Sprint 1 Process & Reflection

We successfully implemented our minimum viable product (MVP) of Ecomon. Users can create accounts, via the template based front end. Once registered they can open packs, battle bins and use the home page to locate other gyms on a map. The battle page allows users to have an exciting battle against a simulated version of the current bin owner. The Profile page can be used to see the overview of all your cards along with your current selected deck. Users can choose to log out here.

Sprint One Challenges faced:
One of the biggest challenges faced by team Beep was organisation skills and meeting every day. Many members of the group faced busy schedules and arranging constant meetings for the sprint proved difficult. We currently planned when we could meet at the end of every group session and over messages in the week to ensure calendar changes were accounted for.

Another difficulty was the majority of the team using the Django framework for the first time, resulting in excessive time figuring out how to complete a task before being able to attempt the solutions. We combatted this by teaching each other what we had learned so each person wouldn't have to spend the time figuring out what was necessary each time. Additionally utilising the Django documentation and tutorials wherever possible.

Our final main difficulty was conflicts occuring during the merge processes throughout, this was due to members branches becoming too outdated in comparison to the main. Additionally some team members' commits contained too many new features, this occurred a couple of times which made it harder when merge conflicts occurred.

Sprint One: How the Team Approached the Project
On the day when the specification was released, the group met up to debrief the specification. We made sure to all read and review the specification in detail to make sure we all understood what was expected of us. After the specification was understood we used that first meeting to brainstorm ideas on how we can make a new inventive way to educate and promote sustainability goals while still having users enjoy the process (gamification of the application). After a core idea was cemented a requirement analysis was drawn up to decompose our idea into codeable sub sections. This was then broken down further onto our Kanban board where each task was color coded with priority and members could be assigned to certain tasks. Each section was then dealt out to members to start tackling and coding. This would then be reflected in our kanban board with "who's doing what". Upon each new meeting afterwards, we had consecutive stand up meetings to discuss what had been done by each member and any challenges faced in case a member needed some extra time or assistance with their part of the project. This was crucial as in case any member had struggles with a particular code section or understanding how things would work, it would not last long as we would have regular meetings (every 2 days) to break down what each person has done, what each person will do in the future

and any problems faced while coding.

Sprint One: Brief Reflection

What Went Well:
Overall, we worked very well as a team. With some members of the group more familiar with the Django framework than others, the initial design of the game also came with chances for members to take smaller tasks around Django and learn from the more experienced members of the group. Come later into Sprint One and looking forward into Sprint Two, group members felt much more confident taking a larger task and completing more complicated components.

Similarly, the communication of the group was impressive. With multiple communication methods including Whatsapp, Github and in-person meetings. The group was able to constantly stay updated with where others were at in the project. This allowed the project to flow smoothly with minimal complications.

Even Better If:
One way we plan to improve our organisation and team meetings is by creating a merged google calendar where we can all access and see the times we plan to meet. After a few weeks of working together, we have now learnt each other's schedules and know the key times each day we can all meet. Similarly, we plan to introduce virtual meetings in the evening where we all join on a Microsoft Teams call to recap the work we did that day.

In Sprint Two, we plan to give our internal features tighter deadlines in order to combat the merging issue. This will ensure group members constantly have the most up-to-date code so when it comes to merging into main, less conflicts arise leading to a smoother integration process all-together. Similarly, team members have learnt to commit more frequently to ensure code is not lost in merging. This also makes the ability to backtrack in case an error arises much simpler. Many code complications were fixed due to the communication with other team-members to help debug and easier backtracking will streamline this process.

Sprint 2 Process & Reflection

Sprint Two Overview:
In Sprint Two, we finished off the core features implemented in the first sprint, and added bonus sections to increase gamification and raise awareness on sustainability. By the end of Sprint One, users could create an account, open packs and battle at bins, access the home page featuring an interactable map and see their stats and cards in the profile page. By the end of Sprint Two, a full leaderboard section had been implemented, alongside an achievements system rewarding players in the long term. Each team gained bonus team benefits, gaining slight advantages in different areas, creating a more gamified experience. Cards degraded to raise awareness about decomposition and to increase the users long term experience in having to collect all cards. Finally, complete mobilisation and a design overhaul making Ecomon a more engaging and fun experience to play. Alongside all these changes for users playtime, lots of automated tests were added in the backend to ensure a robust and safe system.

Motivations and Innovations:
Whilst brainstorming our Project and what we wanted to achieve, the group started by reading the ‘University of Exeter’s Environment and Climate Emergency Policy Statement’ where each goal is separated into subtasks. We examined and detailed which goals we wanted to raise awareness on and settled on tackling goals 31-33 and goal 41 as we tackle the issue of plastic consumption campus.

Biodiversity	
41	Establish net positive plan for Woodland, Wetland and Campus wide biodiversity

Waste & Recycling	
31	95% reduction in single use plastic packaging
32	85% recycling or all waste
33	Campus wide waste recuse / recycling programme

‘University of Exeter’s Environment and Climate Emergency Policy Statement’ found at:
‘https://www.exeter.ac.uk/v8media/specificsites/sustainability/docs/Environment_and_Climate_Emergency_Policy_Statement.pdf’

After finding our goals and motivations on the project, we then brainstormed how we could gamify the project. Our solution was to create a battle card game where players would scan in at different QR codes around campus to battle different items of plastic, recycle and plants to earn rewards for each team.

