Hand Me Down Clothing Documentation

1 Informative Part

1.1 Team

The team is organized into key functional areas with dedicated leads overseeing documentation and requirement completion, authentication, listings, and search and map integration, under the guidance of three project managers.

Managers

- Anthony Martinez
- Alma Piñeiro
- Jahsyel Rojas

Team 1 - Documentation & Requirements

- Joshua Dávila (Lead)
- Ojani Figueroa
- Giovanny García
- Juan Iranzo

Team 2 - Authentication & User Accounts

- Lorenzo Pérez (Lead)
- Jessy Andújar
- Gabriel Marrero
- Luis Marrero
- Ángel Villegas

Team 3 - Listings

- Kevin Gómez (Lead)
- Leanelys González
- Karina López
- Nicolás Rivera
- Jachikasielu Uwakweh

Team 4 - Search & Map Integration

- Jorge De León (Lead)
- Devlin Hahn
- Alejandro Marrero
- Kian Ramos
- Januel Torres

Team 5 - UI/UX & Branding

- Fabiola Torres (Lead)
- Yamilette Alemañy
- Daniella Melero
- Andrea Segarra
- Kenneth Sepúlveda

1.2.1 Current Situation

Landfills and textile waste in Puerto Rico

- High waste volume: Approximately 250 million pounds of clothing and textiles are sent to Puerto Rico's landfills annually.
- High landfill rate: Similar to the global and U.S. trends, a very high percentage of discarded textiles, around 85%, end up in landfills, despite being largely recyclable.
- Low recycling rates: Puerto Rico's overall recycling rate is notably low, with some reports estimating it to be less than 10%. This is significantly lower than the U.S. national average.
- Overwhelmed landfills: Puerto Rico's landfills are facing a serious crisis, with many already at or over capacity. The high volume of textile waste contributes to this problem.

Sources:

- investpr.org
- theenvironmentalblog.org

Poverty

- Overall Poverty: The poverty rate in Puerto Rico is alarmingly high, at around 41.7% as of 2022. This is over three times the U.S. national average.
- Child Poverty: A staggering 54.3% to 57.6% of children under 18 in Puerto Rico live in poverty. This is more than any U.S. state and indicates that a vast number of families cannot afford to consistently provide their children with properly fitting, weather-appropriate clothing and shoes.
- Persistent Poverty: All 78 municipalities in Puerto Rico are classified as "persistent poverty

counties," meaning they have maintained a poverty rate of 20% or more for at least 30 years.

Sources:

- centropr.hunter.cuny.edu
- geopoliticaleconomy.com

Homelessness:

- Homeless Population: Recent counts show the homeless population in Puerto Rico to be around 2,096 individuals. For these individuals, clothing is a constant and critical need.

Sources:

- periodismoinvestigativo.com

1.2.2 Need

The purpose of this section is to establish the fundamental needs that motivate the Hand Me Down project, expressed independently of any system-to-be. These needs are grounded in the resale domain and must reflect the concerns of students and families who participate in secondhand exchanges. The articulation of these needs will guide the subsequent development of domain descriptions, requirements, software architecture, and testing activities.

Stakeholders in this domain shall be understood as students and families seeking opportunities for affordable, accessible, and trustworthy secondhand exchanges. Their needs are not for a platform itself, but for solutions to the problems they encounter when attempting to exchange goods in local communities.

The following distinct needs are identified:

- Students and families must have affordable access to secondhand goods that support daily life, education, and well-being.
- Stakeholders must be able to rely on transparent information about the condition and history of pre-owned items.
- Exchanges shall be conducted in a manner that establishes trust, fairness, and safety between participants.
- Opportunities for accessibility and inclusivity must be available so that all families and students, regardless of economic background, will participate in the resale domain without barriers.
- Developers shall have clear requirements, descriptions, and architecture to build upon, since no structured system currently exists to organize this resale context.

These needs form the foundation for further project work. They are deliberately expressed at the domain level, independently of any particular solution, to ensure that subsequent design and implementation activities will remain aligned with the stakeholders underlying motivations.

