include two main market segments:

1. Individuals / Eco-Conscious

- Users can track sustainable behaviors used every day, including the use of public transport and non-plastic use.
- The estimated carbon footprint is established based on the activity data they input, with the use of new emission factor guidelines (UNEP, 2020).
- There is a reward system with points, badges, and achievements awarded for users' sustainable behaviors (OECD, 2021).

2. Local Green Enterprises

- Local green businesses can create an account on the platform.
- They can showcase eco-friendly products, services, and offers which would appeal to eco-conscious consumers.
- Companies need to pass a verification process so that authenticity and credibility can be established according to ISO standards (ISO, 2019).

The users can access sustainable events, take up community challenges, and work towards shared environmental goals with the help of the available gamification features of the platform such as leader boards and milestones (OECD, 2021). The platform includes functionalities such as data visualization, progress monitoring towards shared objectives, alerts, and history tracking of awards won by the users.

The product is made by utilizing the Agile approach with a Scrum framework, where continuous planning, refinement of the backlog, and improvement cycles carried out on Trello boards enable teamwork and details related to user stories, acceptance criteria, and teamwork distribution with regard to spike stories, organized electronically for better adaptation within the process of developing products (OECD, 2021).

Team Distribution & Responsibilities

The roles were allocated among members of our team according to the strength and capabilities of each member, an ideal strategy recommended in some of the latest versions of teamwork methods proposed by the agile project management approach described by Schwarber & Sutherland (2020). Each one of us focused on implementing a given role, making it much easier for us to control ourselves and work jointly within the duration of the project. With a clear comprehension of the roles taken by each one of us, it is much easier for us to work together effectively, communicate with one another, and avoid any misunderstandings within the duration of project development, an ideal strategy recommended within structured requirement and management of roles, guidelines described by ISO (2019). This specific strategy of handling roles enabled us to handle certain tasks quickly, be productive with each sprint, and ensure that every area within the project, including design and so on, is addressed in an efficient manner described by OECD (2021).

Task Name	Assigned To	Status	Comments
UI/UX Designer /Scrum Master	Rajan (B001000042)	Complete	Responsible for creating centred designs, conduction user research, and ensuring a seamless user experience
DevOps	Suresh (B00997463)	Complete	Responsible for developing and delivering the product increment, estimating the work, and ensuring the quality of the deliveries

Business Analyst/Scrum Master	Prabin (B00999401)	Complete	<ul style="list-style-type: none"> • Responsible for gathering the analytics, translating them into user stories and collaborating with the team • Ensure that the product meets the customer needs and to identify metrics
Test Engineer	Pradip (B00999042)	Complete	Responsible for testing the product increment, creating test plans, and ensuring the quality and reliability of the software product
Database specialist	Aqib (B00998370)	Complete	<ul style="list-style-type: none"> • Responsible for database design, data security and setup

Network specialist	vishow (B00997704)	Complete	Responsible for configuring, monitoring, and maintaining network systems, ensuring secure, reliable connectivity, and resolving network issues to support smooth organizational operations.
--------------------	-----------------------	----------	---

Main Three Features

Feature ID	Features Title	Features Description
F1	Carbon Tracking	Users log activities and see their carbon impact.
F2	Eco Footprint –Friendly Business Directory & Rewards	Users find verified eco-friendly local businesses.
F3	Community Events & Challenges	Users join events and the challenge to earn rewards.

Ungroomed backlog User Stories

User stories are a systematic approach for requirements specification in an agile environment with a strong emphasis on the users' needs (OECD, 2021). User stories outline what different users would look for in a sustainable development online platform and what value each functionality can add to the users. This is a most reliable approach to develop a project according to what users want rather than what is projected and objectively defined (ISO, 2019). The introduced user stories define what main functionality is available on the sustainable living platform with an objective of helping users understand and reduce their impact, gain access to sustainable services, and participate in group-based sustainable projects related to a specific sustainable development activity (UNEP, 2020).

User story ID	User stories Title	Features ID	User stories description
S1	Log Daily Activities	1	Users record their daily eco-related activities.
S2	Automatic Carbon Calculation	1	The System calculates carbon footprint from logged activities.
S3	View Progress Dashboard	1	Users see charts of their carbon usage over time.
S4	Receive Eco Recommendations	1	Users receive personalized tips to reduce carbon footprint.
S5	Discover Eco-Friendly Businesses	2	Users browse and filter verified eco-friendly businesses.
S6	Business Profile Creation	2	Businesses create profiles and submit sustainability documents.
S7	Eco-friendly Businesses Rewards & Discounts	2	Users earn points for eco actions and redeem rewards.

S8	Eco-friendly Business Analytics	2	Businesses view analytics like profile views and redemptions.
S9	Join Sustainability Events	3	Users join eco events and track attendance.
S10	Create Community Events	3	Organizers create and manage sustainability-related events.
S11	Join & Track Sustainability Challenges	3	Users join challenges to improve their eco habits.
S12	Reward Participation in Events	3	Users earn points after participating in events.

Story ID: S01

Feature Title: Carbon Footprint Tracking

Story Title: Logging daily activities for carbon footprint tracking

Narrative: As a user, I want to record my daily eco-related activities so that I can track my carbon footprint accurately.

Story Size: Medium

Acceptance Criteria Scenarios:

Scenario Title : Successful Logging

Given:

Already logged into the app.

And the Daily Activities page is open and ready for input.

When

Users entered details like distance travel, energy usage, and what they ate.

And users press the Submit button once they are done.

Then

The system saves everything smoothly without errors.

And A confirmation message appears.

And the new activity shows up immediately in my activity list.

Scenario Title : Missing Input Validation

Given

The user started filling out the form but left a few required fields blank.

And users are distracted or rushed when doing it.

When

The user will try to submit the form anyway.

Then

The system clearly tells me which fields I missed.

And none of the data gets saved until I complete those fields properly.

Story ID: S02

Story Title: Automated calculation of carbon footprint

Feature Title: Carbon Footprint Calculation

Feature ID: F01

Narrative: As a user, I want the system to calculate my carbon footprint automatically so that I don't need to calculate it myself.

Story Size: Medium

Acceptance Criteria Scenarios

Scenario Title : Carbon Footprint Calculation

Given

I've put in realistic estimates of travel, electricity consumption, or food.

And all the inputs appear valid and meaningful.

When

The process begins functioning based upon the data that I've submitted.

And it applies whatever calculation rules it uses regarding CO₂ conversion.

Then

It shall display the amount of CO₂ based on what I entered.

And my dashboard needs to refresh immediately with the new footprint.

Scenario Title : Handling Invalid Data

Given

I have typed some values which do not make any sense, such as negative distance

And the process detects that there is something incorrect about the input.

When

It attempts to process such invalid data.

And it examines whether data points are in valid boundaries.

Then

I need to receive a clear message about the fact that the numbers I entered aren't valid.

And the calculations in the system shouldn't happen until I fix these entries.

Story ID: S3

Feature Title: Carbon Tracking

Story Title: View Progress Dashboard

Story Narrative: As a user, I want to view visual representations of my carbon usage so that I can understand my progress.

Story Size: Large

Acceptance Criteria Scenarios

Scenario Title: Display Weekly Trend

Given

I have documented several activities performed daily in the current week.

And each activity has valid data related to travel, energy, or other carbon use.

When

I open the “Progress Dashboard” section,

And my activity data from the current week is obtained by the system.

Then

The system needs to calculate my total emissions of CO₂ in a week,

And show the data in both numerical form and in some type of graph such as line or bar graphs.

And update the dashboard automatically when new activity logs are added.

Scenario Title: Display No Data

Given

I have not logged any activities for the current week

And carbon tracking data from the current week does not exist.

When

I open the "Progress Dashboard" section,

And the process searches for activity log entries corresponding to the current week, which are accessible.

Then

The program ought to display a message like "No data available",

And optionally, include a button or link leading me to the Activity Logging page,

And so that I can record my activities so that I can see future progress.

Story ID: S4

Feature Title: Carbon Tracking

Story Title: Receive Eco Recommendations

Story Narrative: As a user, I want personalized eco-friendly tips so that I can improve my sustainability habits.

Story Size: Medium

Acceptance Criteria Scenarios

Scenario Title: Suggestions

Given

According to my logged data, my carbon footprint in terms of travel is above average.

And I have logged several travel-related activities successfully.

When

I go to the application and open the “Eco Tips” or “Recommendations” section,

And my most recent activity data is retrieved and examined by the system.