The project raises awareness about our goals in many innovative ways. Firstly, the core feature of the game creates the opportunity for players to visit real recycling bins around campus and battle personally made Ecomon cards that raise awareness about different plastic and

recyclable trash items. Similarly, the strongest Plant cards include common trees around Exeter and the UK promoting the power of a green environment. Deeper than the surface level of our game, we also came up with many embedded features to root sustainability into the core of our project. Players battle for teams ‘Reduce, Reuse or Recycle’ where each team has a bonus team benefit promoting the ‘Three R’s’ in their battle against our evil ‘Team Fossil Fuels’. Cards are unlocked through a pack feature where once a player opens a pack, their wrapper count increases filling up their bin. To empty the bin, the player must win a battle at a recycling bin, promoting recycling and waste consciousness in real life. Similarly, all our Ecomon cards have a use count, recreating a virtual depiction of decomposing and trash landfill, the weakest cards, plastic cards have a much higher use count than recycle or plant simulating how they take much longer to break down than the more environmentally friendly counterparts. This also increases gamification as it causes players to need to keep playing to keep and unlock all the cards.

Overall, our game has many features constantly promoting and raising awareness about plastic consumption and bin usage on campus. As the game revolves around recycling bins and an interactable map, it is expandable outside the University of Exeter where Staff at other campuses could set up Recycling Bins at their campus to promote environmental awareness to students. This meant Ecomon achieved all our motivations of creating a game raising awareness about plastic and bins, but keeping a fun and positive game approach keeping students engaged.

Sprint Two Milestones and Achievements:

After achieving the core functionality of the Ecomon game in Sprint One, Sprint Two was about increasing long term gamification, and polishing off a final product. At first the game was simple, collect cards and battle them at gyms to earn more packs and thus more cards. So in Sprint Two we implemented a full leaderboard system and an achievements section.

The leaderboard page is accessible through the home page and allows players to compare their team stats with other teams and see which team is performing the best. Similarly it also allows players to see individual personal stats, so they can compare themselves with other players on their card collections and how many battles they have won. This feature increased gamification and keeps players on the Ecomon game as they battle to top the leaderboards. Similarly, the achievements feature added long term goals to players of the Ecomon game. Rewarding players for milestones of winning battles, emptying their wrappers at bins and opening packs. The achievements model would keep players engaged in the game for a longer term to earn packs and rewards.

Another feature completed in Sprint Two was introducing degrading cards. To raise awareness about decomposing and plastic landfill, cards would have a use count on how many times they could fight in battle before they degraded. This meant plant cards would degrade the quickest, then recycle, and then plastic. Not only did this feature embed sustainability by tackling landfill, it also increased gamification. As plant cards are stronger and do more damage in battle, by

introducing a factor that limits their use, players are forced to tactically choose when to fight and play their stronger cards.

Following from this, a large goal the team achieved in Sprint Two was introducing the functionality of team benefits. Before the teams (reduce, reuse and recycle) battled for recycling bins against ‘Team Fossil Fuels’ but there was no reward or benefit for each team. So after brainstorming, unique team powers were created that offer a tactical advantage for each team. Team Reduce takes less damage in battle, creating a stronger, more defensive approach. Team Recycle have boosted attacks with Recycle cards creating a unique way they may choose their deck and Team Reuse have a higher use count on cards so they can use them more often in battle. This feature also embedded the core ideas of sustainability into our project. Instead of just saying the ‘Three R’s’ we actively promote their values by changing the way the game plays with each team.

The next big milestone of the project was polishing design features and increasing the game content to add game functionality. The game revolves around battling Ecomon cards at recycling bins around campus. So to further improve the game, double the Ecomon cards were added alongside a whole new set of bin locations representative of where real life bins were around the campus.

Then each member of the group took time to polish their section and add designs to further increase gamification. The profile page implemented achievements and created a card flipping animation on obtained cards to create a more engaging page. The battles underwent a complete revamp to create a more appealing and capturing game, and simple changes like the pinpoints of recycling bins on the campus becoming the team icon of whichever team owned the bin made the game more captivating.

Outside of front-end improvement. A crucial milestone in Sprint Two was our testing of the system. Automatic tests were written for every python function, checking the authentication and sign in whilst also checking each function worked how it was supposed to like degrading cards and removing elements from the database. On top of this, we also made sure to constantly trial and play the Ecomon game, testing each other's sections and offering feedback for improvements to design and functionality that would create a more engaging service easier for new users.

Finally, mobilisation was a large process each member of the team wanted to achieve. As the game revolved around scanning QR codes at different bins across campus. We all agreed at the end of Sprint One, that creating a mobile optimisation for the game was crucial for it to be fun and accessible around University campuses. So each team member altered a page or a section to create an Ecomon game that worked on phones and tablets. After this was complete, the Ecomon game was ready to deploy at www.ecomon.org.uk

Sprint Two Challenges faced:

An issue we faced in Sprint Two was database merges. When branches were merged, despite the code being up to date due to the tighter deadlines. As much of the database was bulked out and added too, such as new cards and gym locations, sometimes databases would be written over and lose important information in the merging process.