1.3.1 Scope & Span

Scope

The Hand Me Down project will operate in the broad domain of online resale marketplaces. It will address the general problem of enabling individuals and communities to exchange secondhand goods in a structured, reliable, and sustainable manner. The scope will cover activities in domain engineering, requirements engineering, and software architecture to ensure a well-founded solution.

The project will emphasize the following areas:

- Domain:: Resale of pre-owned items across categories such as clothing and accesories.
- Requirements:: Identifying user needs related to affordability, sustainability, accessibility, and usability.
- Architecture:: Defining a framework that supports secure and scalable interactions between sellers and buyers.
- Project Activities:: Documentation, validation, and design processes that must accompany implementation.

Span

The span narrows the focus of the Hand Me Down project to **specific concerns and audiences** within the general resale domain. The platform must primarily serve individuals and families who wish to exchange items affordably, students and young adults seeking budget-friendly goods, and community members interested in sustainable consumption.

The span includes the following project-specific aspects:

- User Interaction:: Individuals must be able to list, browse, and search for secondhand items.
- Categorization:: Items will be organized into categories that facilitate discovery.
- Transaction Support:: The system must provide structured means for negotiation, offers.
- Trust and Transparency:: Item conditions and relevant metadata must be clearly described to support informed decisions.

1.3.2 Synopsis

This Synopsis provides overview of the Hand Me Down project from the perspective of students and families engaged in secondhand exchanges. It articulates the domain, affordability, accessibility, trust, safety and states that stakeholders must be able to discover, evaluate, and exchange pre-owned goods with transparent information about item condition and history. The project shall be conducted through structured domain acquisition to produce a domain description, a requirements prescription that specifies goals, constraints, and quality attributes with traceability to stakeholder needs and a software architecture that evaluates alternatives and justifies decisions, prototyping where necessary to mitigate risk. Component design and iterative implementation will realize prioritized capabilities while preserving traceability. Verification and validation shall

include a test plan that covers functional fitness, usability, and trust/safety concerns, supported by versioned documentation, change control, risk tracking, and metrics.

1.4 Other Activities than Just Developing Source Code

This project will not be limited to writing source code. To satisfy the needs identified for affordability, accessibility, trust/safety, and transparency in the Mayagüez/UPRM context, the team shall execute the following activities in addition to implementation. Each activity is mandatory, tied to a stakeholder need and justified by the current situation.

Domain engineering

The team shall elicit and model the domain of donation and resale of clothing and accessories for students and families (actors, workflows, vocabulary, constraints).

- **Need satisfied:** developers must share a precise vocabulary and mental model to preserve accessibility, affordability, and transparency.
- **Current situation:** rough sketches are based on team self-observation; no external interviews conducted yet; stakeholder roles are not enumerated; internal terminology seems consistent but remains unvalidated in the field.
- **Contributions to date:** condition labels and verification practices were researched; the **Sell** vs **Donate** category structure was standardized; initial personas were drafted to ground concepts.
- **Planned outcomes:** domain glossary, context diagram, concrete exchange workflows, and domain verification norms (tag photo, full-item photos, defect call-outs).

Requirements engineering

The team shall prescribe goals, user-level functional requirements (listing, browse/search, donation/resale flows, offer/negotiation) and quality attributes (trust/safety, transparency, usability, accessibility) with explicit traceability to needs and acceptance criteria.

- **Need satisfied:** developers must clearly understand system functionality and nonfunctional expectations that build trust and reduce effort.
- **Current situation:** no consolidated requirements baseline or acceptance criteria exist.
- **Contributions to date:** epics were linked to user stories (buyer/seller perspectives) against stakeholder needs; interface requirements at the system boundary were authored; measurable machine requirements (response time, uptime, user capacity) were drafted.
- **Planned outcomes:** requirements set with SHALL statements and acceptance criteria; traceability matrix (Need → Requirement → Test); nonfunctional thresholds made testable.

Software architecture

The team shall select and justify an architecture addressing security, privacy, modifiability, and campus-scale usage; architectural views and decision records will be maintained.