Then

The system must provide me with eco-friendly tips concerning my travels (for instance, “Public transit or carpooling is a good option to cut down on emissions”),

And the tips should be individuals and there should be a basis of the most recent logged activities.

And every suggestion must provide concise and practical advice to promote the sustainability of living.

Scenario Title: No Recommendations Yet

Given

I have not recorded any activities in the system

And there is no usable data in the system to produce tailored eco-friendly suggestions.

When

I access the “Eco Tips” or “Recommendations” area,

And the system looks for activity logs linked to my profile that are available.

Then

The system ought to show a message like “Log your activities to receive personalized eco-tips.”

And offer a link or button that takes me to the Activity Logging page,

So that I am motivated to begin logging my activities to gain access to personalized recommendations.

Story ID: S5

Feature Title: Eco-Friendly Business Directory

Story Title: Discover Eco-Friendly Businesses

Story Narrative: As a user, I want to find and browse verified eco-friendly businesses so that I can support sustainable organisations.

Story Size: Medium

Scenario Title: Eco-friendly firms are shown accurately

Given

The user is browsing Eco-Business Directory.

And eco-friendly firms are available in the system.

When

The user opens a business directory

And the system displays results based on geolocation or filters used

Then

Only those environmentally responsible companies should be shown.

And every entry shall display a 'Verified Eco Business' badge

Scenario Title: No verified businesses available

Given

The user is browsing Eco-Business Directory

And there are no confirmed environmentally responsible businesses in this region and category.

When

The user opens the directory.

And the system looks for similar businesses.

Then

There should be a message: 'No verified eco-friendly businesses found.'

And the directory should exclude unverified and/or unrelated listings.

Story ID: S6

Feature Title: Eco-Friendly Business Directory

Story Title: Business Profile Creation

Story Narrative: As a business owner, I want to create a profile and upload sustainability documents so that I can become a verified eco-friendly business.

Story Size: Medium

Acceptance Criteria Scenarios:

Scenario 1: Business profile submission successful

Given

The owner of the business examines the registration form

And all mandatory fields are shown (Name, Category, Documentation)

When

The owner has entered valid data for all fields

And they make a registration application

Then

The Status field needs to be updated to "Pending Verification".

And the entrepreneur will receive a confirmation message

Scenario Title: Incomplete or Invalid Profile Submission

Given

"Business Owner" is shown in the registration form

And he compulsory fields are available but incomplete

When

The owner attempts to submit a form with missing data and/or incorrect files.

Then

The system should deny accepting the submission

And there needs to be an error message, for example, "Please upload valid proof documents."

And your profile status must not be "Pending Verification".

Story ID: S7

Feature Title: Business Directory

Story Title: View Businesses on Map

Story Narrative: As a user, I want to view eco-friendly businesses on a map so that I can find the nearest locations.

Story Size: Large

Acceptance Criteria Scenarios:

Scenario Title: Redemption of Points.

Given

I have enough eco-points in my account.

And a reward is there for redemption.

When

I would like to redeem my reward.

And the system handles my request for redemption.

Then

My account should be charged with the exact number of eco-points.

And the reward I selected should be successfully given to me.

Scenario Title: Point Not Enough

Given

My account does not have enough eco-points.

And the reward has a higher point requirement than I have.

When

I will attempt to redeem the reward.

And the system will check my points balance.

Then

I should receive an “Insufficient points” notification.

And no action should be taken on the redemption process.

Story ID: S8

Feature Title: Eco Footprint –Friendly Business Directory & Rewards

Story Title: Join Challenges

Story Narrative: As a user, I want to join sustainability challenges so that I can stay motivated and earn points.

Story Size: Medium

Acceptance Criteria scenarios

Scenario Title: View Engagement Metrics

Given

People interact with my business.

And engagement data will be tracked: views, clicks, and redemptions.

When

I opened the analytics page.

And the system loads my engagement statistics.

Then

Number of views, clicks, and reward redemptions should appear.

And it must be representative of valid and reliable measurements.

Scenario Title: No Engagement Yet

Given

No one visits my business page.

And no engagement data has been recorded.

When

I accessed the page for analytics.

And the system verifies if there are already any engagement records.

Then

A message stating “No interaction yet” is supposed to pop up for me.

And there would be no metrics displayed, no engagement counts at all.

Story ID: S9

Feature Title: Community Events & Challenges

Story Title: Join Events

Story Narrative: As a user, I want to view and join community sustainability events so that I can participate in eco activities.

Story Size: Medium

Acceptance Criteria Scenarios

Scenario Title: Successful RSVP to an Event

Given

The user is logged in to their account.

And the user proceeds to the Events section through the menu.

When

They click the "Join Event" button corresponding to a specific event.

Then

The system should record the response of the user to the event.

And there should be a confirming message shown:

And the system should also send a notification confirming the RSVP.

And the event should now appear in "My Events" in the user's view of their profile.

Scenario Title: Trying to RSVP Without Fulfilling the Requirement

Given

And the user is logged in, but the following conditions are present for the event: The event has reached its full capacity, OR The pass date has passed.

And the user has already RSVP'd to the same occasion before.

When

The user will try to click the "Join Event" button.

Then

The system should make sure that the RSP process has stopped.

And the proper error message to be displayed is: "Event full - No more participants can be added."

And the "My Events" listing should NOT include the event.

Story ID: S10

Feature Title: Community Engagement

Story Title: Community Events & Challenges

Story Narrative: As an organizer, I want to create sustainability events so that the community can participate.

Story Size: Large

Acceptance Criteria Scenarios:

Scenario Title: Create Event

Given

The user is a verified community organizer.

And “Create Event” option is in the events section.

When

The user types in the information regarding the events like their name, description, date, time, and venue.

Then

The system will successfully save an event.

And this event will appear on the public events list and will be available for everyone to see.

And a success message will indicate that the event has been created.

Scenario 2: Validation Error

Given

The organizer gives wrong details about the event.

When

The organizer presses the “Publish.” button.

Then

The validation error message should indicate which fields are mandatory and must be completed.

And the announcement will not be made until all necessary information is provided.

Story ID: S11

Feature Title: Community Events and challenges

Story Title: Challenge Progress Tracking

Story Narrative: As a user, I want my sustainability challenge progress to update automatically so that I can see how close I am to completing it.

Story Size: Large

Acceptance Criteria Scenarios

Scenario Title: User wants to join a challenge

Given

There is a challenge going on that you can see on the Eco-Connect page.

And the user has logged into their Eco-Connect account, which has been confirmed.

When

The user clicks the "Join Challenge" button on the page for the challenge.

Then

The system should add that person to the list of those who are doing that challenge.

And the user should get a message saying that they have successfully signed up.

Scenario Title: User Tries to Join a Challenge They Can't Access

Given

The challenge has already ended, it's restricted or invite-only, Or the user already joined.

When

The user clicks "Join Challenge."

Then

The system just stops them right there.

And "This challenge is no longer active" is one of the examples of the error message that appears. "You are not eligible to take part in this challenge." "You've already accepted this challenge."

And additionally, that challenge will not appear in "My Challenges."

Story ID: S12

Feature Title: Community events and challenges

Story Title: Reward Participation

Story Narrative: As a user, I want to earn reward points for event participation so that I feel motivated to be more eco-friendly.

Story Size: Medium

Acceptance Criteria Scenarios

Scenario Title: User earns eco-points for attending an event

Given

The user was present at an Eco-Connect event that was approved.

And the organizer has confirmed the user's presence in the system as "confirmed."

When

The organizer wants to find out whether the user came or not.

Then

Eco-points will be added to the user's account as a credit.

And the user will be sent a notification message about the reward.

And the dashboard of rewards will instantly display the new total eco-points.

Scenario Title: Invalid Attendance Claim

Given

The user was not present at the event.

And the name of the user is not included in the attendance record of the event.

When

The user attempts to claim eco-points for that event.

Then

The system verifies the claim and locates no valid attendance record.

And reject the reward application and show an appropriate error message, like "Attendance not verified."

And no eco-points will be credited to this user's profile. Deny the reward request and display an appropriate error message, such as "Attendance not verified."

Spikes stories

A spike story is amortizing a small research paper that the entire group does together any time there is something unclear to us or the risk of failure is too high that we cannot implement it straight away. Rather than immediately beginning to build and being faced with errors we could have avoided, we can use a spike to investigate a problem area to determine how we should proceed.

