# Chapter 2 Literature Review

The purpose of this literature review is to explore existing research and real-world platforms that inform the development of the Personal Accounting Climate Economics (P.A.C.E) website. The objective is to establish a foundation for building a user-focused platform that encourages sustainability habits and the active participation of individuals in achieving all the sustainable development goals [1].

## 2.1 User Experience Design Process and Best Practices

User Experience (UX) design process is critical when developing digital platforms, particularly those that would further sustainability. The process helps in ensuring that the product is finished is user centred, intuitive and working across all platforms. A normal UX design cycle includes usability testing, wireframing, task prioritisation and user research.

User Research and Requirements Gathering is the initial step in the process, during which designers attempt to learn about what its users need and anticipate of the platform. It could include online surveys, personal interviews or discussion in focus groups with individuals having different backgrounds. The aim is to extract general user requirements and areas of pain, which will serve to inform the subsequent design choices.

The second phase is UX Strategy and Task Prioritization and the most essential features or user journeys are scheduled. An example is the platforms that concentrate on enhancing navigation ease, lightening the cognitive load with neutral coloring, and focusing on such features as AI-generated suggestions that enable users to promptly make high-impact actions without being confused by many options.

After the development of the strategy, designers transition to Wireframing and Prototyping. Wireframes are simple visual maps that map the layout of a site and then are developed into a real site. Low-fidelity wireframes are simple sketched diagrams that may be tested by hand to explore initial layout hypotheses, whereas high-fidelity prototypes, typically made with tools such as Figma, are more realistically detailed and interactive, and they can be used to explore user paths more deeply.

Lastly, Usability Testing is done in order to provide validation to these designs. At this phase, the prototype will be presented to people that have been part of the previous research groups to be compared to their needs and expectations. Feedback is also obtained regarding the ability of users to achieve critical tasks without having to struggle (so-called red routes) and changes are being done to clarify things, minimize friction and enhance accessibility.

This is an iterative process of UX that is becoming a standard in modern web design and is especially helpful in platforms whose design is intended to encourage ongoing user interaction and streamline decision-making. Within the framework of sustainability-oriented uses, this methodology is used to create transparent, easy to access, and simple interfaces that reduce entry barriers. Following these principles of design will help platforms direct users to actions that are meaningful, make them inclusive of people with different backgrounds, and keep them interested with the platforms because of their ease of use and the ability to see their progress.

## 2.2 The SCRUM Process for software Development

The SCRUM is a popular approach to the contemporary software development. It pays special attention to iterative development, joint planning and constant improvement. This methodology is especially useful in dealing with complicated projects in which requirements could change over time.

SCRUM has three prominent roles:

* The Product Owner states the product vision and identifies the features which add the most value.
* The Scrum Master makes sure that the development process works well and eliminates all barriers and leads the team towards Scrum principles.
* The Development Team will work on developing the product in a series of small steps, with their main emphasise being on small deliverables in every cycle.

The methodology contains also a number of artifacts:

* Product Backlog, which includes all tasks, features and fixes that are prioritized according to the importance and urgency.
* Sprint Backlog A Sprint Backlog, a subset of the product backlog the team hopes to accomplish within a single sprint.
* A product or feature that is produced at the end of a sprint cycle and which is the working product or feature.

Key events in the SCRUM process include:

* Sprint Planning, at which the work of the next sprint is chosen and determined.
* Short check-ins ( Daily Scrum ( Stand-Up) meetings ) to look over progress and spot blockers.

A Sprint Review, in which the work done is presented and feedback is received.

* A Sprint Retrospective, during which a reflection on the sprint is made to find out the areas of improvement and the achievements.

The approach can be particularly effective in both individual and team-based developmental settings. As an illustration, academic projects tend to separate tasks into specific modules such as user-facing parts and organizational dashboards and then subdivide them into smaller deliverables, such as the ability to log in, track donations, or analytics pages. Scheduling weekly review meetings with academic supervisors can be used in the same way sprint reviews, keeping the development process in-track and maintaining feedback. Here, the adherence to the SCRUM process gave the developer the ability to plan and deliver the features in an incremental manner, keep the momentum of the project going and modify the workflow with the changing requirements as the project progresses.