- **Need satisfied:** stakeholders must receive a reliable, maintainable basis for transparent, safe exchanges.
- **Current situation:** direction is leaning toward Supabase for authentication (Google sign-in

compatibility) with a full custom backend; no UPRM hosting/privacy constraints identified; ADRs and C4 views are not yet written.

- **Contributions to date:** search and map integration approaches were evaluated and geolocation/privacy considerations documented; authentication backends (Firebase vs. Supabase) and session-management implications were analyzed; page-level layouts were produced to inform view composition and navigation flows.
- **Planned outcomes:** C4 views (context/container), Architectural Decision Records (auth, data, map/search), quality-attribute scenarios, and targeted risk spikes where uncertainty is high.

Component design

The team shall define modules, interfaces, and data contracts to preserve testability and changeability (catalog/search, profiles/auth, exchange/offer, reporting/moderation, “items circulated” metrics).

- **Need satisfied:** maintainable, verifiable components are required to deliver transparency (clear item/condition data) and accessibility (predictable flows).
- **Current situation:** boundaries and interfaces are only partially documented.
- **Contributions to date:** the user/auth schema (roles, profile fields, donation/sell history) was initiated and APIs for login/registration/logout were defined; search behavior and map-related data interactions were documented; wireframes and page designs (Homepage, About, Clothes Listing, Individual Item, Favorites, Checkout, Log In/Sign Up, Profile) clarify interface responsibilities and data needs.
- **Planned outcomes:** module responsibilities, interface specs (inputs/outputs/preconditions/postconditions), initial schemas with migration notes, and example queries.

Implementation planning

The team will establish a delivery roadmap, Definition of Done, contribution standards, and a branching/CI strategy suitable for a student-run service.

- **Need satisfied:** predictable, reviewable progress must be ensured to realize stakeholder value without regressions.
- **Current situation:** a branch is created per team with controlled pull requests and merges to main when working; no CI pipeline is in place; review checklist/PR template usage is minimal.
- **Contributions to date:** the AsciiDoc documentation structure and conventions were established; documentation issues with acceptance criteria were created; a step-by-step Node.js/npm installation and verification guide was produced to bootstrap the development environment.
- **Planned outcomes:** roadmap with dates/owners, Definition of Done, CONTRIBUTING guidelines, PR template, and CI workflow for lint/tests on pull requests.

Testing and validation

The team shall produce a test plan spanning unit, integration, end-to-end, and usability/acceptance with students and families; trust/safety validations shall be included (e.g., prohibited items policy, condition/fit etiquette).

- **Need satisfied:** stakeholders must have confidence that behavior and quality attributes match the prescription.
- **Current situation:** no automated tests exist and the test plan is not started; usability/acceptance testing is deferred to later milestones; recruitment will be informal ("ask around UPRM"); top priority requirements for acceptance scenarios are not selected yet.
- **Contributions to date:** machine requirements were expressed in measurable terms (e.g., support ~100 simultaneous users) to anchor performance testing; trust-building practices (verification methods, condition labels) were documented to translate into validation checks.
- **Planned outcomes:** test plan, seeded test suites, acceptance scenarios (Given–When–Then) mapped to requirements, trust/safety validations, and a defect taxonomy with triage protocol.

Deployment considerations

The team will define dev/staging environments, configuration, seed/reset data, rollback procedures, and a minimal operations runbook for a student-operated service.

- **Need satisfied:** availability and safe adoption are necessary for accessibility and affordability benefits to materialize.
- **Current situation:** no documented path to deploy, recover, or roll back; backend selection work is informing environment and secrets management but is not yet consolidated in docs.
- **Contributions to date:** Docker usage was explored to standardize developer environments and setup was documented; backend evaluations (Supabase/Firebase) inform environment and secret management decisions.
- **Planned outcomes:** environment definitions, secrets/config guidance, release/rollback steps, seed scripts, and a basic ops runbook.

Stakeholder liaison and feedback (cross-cutting)

The team shall schedule and document periodic touchpoints with students and families in Mayagüez to validate assumptions early (quotes/anecdotes shall be recorded in §2.1.1).