We choose to do a spike story every time we needed more information, during this project, such as when we learned about carbon calculation, business verification processes, and which map API to use. The spikes ensured we eliminated confusion, resolved technology uncertainty, and made informed decisions on how to proceed with our project. Since we managed these spikes early on during our project, we prevented problems that could have disrupted our project and ensured everything ran smoothly. By completing these spikes early, we avoided bigger issues later and kept the project running smoothly.

Spike ID	Story ID	Spike Category	Risk	Spike Story
SP 1	S1	Functional	Carbon footprint calculation may be inaccurate	Research industry-approved calculation models (GHG Protocol / Carbon API). Test how to convert activity data (km travelled, usage hours) into CO ₂ emissions. Output: documentation + prototype calculation.

SP2	S5/6	Functional	Fake businesses may register on the platform	Explore verification process. Test document upload + admin approval workflow. Output: flow diagram + prototype profile verification.
SP3	S3	Functional	The app becomes “installed and forgotten.” No active tracking or rewards usage.	Research gamification strategies for eco apps. Test leaderboard, points, and reward triggers. Output: mockups + engagement model.
SP4	S5	Technical	Business discovery depends on API reliability and cost per API call.	Compare Google Maps API vs OpenStreetMap. Test connecting to both and measure cost/performance. Output: API decision document.
SP5	S1/5	Technical	App may lag or crash due to many carbon tracking calculations and map requests.	Test DB indexing & caching methods. Perform load test with sample 5k+ users.

				Output: optimization plan.
SP6	S6	Technical	<p>App stores personal info, business documents — GDPR risk.</p>	<p>Research best authentication (OAuth/JWT).</p> <p>Prototype secure login & role-based access (Admin/Business/User).</p> <p>Output: working secure login draft.</p>

Spike 1: Carbon Footprint Accuracy Validation

Spike Type: Functional

Spike Narrative: To produce reliable carbon results, the system needs to test industry-approved emission models and verify calculation consistency.

Spike Story Description: This spike explores the functional risk that carbon calculations may be incorrect if the wrong emission factors or formulas are used. The platform's credibility depends on the accuracy of the user activity data conversion into CO₂ values, improper conversion might impact credibility and mislead users. The spike entails validation of which method yields the most accurate output by comparing the formulas of the Greenhouse Gas Protocol and other environmental APIs (UNEP, 2020). Among the results is the generation of calculation prototypes that have undergone input variations testing for robustness and reliability confirmation prior to the integration with the dashboard.

Spike 2: Prevention of Fake Business Registration

Spike Type: Functional

Spike Narrative: The verification workflows and document review processes must be experimented with by the system so that only eco-friendly businesses verified would be displayed.

Spike Story Description: The spike deals with the functional risk of the platform being trustless if fake businesses could get processed as eco-friendly ones. The test would thus be directed to document uploads, admin approval processes, and verification logic to ascertain that only the most authentic ones get the 'certified' badge. Also checked are the standards like the ISO environmental verification guidelines (ISO, 2019) to design the approval process. The output will be a diagram of a prototype verification flow and a miniature test model meant to determine document-handling behavior and prevent unauthorized approval along with that.

Spike 3: User Engagement and Gamification Insights

Spike Type: Functional

Spike Narrative: For the application to engage users in the long run, it has to ponder on the usage of gamification methods which will lead to the proper users' behavior.

Spike Story Description: The initial setup of the app might lead to a risk that users will cease to use the app. Sustainability-oriented platforms rely on user input to keep running and thus gamification, as a method of user motivation, can bring about the desired behavioral change (OECD, 2021). This spike will consider different types of incentives like rewards, points, leaderboards, etc. and user participation in events along with their pros and cons. The product would consist of mockups and the engagement model whereby users receive rewards and set their own milestones. Users' engagement would be highly positive and observable through the change in their digital behavior rather than through mere app usage.

Spike 4: Testing of Reliability & Cost of Map APIs

Spike Type: Technical

Spike Narrative: The company is going to test various map APIs to find the best mapping API to support location searches reliably, according to the speed, accuracy, and cost.

Spike Story Description: This spike considers the technical risk that the map-based business discovery can be very slow, inaccurate, or expensive. The team assesses Google Maps in comparison to OpenStreetMap in different aspects like load times, geolocation accuracy, caching efficiency, and the occurrence of rate-limit behavior (Google Maps Platform, 2023). The main purpose is to find the one that gives the best cost-performance balance for long-term sustainability. The resultant output is an API decision document along with performance metrics that would help in avoiding such failures as Businesses with incorrect locations or high API billing.

Spike 5: App Performance & Load Management

Spike Type: Technical

Spike Narrative: To maintain stable performance, the system needs to test caching, database indexing, and multi-user load handling.

Spike Story Description: The goal of this spike is to examine the performance risks associated with the scenario where multiple carbon calculations, map loads and database queries take

place at the same time and possibly cause the system to crash. To this end, the spike will run tests under very high usage conditions (5,000+ users) to evaluate the efficiency of the platform in handling multiple requests. It will also check the effectiveness of DB indexing, caching and asynchronous processing as possible solutions to avoid slowdowns. The reason for this is to find the optimizations when the system is small so that later, users will enjoy smooth navigation, fast dashboard loading, and continuous map rendering.

Spike 6: Secure Authentication & GDPR Compliance

Spike Type: Technical

Spike Narrative: To ensure confidentiality of user and enterprise information, the system has to be subjected to secure authentication and role-based access controls testing.

Spike Story Description: This spike scrutinizes the scenario of authentication being too weak or insecurely handled personal and business data. Since the platform is the storage for sensitive documents and user profiles, it is obliged to comply with GDPR and modern authentication standards (ISO, 2019). The spike investigates through various methods like OAuth, JWT tokens, password hashing, and access with multiple roles (Admin, Business, User) plus along with how sessions expire and how securely data is transmitted. The prototype developed is a working model of secure login and access control that ensures compliance before the implementation of business verification or event participation modules.

Needs and Risk Assessment

Needs and Risks Analysis is an instrument applied when analyzing the requirements of the sustainable platform and the risks which can affect the effectiveness of developing and implementing a sustainable platform (ISO, 2019). Needs analysis helps the project team align with the requirements of the users and the requirements of the environment in which the project is being placed so that the project is functional and sustainable within its impact (UNEP, 2020). However, needs analysis is required alongside a risks analysis, which helps the project team understand risks related to functionality, safety, usability, technological risks, and so on, with the objective of taking corrective actions (OECD, 2021).

<u>Risk ID</u>	<u>RISK</u>	<u>LEVEL</u>	<u>ELIMINATION</u>	<u>BACKUP</u>
R1	Data Breach / Hacking	High	<ul style="list-style-type: none">• Encrypt sensitive user data during storage and transmission.• Perform regular security audits and vulnerability testing.	<ul style="list-style-type: none">• Prepare an incident response plan to notify users quickly and secure compromised accounts.
R2	Unauthorized Access	High	<ul style="list-style-type: none">• Use strong password policies, MFA, and session timeout. Secure login endpoints against brute-force attacks.	<ul style="list-style-type: none">• Lock accounts temporarily after repeated failed login attempts.
R3	Incorrect Carbon Calculations	Medium	<ul style="list-style-type: none">• Use verified emission factors (GHG Protocol).	<ul style="list-style-type: none">• Allow manual correction and automatically

			<ul style="list-style-type: none"> Validate formulas with test data 	flag suspicious values.
R4	Map API Failure (Business Directory)	Medium	<ul style="list-style-type: none"> Use a stable open-source map API (OpenStreetMap). Cache business locations offline. 	<ul style="list-style-type: none"> Display a fallback list view if the map fails to load.
R5	File Upload Issues (Business Verification)	High	<ul style="list-style-type: none"> Validate file types, size limits, and secure upload paths. Use virus scanning for uploaded documents. 	<ul style="list-style-type: none"> Allow businesses to email documents manually.
R6	User Not Engaging with App	Medium	<ul style="list-style-type: none"> Implement gamification (points, badges, daily streaks). Send motivational eco-tips and weekly summaries. 	<ul style="list-style-type: none"> Offer rewards and community challenges to re-engage inactive users.
R7	Data Loss / Database Failure	High	<ul style="list-style-type: none"> Schedule daily automated backups. Use reliable cloud storage with redundancy. 	<ul style="list-style-type: none"> Keep off-site backups for emergency restore.
R8	Slow Performance / App Lag	Medium	<ul style="list-style-type: none"> Optimize database queries. Cache repeated requests (e.g., business list). 	<ul style="list-style-type: none"> Provide “Lite Mode” with reduced features for low connectivity.
R9	Fake or Fraudulent Business Registrations	Medium	<ul style="list-style-type: none"> Require mandatory sustainability documents for verification. Manual admin review. 	<ul style="list-style-type: none"> Immediately suspend flagged profiles until reviewed.