Another issue faced was a difficult testing process to catch bugs and errors. All Python and backend features were tested with automatic testing however frontend bugs and design issues were hard to catch. We constantly had members of the group playing and trialing the game to catch any errors that needed fixing, but it was a challenge to find some bugs.

Finally workload was an issue the team faced. As all members had other coursework deadlines and commitments outside of University. We sometimes faced challenges in taking on a workload and spreading the work out evenly.

Sprint Two: How the Team Approached the Project

At the end of Sprint One, the group instantly met up to debrief the plan for Sprint Two. We started by brainstorming all features we wanted to implement in Sprint Two, bulking out the backend with task descriptions and adding bonus features we came up with. We also agreed to improve our coding quality and style from Sprint One, promising to commit more often and meet tighter internal deadlines to keep the code up to date with main. After all features for Sprint Two were theorised, further discussions came with how to embed sustainability and increase gamification through the features. Then with all ideas fleshed out they were split into achievable subtasks in the Kanban board. Each task was then colour coded with priority levels, where higher priority tasks improved core functionality of the game and lower priority tasks were design and style changes to make at the end of the process. Each task was then taken by members of the group and assigned to them through the members section on the Trello card on the Kanban board to allow Independent work to start. From these initial meetings, we then had meetings every couple days to debrief the project and the steps moving forward. Other than these important in-person meetings, we also made sure to call on Microsoft Teams or Whatsapp most evenings to debrief the work we accomplished that day. As members felt much more confident with the Django Framework by Sprint Two, coding work flowed much quicker and more effectively. This also ensured the in-person meetings were a celebration of the work done and establishing what tasks people will complete next, meaning the code was completed in excellent time to then test and refine all features.

Sprint 2: Building on the Challenges of Sprint One

As outlined in the Sprint One reflection document, the main challenges we faced were organisation issues, the Django framework and merging conflicts.

To improve on the challenge of organisation. The group made sure to use a shared calendar where we could submit what times we could meet and when we were busy, this allowed us to

organise meeting times much simpler and further in advance to avoid complications. Similarly, we had Microsoft Teams and WhatsApp group video calls in evenings to concur on what work was achieved in the day, and what the plans for work were tomorrow.

The other issues we struggled with were the Django Framework and Merging Conflicts. In Sprint Two, after working on the Django Framework all of Sprint One, the team felt much more confident in how to handle Django and the project moved much quicker. Similarly, to handle the merging conflicts, commits were made much more frequently to back up code and tighter internal deadlines were created so the code never strayed too far from the main source code. This streamlined the whole coding process in Sprint Two, as we were able to code much more confidently at a quicker pace with an improved organisation.

Sprint Two: Brief Reflection

What Went Well:
In Sprint Two, the team still worked very well together. During Sprint One, some members of the group were far more familiar with the Django framework and helped teach members how it worked. For Sprint Two, as members were more familiar with Django, it allowed for people to take on larger tasks independently and not rely on more experienced members. This still increased teamwork as the group felt more confident allowing others to work and checking in to help when necessary. Similarly in Sprint Two, as some major changes included mobilisation and design choices using JavaScript and CSS, more experienced members who had done Web Development before, were able to help members learn to style and design a website.

Also, the communication of the group was impressive. As outlined above, the group were constantly meeting in person to discuss the project whilst also meeting virtually through Microsoft Teams and Whatsapp to recap the work of the day. As members took on larger tasks, the work was able to be done smoothly and independently and group meetings allowed people to look forward with the project, and identify the next steps rather than having to help previous work that needed improving.

Even Better If:
One struggle during Sprint Two was the scale of the project and database merge issues. Despite making tighter deadlines to ensure code was constantly up to date in main, the database would still conflict when copying over from different branches. As in Sprint Two much more was implemented, including adding new gyms, allowing new users to test and doubling the amount of unique Ecomon cards. The database would often have a merge conflict that would cause some data to be lost. We eventually learnt to resolve this issue by creating local backup databases that we could pass through to main if we lost the important data in the merge. Alongside this, our meetings and virtual recaps allowed us to state important database changes we were going to make and made sure everyone knew what was to be implemented to the database if they wanted to alter their branch for the up to date backend.

Another issue we faced during Sprint Two was work overload and people being busy. With all of us having multiple other courseworks to do and commitments outside of University, sometimes taking on a large project between our meetings could prove a difficult task for certain members. The solution came from our excellent teamwork and how cohesively we worked. Members were willing to take on an extra workload for the group if certain members were busy or couldn't take on a task at the time. This meant the project stayed up to date however if in the real world, we would try and remove other commitments to focus on the whole project. Another solution that helped this was the Kanban priority board, where each task was colour coded for how important it was to development, as each team member wanted to contribute to the project at every meeting, members who were busy could take a smaller task and still feel like they contributed to the final Ecomon project.