- **Need satisfied:** continuous alignment is required to keep requirements correct and trust high.
- **Current situation:** no formal liaison cadence is defined; external interviews are not planned at this time; consent/ethics approach is undefined.
- **Planned outcomes:** contact cadence, feedback and decision logs, and lightweight consent notes for any future interactions.

Documentation & governance (cross-cutting)

The team shall maintain versioned documentation, change control, risk tracking, and metrics to ensure durable traceability across activities.

- **Need satisfied:** traceability is required to justify decisions and onboard contributors without rework.
- **Current situation:** a docs index/navigation page is considered established (initial draft); changelog and risk register are not started; project metrics beyond "items circulated" are not

yet defined.

- **Contributions to date:** the docs/ layout and AsciiDoc style were standardized and most documentation issues were created; branding (logo, color palette, typography) was established to keep artifacts consistent and legible.
- **Planned outcomes:** docs index and navigation (maintained), changelog, risk register (e.g., technology choice risk, schedule slip, data/privacy misconfiguration), and basic metrics (e.g., items circulated as a primary signal).

1.5 Derived Goals

In addition to the primary goals (needs, scope, and core functionality), the project shall pursue secondary outcomes that respond to the realities of Mayagüez and the UPRM community. These outcomes are substantially different from core system behavior and emphasize long-term social, educational, and community benefits for students and families.

- Promote sustainability literacy and circular practices in Mayagüez:: The project shall normalize reuse, repair, and responsible disposal behaviors among students and families through donation and resale norms. **Broader impact:** item lifecycles will be extended and textile waste pressure will be reduced without prescribing any specific technical solution.
- Strengthen community engagement and mutual aid through UPRM-led outreach:: The project will cultivate equitable sharing practices (donation, fair resale) centered on UPRM as the primary touchpoint. **Broader impact:** social capital will increase and households will respond more effectively to clothing and accessory needs across semesters and seasons.
- Raise awareness of affordability and access constraints faced by local households:: The project shall make visible how structured sharing reduces acquisition cost and effort for students and families. **Broader impact:** schools and neighborhood groups will make more informed choices about drives, sizing priorities, and targeted outreach.

These derived goals will guide outreach, education, and validation activities alongside the primary objectives, and shall not be construed as mandates for any specific platform or implementation approach.

2 Descriptive Part

2.1 Domain Description

The domain of **hand-me-down clothing exchange** in Puerto Rico is shaped by social, environmental, and economic realities. It exists independently of any digital platform or technical system and can be understood through the people, practices, artifacts, and norms that sustain the circulation of clothing and accessories among students, families, and local communities.

At its core, the domain revolves around two primary actors:

- **Donators**: Individuals or households who release garments they no longer need.
- **Collectors**: Individuals who claim garments for reuse, whether through purchase or donation.

The central entity in this domain is the **Piece**, any individual article of clothing or accessory that circulates between actors. Each Piece carries attributes such as:

- **Type**: The category of clothing.
- **Condition Rating**: A measure of quality or usability.

Pieces move between states through events:

- **Donation Event**: Occurs when a Donator makes a garment available.
- **Collection Event**: Occurs when a Collector takes possession of a garment.
- **Discard Event**: Occurs when a Piece leaves circulation, feeding into the wider **Textile Waste Stream**.

The domain is sustained by informal practices and behaviors:

- **Exchange Flows**: The recurring sequence in which garments are identified, negotiated, and handed over in person.
- **Condition Disclosure Norms**: The expectation that Donators will show tag photos, highlight defects, and represent garments honestly.
- **Student Resale Price Bands**: Informal valuation brackets (typically USD $8–$15), distinguishing resale from donation or commercial sale.
- **Dormant Stock**: Clothing stored in homes awaiting redistribution, donation, or disposal.
- **Meetup Spots**: Semi-public locations (e.g., campus benches, apartment lobbies) chosen for exchanges.
- **Ad-hoc Channels**: Informal digital venues (e.g., Facebook Marketplace, WhatsApp groups, Instagram stories).
- **Trust Cues**: Bilingual communication, recognisable names, or clear photos that influence whether an exchange proceeds.
- **Seasonal Demand Pulses**: Cyclical increases in demand, such as back-to-school or weather-driven surges for uniforms or outerwear.