R10	Event Attendance Misreporting	Low	<ul style="list-style-type: none">• Use location check-in or QR scanning for events.• Track join timestamps and device IDs.	<ul style="list-style-type: none">• Allow organizers to manually verify attendance for users with issues.
-----	-------------------------------	-----	--	---

Stage 1 Conclusion

From this sustainability tracking web app project, technology is shown to play a positive role in assisting individuals to make small but vital contributions to sustainable lifestyles. From this project, we have managed to identify how consumers can benefit and contribute positively to this web app to enhance personal behavior while promoting positive sustainability initiatives.

The Agile approach incorporating stories helped us break down our tasks into smaller, more manageable pieces (Schwaber & Sutherland, 2020). This helped us ensure that each one of us could do our part to work on our project, whether it was about analyzing stories, designing wireframes, implementing functional elements, or validating app functionality. The design elements such as designing wireframes and flows early on helped us keep our interface simple and user-centric (Garrett, 2011) to make our app intuitive to our consumers.

An incorporation of right carbon foot printing logic, which is directed by existing recommendations like Greenhouse Gas Protocol (WRI, 2004), is a key factor in this project. The map design rules based on case studies like OpenStreetMap (OpenStreetMap, 2023) enable the eco-business directory search and distance search functionalities. An essential element within this project is integrating necessary security guidelines such as correct authentication informed by up-to-date guidelines such as JWT (Jones, Bradley & Sakimura, 2015).

This project has opened our eyes to how design, teamwork, and research can work together to result in something that can help to catalyze sustainable behavior. Further development may provide this application as a helpful tool for those who live the sustainable way, in terms of personal life or business life.

Stage 2 Overview

This represents stage 2 of this assessment where emphasis shall be put on developing a Minimum Viable Product (MVP) and formulating a Sprint Plan based on user stories elaborated during stage 1. As indicated in this assignment requirement for this task, Agile methods shall be employed for user story mapping and planning for delivery in a span of three sprint cycles. The scope of this Minimum Viable Product shall be implementing as few functionalities as possible to facilitate user interaction with this sustainability tool.

The story mapping exercise gives the team opportunities to establish user value, story size, workload, and dependencies for enabling decisions concerning feature development priorities for MVP. Through this data, a release plan for a delivery schedule for a span of three sprints is determined. This delivery schedule initially begins with developments concerning carbon tracking functions and then business listings before reaching community involvement capabilities. All levels of this delivery schedule contain tasks such as development tasks and test cases planned carefully while considering risk management and best practices for Agile.

This stage focuses on appropriate story sizing, analysis of dependencies, and then use of capacity planning with a focus towards making certain that each sprint remains a realistic and achievable target given the limitations of development outlined in the coursework assignment brief (Ulster University, 2025). This stage in Part 2 indicates that finishing a possible MVP and a sprint plan signifies how a scientific approach towards using Agile techniques was employed in establishing a realistic beginning level for a given sustainability platform.

Minimum Viable Product (MVP)

Minimum Viable Product (MVP) revolves entirely around the function that would make the sustainability platform provide immediate utility for the user. MVP allows the validation of the vital concept for the system in terms of utilizing resources for their effective use (OECD, 2021).

The MVP for this assignment includes three components:

1. Carbon Footprint Tracking (F01)

It also allows consumers to begin tracking their impact from the very first day.

Included functions:

- Log sustainable daily activities (transportation, energy usage, waste)
- Carbon calculation by automated software via recognized standards
- Basic dashboard to display the daily/weekly carbon data

Why included:

- It satisfies the primary purpose of the platform: carbon awareness.
- The users get immediate quantifiable feedback for their behavior (UNEP, 2020).

2. Eco-Friendly Business Directory (F02)

This will ensure consumers are able to identify sustainable businesses.

Functions included:

- View local green businesses
- Basic business profiles
- Submission of Sustainability Proof for Verification

Why included:

- Fosters trust between the users and local green businesses
- Defines the market component portion early (ISO, 2019)

3. Community Participation (F03)

This improves social interaction. It also encourages people to keep their accounts active.

Included functions:

- Participate in activities related to sustainability
- View basic event details & locations

Why included:

- Being involved in the community promotes sustainable living
- Implementing collaborative features to encourage the users (OECD, 2021)

Justification of story points

SPRINT 1 (RELEASE 1)

1. Daily Activity Logging (Story Point: 3)

- Effort: This one took little effort. Most of our work was designing and testing the form for users to input their activities. Adding basic checks for missing values was a small-to-medium lift.
- Complexity: Not very complex. The user's input is stored. While other funds come with all sorts of strings attached, this one comes with almost none.
- Risk: The story is likely quite well contained, and the risk would purely be someone putting in incomplete or weird information.

2. Automatic Carbon Footprint Calculation (Story Point: 5).

- Effort: This feature also took a little longer to execute than we expected, as we needed to map the activity data to the appropriate carbon emissions calculations. It was a simple one, but we verified against real measurement standards.
- Complexity: Medium complexity. They also had to carefully consider what happens with outlying values — extremely high, extremely low or negative numbers.
- Risk: The student asked for a vague yet inspirational response. The biggest risk is that the methodology by which the emissions are calculated is shoddy and unreliable.

3. Weekly Dashboard Charts (Story Point: 8)

- Effort: This was the feature that took the longest, and it was the focus of Sprint 1. The team went through several iterations of testing out how we wanted the charts to be displayed. And getting the dashboard to automatically update as new activities were added requires a bit more work.
- Complexity: Fairly high. It had to, for example, collect data every day, sort it correctly by week, and produce easily readable charts. There also had to be conditions for what to do in cases where there was no data yet.

- Risk: Overloading charts with data cause them to halt or fail to load at all. We also kept performance in mind, to make sure you're not kept waiting for assets to load.

4 Eco-Friendly Tips / Recommendations (Story Point: 5)

Effort: We had to create the logic for how tips would appear according to user behavior first to make the tips relevant. The ratio of the advice and the most recent actions is quite acceptable and not very difficult to manage.

Complexity: Moderate. The system scans a user's recent activity and then checks each suggestion for higher carbon usage.

Risk: Low risk overall. At worst, we have a few off-base tips.

SPRINT 2 (RELEASE 1)

1. Eco-Friendly Business Directory (Story Point: 8)

- Effort: One of the more daunting tasks to tackle earlier in the project. Search filters, verified badges, and map to see surrounding places. Every one of those layers added hassle and more of them will bog the project down.
- Complexity: This is a rather complex feature which involves doing a database search, calling out to other people's systems for map data, and paging and filtering content when it's returned. All these systems in combination are fragile: They depend on each other, so a failure in one can knock the others over. The map on our site is slow to load or does not respond. So, our users have come to expect that our mapping feature does not work. While many requests will succeed, they will also probably observe recurring API latency or outright connection failure.

2. Business Verification Workflow (Story Point: 5)

- Effort: During the initial phase of the project, uploading files, reviewing by admin and processing of approvals remained constant but not heavy workflow. Documents needed to be locked and protected no matter what.
- Complexity: Medium complexity. Several additional steps are required to complete the process; among them are validating the file and linking to business profiles.
- Risk: Therefore, document security and privacy are the key risks involved. Incorrect pairwise relations put the context learning system to hell.

3. Dashboard Improvements (Story Point: 5)

- Effort: Some visual and category filters were added, as well as some changes in the layout of the week trend section. Even though an existing version of the dashboard had been created, this project required less weightage and some redesigning.

- Complexity: Moderate. In this scenario, some added complexity exists because it retrieves data from multiple sources.
- Risk: Loading too much data in one go may give rise to problems such as slowing down the dashboard.

4. Integration of Maps & Caching (Story Point: 5)

- Effort: A tremendous amount of time was dedicated to the right installation of map tiles as well as to very precise location detection and lastly, to the development of caching which would guarantee that the map would be loaded only once and not every time anew. Various scenarios were simulated, and tiny adjustments were made until the entire process was reliable and effortless.
- Complexity: Medium. It is common that during the integration of geocoding and map APIs, unexpected problems arise, especially regarding delays in the network and inconsistencies in API responses, so the process was not entirely smooth.
- Risk: The significant risks are wrong location detection and a longer-than-expected loading time for the map. If the map is wrong or too slow to load, this will reflect negatively on the directory's credibility perception.