## 2.3 Current Best Practices in Sustainability Web Applications

The two components of Web applications are the frontend and the backend which are developed with the objective of creating an application. The front (or the client-side) is the visual component of the site that the user interacts with, i.e. buttons, menus, and pages they view in their browser. The backend (or server-side) refers to the back-room system, which manages data, user accounts, processing requests and data base interactions.

In the frontend, the modern web development frequently employs a set of tools (HTML, CSS, and JavaScript frameworks such as React, Angular, or Vue.js). React is one of them and is commonly known to be strong in terms of performance and adaptability to develop speedy and reactive user interfaces [2]. It has a Virtual DOM (Document Object Model) which is a browser-friendly object that reacts only to elements in the webpage that require modification, which can be considered to be its major strength compared to what happens with the full webpage [3]. React is also structured in terms of components, i.e. groups of reusable code which enable the reduction of repetition and enhances maintainability [4].

The other aspect that is significant in the modern frontend development is the styling technique. CSS (Cascading Style sheets) is the standard practice of giving a complete customization to the appearance of a web page. Certain frameworks such as Tailwind CSS provide pre-built styles, although plain CSS is frequently favored by developers who want more control and a lower visual hierarchy, particularly in sustainability-conscious designs where minimalism is a design best practice to conserve energy [5]. On the back end, the developers need a system that will handle data storage, processing and the movement between the front end and the database. Firebase, MongoDB, MySQL and Supabase are some of the common technologies used as backends database. Firebase is also characterized by real-time functionality and is a proprietary platform, which does not allow much customization unless one buys a plan. MongoDB is a NoSQL database which is handy in unstructured data but not in complex data relationships.

Conversely, Supabase is developed on the basis of PostgreSQL, which is a relational database, that enables the organisation of data (which can be helpful when dealing with user profiles, donations, and records of volunteers). Supabase can also be customized completely and is open-source, and has self-hosting and real-time data sync features. It also has inbuilt APIs (Application Programming Interfaces) -that are considered as messengers between the backend and front end-whereby it is easy to transmit and receive information between the database and the user interface [6].

The tools and practices are highly used in platforms that pursue sustainable and inclusive design. An example is that sustainability-oriented websites tend to use fewer heavy animations, flashy design and avoidable code to conserve energy and make content more accessible, particularly when using mobile devices or on low-bandwidth networks [5].

## 2.4 Case Designs for Sustainability Web Applications

Sustainable web application design choices tend to focus on promoting user interaction and energy-efficient and simple designs. The analysis of existing platforms assists in determining the trends in the behavior of people, the flow, and motivation strategies.

Among the popular options is a crowdfunding web site, GoFundMe, which enables people and groups to crowd source their personal or social money [16]. The design of the platform is on a streamlined layout that requires few steps to donate. The interface is not overloaded with visual clutters and users can therefore focus more on the important actions. Such simplicity promotes increased participation of users in the use as confusion is minimized, and accessibility is enhanced.

One more platform implemented sustainability-oriented approach is Ecosia a web search engine generating its advertising income to plant trees [17]. Ecosia gives the user live counters and impact visualizations indicating how many trees have been planted depending on user action. Such real-time feedback can allow users to interpret the immediate impact of their interaction, potentially encouraging users to engage in the process again and be more conscious of the environment.

The design features these platforms have witnessed, are the best practice on web development that is sustainability-oriented:

* Minimalist interfaces cut on distractions and energy usage.
* Real-time impact displays and progress bars make one feel that they contribute and are responsible.
* Easy to navigate flows allow users to make actions fast, particularly with donation-based or purpose-driven websites.

These characteristics can be canvassed as a broadly recommended practice in user experience (UX) and sustainability literature as tactics to create meaningful, and accessible digital environments [5].