SPRINT 3 (RELEASE 3)

1. Event Participation & RSVP (Story Point: 5)

- Effort: This encompassed putting into action the enumeration of events comprising the join button and overseeing RSVPs. The functionality was not the toughest but still required properly connected user profiles.
- Complexity: Low/Medium. Event participation normally is not hard, but it still necessitates right data passing between users and events.
- Risk: If the RSVP is not recorded, there is a possibility that users will think they have confirmed their attendance, whereas they haven't.

2. Event Creation (Story Point: 8)

- Effort: To be honest, the event creation process was a lot longer than I expected at first because the event creator had no choice but to complete a very long and complicated form with a plethora of details - date, description, location, capacity, etc. It took a good amount of time to arrange everything in a proper way and to double-check if all the links were correct.
- Complexity: The process was certainly not simple. Events have to go through a succession of steps - creation, listing, and attendance - and none of the steps could be performed well if the previous one didn't go smoothly, which is why the logic needed thorough devising and meticulous execution.
- Risk: If the validation is not really strict then the system may end up with wrong or duplicated events and that will not only create confusion for the users but also affect negatively the operation of the related functions.

3. Challenge Progress Tracking (Story Point: 8)

- Effort: I tried to put down the behaviors trails to create systematic measures of user actions that can be counted out as challenging behaviors. This led to the development of the logic to the last detail and testing different situations to ensure that the changes were reasonable. It took longer than expected due to the number of cases involved.

- Complexity: Unbelievably high. To synchronize the user's actions with the specific challenge and requirements is not a straightforward process and it requires very thorough checks to make sure that everything is in the right place.
- Risk: If the updates regarding progress are inaccurate, the user will immediately realize that something is wrong. Poor progress tracking could easily result in user disappointment and hence, a loss of trust in the future.

4. Rewards Engine for Events (Story Point: 8)

- Effort: The linkage between the point system and occurrence participation and outcomes had to be investigated very directly. It was a laborious task since the reward features play a significant role in user experience; thus, we had to ensure that the whole process worked perfectly.
- Complexity: Extremely high. Not only did we need to avoid the occurrence of incidents like double-spending and invalid claims but also the points had to be updated instantly with no errors at all. All this resulted in the introduction of a slew of complexities.
- Risk: In the case that the users discover ways of beating the system or the system mistakenly assigns points, then the whole rewards function will be perceived as untrustworthy. If the rewards do not perform well, trust can quickly disappear

Story Mapping

Features	Carbon Tracking	Eco-Business Directory	Community Engagement
Sprint 1	<p>Daily Activity Logging Story Size: S</p> <p>Design and develop activity logging forms for users to input transport, energy, and waste activities. Implement basic validation and data storage.</p> <p>Basic Navigation: Menu → Activities → Log Activity</p>	<p>Database Setup (Support for F01–F04) Story Size: M</p> <p>Set up database tables for business listings, categories, verification documents, and geo-location fields. Ensure relationships support browsing and filtering.</p> <p>Basic Navigation: Backend (no UI navigation)</p>	<p>Authentication + MFA Set up Story Size: M</p> <p>Implement secure login with multi-factor authentication. Users must verify identity to access platform features.</p> <p>Basic Navigation: Login → MFA → Dashboard</p>
	<p>Automatic Carbon Calculation Story Size: M</p> <p>Link emission factors to activity data and generate automatic footprint values. Handle outliers and incorrect values.</p> <p>Basic Navigation: Dashboard → Carbon Summary</p>		
	<p>Weekly Dashboard Charts Story Size: L</p> <p>Generate weekly charts of user carbon usage. Charts auto-update when new</p>		

	<p>activities are logged. Handle missing or incomplete data.</p> <p>Basic Navigation: Dashboard → Insights → Weekly Charts</p>		
	<p>Eco-Friendly Tips / Recommendations Story Size: M</p> <p>Provide automated sustainability tips based on user patterns and high carbon categories.</p> <p>Basic Navigation: Dashboard → Recommendations</p>		
Sprint 2	<p>Dashboard Improvements Story Size: M</p> <p>Enhance charts with filters, improve layout, and redesign insights section.</p> <p>Integrate multiple data sources cleanly.</p> <p>Basic Navigation: Dashboard → Filters</p>	<p>Business Directory (F02) Story Size: L</p> <p>Build searchable directory with filters, categories, and verified badges. Display eco-business cards and map previews.</p> <p>Basic Navigation: Menu → Businesses → Directory</p>	<p>Join Sustainability Events Story Size: S Allow users to browse event listings, view details, and join events.</p> <p>Basic Navigation: Menu → Events → Join</p>
		<p>Business Verification Workflow Story Size: M</p> <p>Allow business owners to submit verification documents. Admin reviews and approvals.</p>	

		<p>Display verified badge when approved.</p> <p>Basic Navigation: Business Portal → Submit Verification</p>	
		<p>Map Integration + Caching Story Size: M</p> <p>Integrate map APIs for business locations. Add coaching for faster loading and reduce API calls.</p> <p>Basic Navigation: Businesses → Map View</p>	
Sprint 3	<p>Challenge Progress Tracking Story Size: Track user actions toward sustainability challenges. Update progress in real time.</p> <p>Basic Navigation: Dashboard → Challenges → Progress</p>	<p>Rewards for Verified Businesses Story Size: M</p> <p>Reward points for interacting with verified business listings or supporting local eco-shops.</p> <p>Basic Navigation: Businesses → Rewards</p>	<p>Event Participation & RSVP Story Size: M</p> <p>Users can RSVP to events, save attendance, and view status updates.</p> <p>Basic Navigation: Events → RSVP</p>
			<p>Event Creation (Admin)Story Size: L</p> <p>Admins create events with full details—date, time, description, location, capacity.</p> <p>Basic Navigation: Admin Panel → Create Event</p>
			Rewards Engine for Events Story Size: L

			<p>Assign reward points for participating in events.</p> <p>Prevent duplicate claims and ensure instant updates.</p> <p>Basic Navigation:</p> <p>Dashboard → Rewards</p>
--	--	--	--

Development Tasks

Task ID: T1	Task Name: User Registration & Profile Form Design
Task Size	Story Points: 3 (Small)
Dependencies	Requires Registration UI wireframe; Depends on UI/UX guidelines.
Checklist of Subtasks	<ul style="list-style-type: none">- Design registration form.- Add business fields.- Client-side validation.- Password strength rules.- Accessibility checks.- Prepare UI mockups.

Task ID: T2	Task Name: Backend API for User Data & Authentication
Task Size	Story Points: 5 (Medium)
Dependencies	Requires T1; Depends on JWT/OAuth research.
Checklist of Subtasks	<ul style="list-style-type: none">- Define API.- Secure registration.- JWT login.- Hash passwords.- Auth tests.- Swagger documentation.

Task ID: T3	Task Name: Carbon Calculation Engine
Task Size	Story Points: 8 (Large)
Dependencies	Depends on emission factor research (SP1) and activity model.
Checklist of Subtasks	<ul style="list-style-type: none"> - Use GHG Protocol factors. - Convert inputs → CO₂. - Validate inputs. - Calculation endpoint. - Unit tests. - Manual correction logic.

Task ID: T4	Task Name: Activity Logging UI
Task Size	Story Points: 5 (Medium)
Dependencies	Depends on T1 and T3.
Checklist of Subtasks	<ul style="list-style-type: none"> - Build logging form. - Connect backend. - Field validation. - CO₂ output display. - Edit/delete entries. - User messages.

Task ID: T5	Task Name: Progress Dashboard & Charts
Task Size	Story Points: 8 (Large)
Dependencies	Depends on T3 and T4.
Checklist of Subtasks	<ul style="list-style-type: none"> - Dashboard layout. - Weekly trend charts. - Filters. - No-data message. - Cache queries. - Dashboard tests.

Task ID: T6	Task Name: Eco-Friendly Business Directory & Profiles
Task Size	Story Points: 8 (Large)
Dependencies	Depends on T1 and map API (SP4).
Checklist of Subtasks	<ul style="list-style-type: none"> - Business model/pages. - Search & filter. - Verified badge. - Edit profile. - Pagination. - List API tests.

Task ID: T7	Task Name: Business Verification Workflow
Task Size	Story Points: 5 (Medium)
Dependencies	Depends on T6 and secure upload (R5).
Checklist of Subtasks	<ul style="list-style-type: none"> - Secure file upload. - Admin verification panel. - Status updates. - Email notifications. - Audit log. - Upload validation tests.

Task ID: T8	Task Name: Map Integration, Caching & Fallback
Task Size	Story Points: 5 (Medium)
Dependencies	Depends on SP4 and T6.
Checklist of Subtasks	<ul style="list-style-type: none"> - Map API integration. - Geocoding. - Tile caching. - Fallback list view. - Cluster markers. - Performance tests.

Task ID: T9	Task Name: Events & Challenge Management
Task Size	Story Points: 8 (Large)
Dependencies	Depends on T1, T6, and attendance logic (R10).
Checklist of Subtasks	<ul style="list-style-type: none"> - Event creation UI. - RSVP/My events. - QR attendance. - Challenge logging. - Reward triggers. - Event lifecycle tests.

Task ID: T10	Task Name: Rewards Engine & Redemption System
Task Size	Story Points: 8 (Large)
Dependencies	Depends on T3, T5, T9.
Checklist of Subtasks	<ul style="list-style-type: none"> - Points model. - Rewards catalog. - Redemption API. - Admin reward panel. - Voucher linkage. - Double-spend prevention.

Task no.: T11	T11 Task Name : Alerts System and Notification
Task Size	Story Points: 5 (Medium)
Dependencies	Depends on T4, T9 and T10.
List of Subtasks	<ul style="list-style-type: none"> - Push/email service. - Notification templates. - User settings. - Trigger notifications.

	<ul style="list-style-type: none">- Notification history.- End-to-end tests.
--	---

Task no. : T12	T12 Task Name: Admin Dashboard and System Management
Task Size	Story Points: 8 (Large)
Dependencies	Depends on T6, T7, T9 and T10.
List of Subtasks	<ul style="list-style-type: none">- Admin UI.- Analytics dashboard.- Role-based access control.- System logs.- Suspend/reactivate functions.- Admin workflow tests.

TEST TASKS

Test Case 1 (S1: User Registration)

Test ID: TC1

Story ID: S1

Story Narrative: Verify successful user registration

Step ID	Step Description	Test Data	Expected Result
1	Navigate to registration page	URL: /register	Registration page loads
2	Enter valid data	Email: user@eco.com, Pass:Test123	Fields accept input
3	Click Submit	N/A	Account created
4	Check inbox	Email: user@eco.com	Verification email received
5	Click verification link	Token:abc123	Account marked Verified

Test Case 2 (S1: Invalid Registration Validation)

Test ID: TC2

Story ID: S1

Story Narrative: Check missing field validation

Step ID	Step Description	Test Data	Expected Result

1	Open registration page	URL:/register	Page loads
2	Leave email empty	Password: pass123	Error: Email required
3	Leave password empty	Email: user@eco.com	Error: Password required

Test Case 3 (S1: Activity Logging)

Test ID: TC3

Story ID: S1

Test Description: Verify daily activity can be logged

Step ID	Step Description	Test Data	Expected Result
1	Open activity logging page	URL:/activity	Page loads
2	Enter valid travel data	Distance:10km	Input accepted
3	Submit activity	N/A	Success: Activity saved

Test Case 4 (S2: Carbon Calculation)

Test ID: TC4

Story ID: S2

Test Description: Verify automatic carbon calculation

Step ID	Step Description	Test Data	Expected Result
1	Log travel activity	Distance: 5 km	Accepted
2	System calculates CO ₂	N/A	Correct CO ₂ displayed

Test Case 5 (S3: Dashboard Weekly View)

Test ID: TC5

Story ID: S3

Test Description: Verify dashboard shows weekly emissions

Step ID	Step Description	Test Data	Expected Result
1	Navigate to dashboard	URL:/dashboard	Loads
2	View weekly graph	N/A	Graph displayed

Test Case 6 (S5: View Eco-Friendly Businesses)

Test ID: TC6

Story ID: S5

Test Description: Verify directory filters

Step ID	Step Description	Test Data	Expected Result
1	Open directory	URL:/business	Page loads
2	Apply category filter	Filter: Cafes	Only Cafes shown

Test Case 7 (S6: Business Profile Creation)

Test ID: TC7

Story ID: S6

Test Description: Verify business can submit profile

Step ID	Step Description	Test Data	Expected Result
1	Open business form	URL:/business/register	Loads
2	Upload verification docs	File:pdf	Accepted
3	Submit	N/A	Status: Pending Verification

Test Case 8 (S6: Business Verification Badge)

Test ID: TC8

Story ID: S6

Test Description: Verify approved businesses show badge

Step ID	Step Description	Test Data	Expected Result
1	Admin approves profile	Status: Approved	Saved
2	View business page	N/A	Verified badge visible

Test Case 9 (S9: Join Event)

Test ID: TC9

Story ID: S9

Test Description: Verify user can RSVP

Step ID	Step Description	Test Data	Expected Result
1	Open events page	URL:/events	Loads
2	Click Join	Event: Tree Planting	Added to My Events

Test Case 10 (S11: Challenge Progress)

Test ID: TC10

Story ID: S11

Test Description: Verify challenge progress updates

Step ID	Step Description	Test Data	Expected Result
1	Join challenge	ID: Recycle Week	Success
2	Log challenge task	Task: Recycled bottles	Progress increases

Test Case 11 (S7: Reward Redemption)

Test Description: Verify user redeems reward

Step ID	Step Description	Test Data	Expected Result

1	Open rewards page	URL:/rewards	Loads
2	Redeem reward	Points=50	Success: Reward issued

Test Case 12 (S12: Event Attendance Points)

Test ID: TC12

Story ID: S12

Test Description: Verify attending event grants points

Step ID	Step Description	Test Data	Expected Result
1	Attend event	QR Scan	Attendance recorded
2	Points awarded	N/A	Eco points added

Stage 2 Conclusion

This enabled stage 2 to translate our original requirements of our system into a development plan. By assessing our scope for our Minimum Viable Product (MVP), we could then prioritize our key requirements for our end-users: tracking data for carbon emissions, finding ecologically responsible firms for transactions, and being part of a community. By using a story map tool, we could then break this down into logical user stories for completion in three sprints.

The use of detailed spike stories allowed us to break down our uncertainty concerning carbon accuracy, verification security, map performance, and system engagement. The use of spike stories helped us address our uncertainty about functions and technology with a focus that aligns with Agile guidance concerning addressing uncertainty before performing a task (Schwaber & Sutherland, 2020). Also, the sprint planning exercise allowed us to address our workload, story size, and system capacity.

To sum up, we may state that our project has strengthened its foundations in Stage 2 with a roadmap ahead of us that ensures better coordination among our team as well as our confidence in the gradual evolution of our system. This planning leads us directly to a planned development stage in Stage 3.

References

- Schwaber, K. and Sutherland, J. (2020) The Scrum Guide. Scrum.org. Available at: <https://scrumguides.org> (Accessed: 24 November 2025).
- ISO (2019) ISO 14064-1:2019 Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions. Geneva: International Organization for Standardization.
- UNEP (2020) Emissions Gap Report 2020. United Nations Environment Programme. Available at: <https://www.unep.org/resources/emissions-gap-report-2020> (Accessed: 24 November 2025).
- OECD (2021) Behavioural Insights for Environmental Sustainability. OECD Publishing. Available at: <https://www.oecd.org> (Accessed: 24 November 2025).
- Garrett, J.J. (2011) The Elements of User Experience. 2nd edn. Berkeley: New Riders.
- Atlassian (2025) *Trello: Visual Project Management Tool*. Available at: <https://trello.com> (Accessed: 10 November 2025).
- Vercel (2025) *Vercel Deployment Documentation*. Available at: <https://vercel.com/docs> (Accessed: 20 November 2025).
- diagrams.net (2025) *Diagrams.net (formerly Draw.io) Online Diagramming Tool*. Available at: <https://www.diagrams.net> (Accessed: 10 November 2025).

Appendix

Trello QR



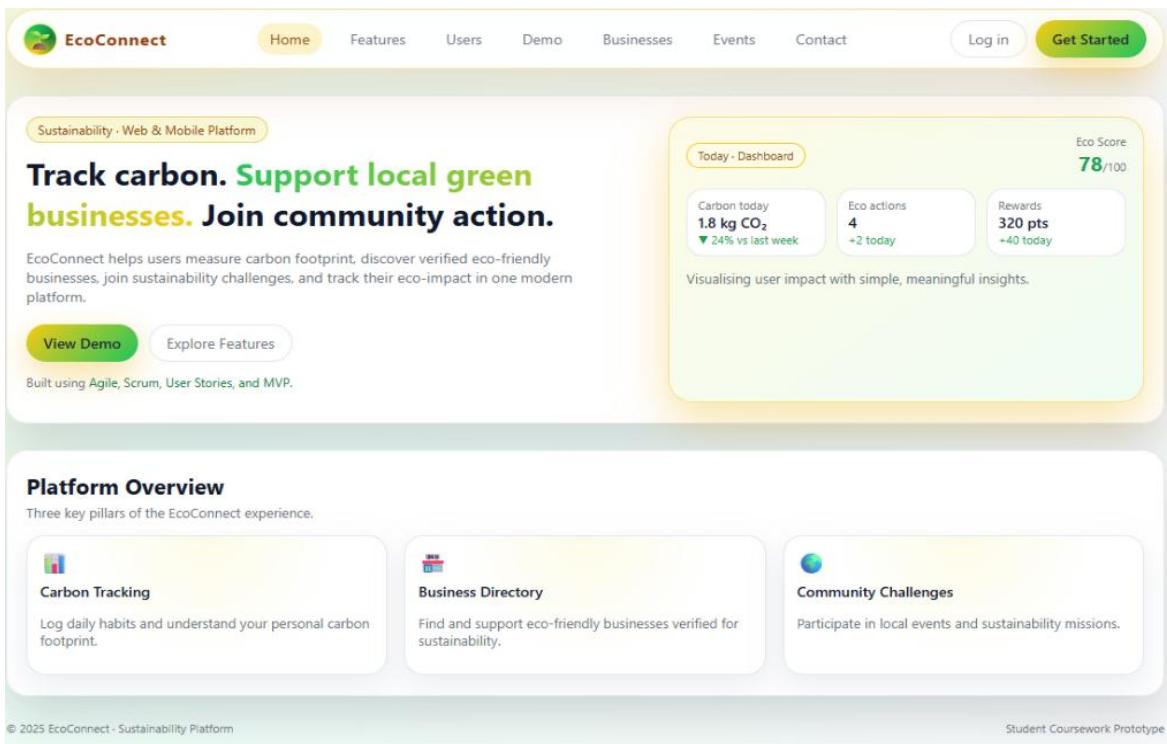
The screenshot shows a Trello board titled "Ecoconnect". The board is organized into several lists:

- Backlog**: Contains cards for "User Management", "DevOps Checklist (Suresh)", "Business Analyst Checklist (Prabin)", and "Tester Checklist (Pradip)".
- SPRINT BACKLOG**: Contains cards for "Daily Activity Logging (S1) (sprint 1)", "Carbon Footprint Calculation (S2)(sprint1)", "Weekly Dashboard Charts (S3)(sprint1)", "Eco-Friendly Tips / Recommendations (S4) (sprint1)", and "Database Setup (Users, Business, Events)".
- Working on**: Contains cards for "Carbon Tracking Implementation (F01)", "Business Directory Filtering", "Tester Test Cases (User Stories S1-S12)", "UI/UX Improvements (Global)", and "Database Setup (Users, Business, Events)".
- BUGS**: Contains cards for "Login Button Not Working", "Dashboard Values Not Updating", "Business Directory Filters Not Working", "Image Upload Fails (Business Verification)", and "Map Not Loading / Location Frrr".

The board has a background image of a mountainous landscape. At the bottom, there are navigation links for "Inbox", "Planner", "Board", and "Switch boards".

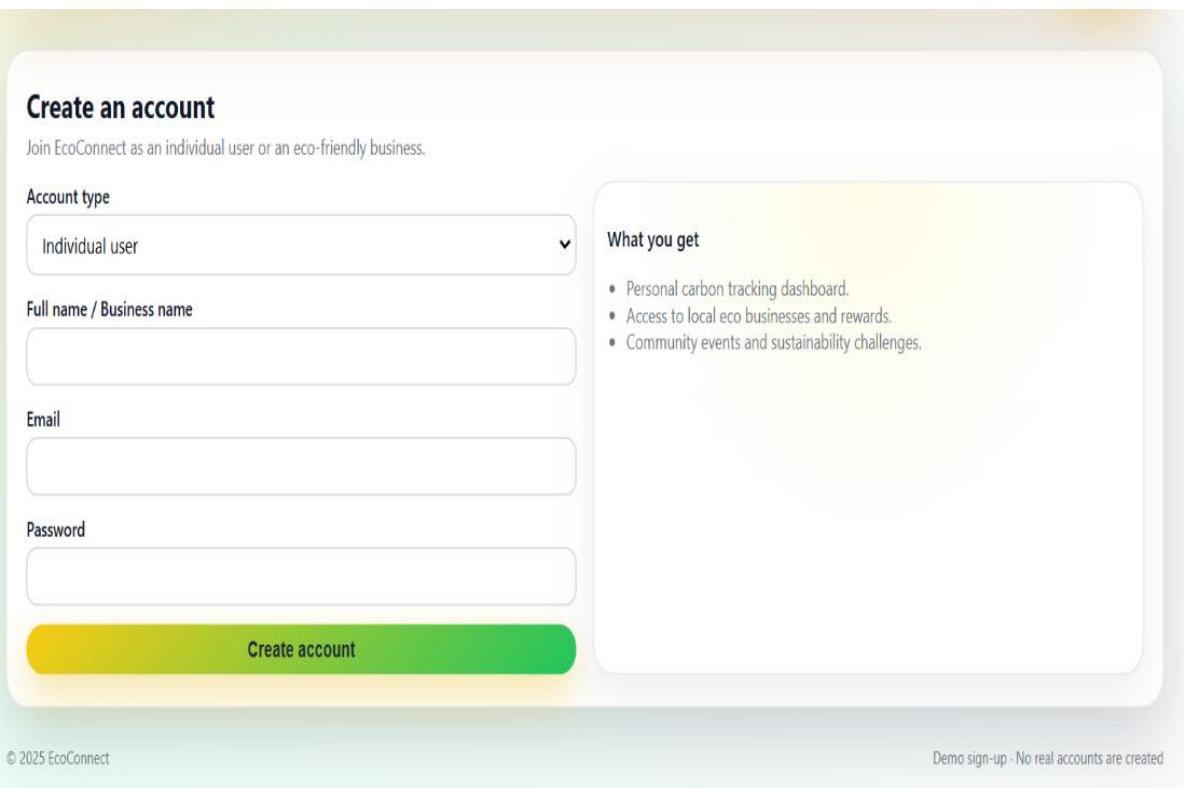
Wireframes

Home Page



The wireframe for the Home Page of EcoConnect features a header with the logo 'EcoConnect' and navigation links for Home, Features, Users, Demo, Businesses, Events, Contact, Log in, and Get Started. Below the header is a banner with the text 'Sustainability - Web & Mobile Platform'. The main section has a heading 'Track carbon. Support local green businesses. Join community action.' followed by a description of the platform's purpose: 'EcoConnect helps users measure carbon footprint, discover verified eco-friendly businesses, join sustainability challenges, and track their eco-impact in one modern platform.' It includes two buttons, 'View Demo' and 'Explore Features', and a note that it's built using Agile, Scrum, User Stories, and MVP. To the right is a 'Today - Dashboard' box showing an 'Eco Score' of 78/100, 'Carbon today' at 1.8 kg CO₂ (down 24% vs last week), 'Eco actions' at 4 (+2 today), and 'Rewards' at 320 pts (+40 today). A note below says 'Visualising user impact with simple, meaningful insights.' At the bottom left is a 'Platform Overview' section with three boxes: 'Carbon Tracking' (log daily habits and understand your personal carbon footprint), 'Business Directory' (find and support eco-friendly businesses verified for sustainability), and 'Community Challenges' (participate in local events and sustainability missions). The footer contains copyright information (© 2025 EcoConnect - Sustainability Platform) and a note that it's a 'Student Coursework Prototype'.

Sign-up



The wireframe for the Sign-up page has a title 'Create an account' and a sub-instruction 'Join EcoConnect as an individual user or an eco-friendly business.' It includes fields for 'Account type' (set to 'Individual user'), 'Full name / Business name', 'Email', and 'Password'. On the right, a 'What you get' section lists benefits: 'Personal carbon tracking dashboard.', 'Access to local eco businesses and rewards.', and 'Community events and sustainability challenges.' A large green 'Create account' button is at the bottom. The footer includes copyright information (© 2025 EcoConnect) and a note (Demo sign-up - No real accounts are created).

Login

Welcome Back 

Log in to track your sustainability journey

Email Address

Password

Log In

Don't have an account? [Create one](#)

— Or continue with —

 Google

 Facebook

Features

 EcoConnect

Home Features Users Demo Businesses Events Contact Log in Sign up

Core Features

EcoConnect is built around three main feature groups that support sustainable behaviour and local ecosystems.

 F01 · Carbon Footprint Tracking

Users log daily activities (transport, energy, waste) and view estimated carbon emissions with simple graphs.

 F03 · Eco-Friendly Business Directory

Local green businesses can be discovered via search and filters, with verification badges to build trust.

 F02 · Community Events & Challenges

Users join events and challenges that reward sustainable participation, increasing engagement and impact.

© 2025 EcoConnect

Feature overview page

Users Interface

The screenshot shows the 'Users' section of the EcoConnect website. At the top, there is a navigation bar with links: Home, Features, **Users**, Demo, Businesses, Events, Contact, Log in, and Sign up. Below the navigation bar, the title 'User segments' is displayed. A sub-section titled 'Individuals / Eco-Conscious Users' describes primary users who want to track their daily behaviour and lower their carbon footprint, with a list of actions: Log daily sustainable actions, View personal carbon progress, and Join events, challenges and earn rewards. Another sub-section titled 'Local Eco-Friendly Businesses' describes verified businesses that offer sustainable products and services, with a list of actions: Create a business profile, Upload sustainability proof for verification, and Offer promotions and rewards to local users.

Individuals / Eco-Conscious Users

Primary users who want to track their daily behaviour and lower their carbon footprint.

- Log daily sustainable actions.
- View personal carbon progress.
- Join events, challenges and earn rewards.

Local Eco-Friendly Businesses

Verified businesses that offer sustainable products and services.

- Create a business profile.
- Upload sustainability proof for verification.
- Offer promotions and rewards to local users.

© 2025 EcoConnect

User segment overview

Businesses interface

The screenshot shows the 'Businesses' section of the EcoConnect website. At the top, there is a navigation bar with links: Home, Features, Users, Demo, **Businesses**, Events, Contact, Log in, and Sign up. Below the navigation bar, the title 'Eco-friendly business directory' is displayed. A sample view of how users discover verified local eco-friendly businesses on the platform is shown. A table lists four businesses: Green Café (Café / Food, City Centre, Verified), EcoGrocer Local (Grocery, High Street, Verified), and RepairHub (Electronics Repair, West End, Pending verification).

Eco-friendly business directory

A sample view of how users discover verified local eco-friendly businesses on the platform.

Business name	Category	Location	Status
Green Café	Café / Food	City Centre	Verified
EcoGrocer Local	Grocery	High Street	Verified
RepairHub	Electronics Repair	West End	Pending verification

© 2025 EcoConnect

Mock business directory for coursework

Events

The screenshot shows the 'Events' section of the EcoConnect website. At the top, there's a navigation bar with links for Home, Features, Users, Demo, Businesses, Events, and Contact, along with Log in and Sign up buttons. Below the navigation, a heading reads 'Community events & sustainability challenges'. Two event cards are displayed:

- Park Clean-Up Day**
A community event focused on cleaning litter in the local park.
Date: 14 May · Time: 10:00-13:00
Reward: 50 pts
- Plastic-Free Week Challenge**
Users commit to avoiding single-use plastics for one week.
Duration: 7 days
Reward: 80 pts + badge

At the bottom left is the copyright notice © 2025 EcoConnect, and at the bottom right is a link to the 'Demo events page'.

Contact us

The screenshot shows the 'Contact & about this project' page. It includes a brief introduction stating it's a student coursework prototype created to demonstrate a sustainability platform using Agile practices.

About EcoConnect
EcoConnect is a conceptual platform that allows users to track their carbon footprint, support eco-friendly businesses and participate in community sustainability events.

The contact form consists of three fields: Name, Email, and Message, each with a corresponding input field. A large green button at the bottom is labeled 'Send (demo only)'.

At the bottom left is the copyright notice © 2025 EcoConnect, and at the bottom right is a note indicating 'Contact page - No real messages sent'.

Website QR



Meeting

Meeting 1 — Project Kickoff Meeting

Date: oct/21/2025

Mode: Online (In person)

Duration: 45 minutes

Attendees:

- Scrum Master
- Business Analyst
- Developer
- UI/UX Designer
- Database Specialist
- Network/Security Specialist
- Tester

Agenda:

- Introducing project members and assigning roles
- Overview of the Sustainability App Concept
- Identify main features
- Setup Trello board and GitHub repository

Discussion Points:

- Team agreed to focus on two main user segments: Individuals and Eco-Friendly Businesses.
- Three primary features were confirmed:
 1. Carbon Footprint Tracking

2. Eco-Business Directory
 3. Rewards & Community Engagement
- I decided to use Agile with Scrum, with weekly sprints.

Meeting 2 — User Story Refinement

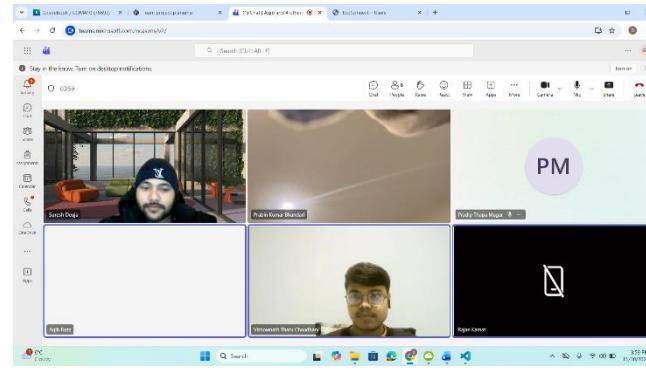
Date: oct/24/2025

Mode: Online (Team)

Duration: 1 hour

Agenda:

- Review and refine user stories
- Add acceptance criteria
- Clarify technical feasibility



Discussion Points:

- 12 user stories were reviewed, and rewritten following INVEST principles.
- Team added Given/When/Then acceptance criteria.
- Developer confirmed feasibility of carbon footprint calculations.
- Network Specialist confirmed Map API options.

Meeting 3 — Wireframe Review & Flow Diagram

Date: Nov /04/2025

Mode: In-person

Duration: 50 minutes

Agenda:

- Review wireframes for main screens
- Validate navigation flow

- Plan Sprint 1 development tasks

Discussion Points:

- Wireframes for login, dashboard, business listing, business profile, and admin panels were presented.
- Flow diagram created: Login → Dashboard → Features → Profile → Rewards.

Meeting 4 — Project Kickoff Meeting

Date: Nov / 20 / 2025

Mode: Online (Teams)

Duration: 25 minutes

Agenda:

- Finalize team roles
- Confirm responsibilities for each section
- Prepare “Members” page for coursework

Discussion Points:

- Team confirmed names, student IDs, and roles for Developer, BA, UI/UX, Tester, DevOps, DB Specialist, and Network Specialist.
- Agreed to include one line description of each role.
- BA will format the Members section according to assignment guidelines.

Decisions Made:

- Members table finalized.
- Each member’s responsibilities are documented clearly.

Meeting 5 — Overview Section Draft

Date: Nov / 22 / 2025

Mode: In-person

Duration: 40 minutes

Agenda:

- Create overview draft
- Agree on sustainability platform description
- Add in-text citations

Discussion Points:

- Discussed final version of the introduction to describe platform purpose: carbon tracking, eco-business directory, community challenges.
- BA added two post-2018 citations.
- Team reviewed tone and clarity.

Decisions Made:

- Overview approved.
- Citations confirmed according to Harvard style.

Meeting 6 — MVP (Minimum Viable Product)

Date: Nov / 25 / 2025

Mode: In person

Duration: 35 minutes

Agenda:

- Define MVP features
- Justify why those features qualify as MVP

Discussion Points:

- Agreed that MVP includes:
- Log Activities
- Automatic Carbon Calculation
- Eco-Business Directory (basic list)
- Discussed feasibility of implementing MVP within Sprint 1 timeframe.
- Developer explained technical limitations and why map view cannot be part of MVP.

Decisions Made:

- Three MVP features confirmed.
- MVP justification section drafted.

Meeting 7— Story Point Justification

Date: Nov / 27 / 2025

Mode: Microsoft(team)

Duration: 50 minutes

Agenda:

- Allocate story sizes (S/M/L)
- Justify story complexities

Discussion Points:

- Each user story reviewed individually.
- Developer and tester explained which stories require more time and testing.
- High-complexity stories (Map View, Business Verification) marked as L.
- Low complexity (Badges, Log Activity) marked as S.

Decisions Made:

- Story sizes finalized for all 12 user stories.

- BA will write justification paragraphs.