These elements form an interconnected web of events, actions, and behaviors. Donators and Collectors rely on ad-hoc digital channels for discovery, agree on terms through negotiation, and meet in semi-public spaces to transfer items. Exchanges are underpinned by implicit rules of trust and fairness, while also constrained by larger social and environmental forces such as poverty rates, limited recycling infrastructure, and overflowing landfills.

From a functional perspective, the domain can be represented through abstract operations:

- `donate(Piece, Donator, Locale) → DonationEvent`
- `collect(Piece, Collector) → CollectionEvent`
- `rate(Piece, ConditionRating) → ConditionRating`
- `review(Collection, Review) → Review`
- `categorize(Piece, Type) → Piece`

- `discard(Piece) → Void`

Each function captures an action that transforms the state of a **Piece** within the domain, producing observable changes such as entering circulation, changing ownership, or leaving circulation.

In sum, the domain of secondhand clothing exchange in Puerto Rico is defined by the **circulation of Pieces**, the **actors who exchange them**, the **events that mark transitions**, and the **behaviors and norms** that make these exchanges trustworthy, affordable, and sustainable. This description provides a foundation for later requirements and design work, while remaining independent of any specific system or implementation.

2.1.1 Domain Rough Sketches

This section captures domain facts, phrases, anecdotes, and observations. It SHALL NOT mention features or designs of any future system. Interviews with external stakeholders are pending.

Stakeholder & Settings

- Team self-observation (students), Mayagüez/UPRM: identified a recurring need for affordable access to clothing/accessories among students and families.
- **No interviews conducted yet.** Contacts to schedule: students, families, school/university staff, local resale participants.

Observed Practices

- Discovery: Facebook Marketplace; Facebook groups; WhatsApp groups; Instagram stories.
- Handoff: in-person meetups at UPRM (on/near campus) or at apartment complexes.
- Typical flow (as reported by students): look up item → contact seller → agree on specifics (price, size, time/place) → pick up item.

Artifacts, Condition Language, and Pricing

- Item types seen/expected: any clothing and accessories (no narrow category observed yet).
- Condition/fit phrasing used: “lightly used,” “like new,” **specific sizes** (size called out explicitly).
- Typical price bracket mentioned for clothing items: USD $8–$15 (symbolic/low-cost resale).

Trust, Safety, and Informal Norms

- Common concerns: item hygiene; no-shows; scams; unsafe meetups.
- Informal norms reported: include a photo of the size **tag**; include full-item photos (front/back/defects).
- Moderation: none observed in ad-hoc chats; Facebook groups **may** have basic moderation/house rules (unverified; needs follow-up).

Language & Access

- Languages used: Spanish + English (bilingual exchanges common).
- Access barriers reported so far: none explicitly identified by team; requires external confirmation.

Existing Channels (local)

- Facebook Marketplace (general Mayagüez and student-adjacent listings).
- Facebook groups (names to be captured during interviews).
- WhatsApp groups/lists (parent/student circles).
- Instagram stories (peer-to-peer sharing).
- Moderation/ownership of channels: unknown (except Facebook-controlled groups); to verify.

Micro-notes / Anecdotal Fragments

- Price sensitivity appears high; low-cost clothing listings ($8–$15) are common reference points among students.
- Meetups tend to prefer familiar, semi-public locations (campus spots, apartment lobbies).
- Sellers are expected to show a **tag photo** and **full product photos**; size clarity is a frequent pain point.

Open Questions (for later concept analysis)

- Which specific groups/chats drive most exchanges in Mayagüez/UPRM? Who moderates them and what rules exist?
- What concrete safety practices are considered “standard” locally (meetup spots, daylight hours, bringing a friend, ID at gates)?
- How is **condition** defined locally beyond “lightly used/like new”? (e.g., semester-used uniforms, defect call-outs, hygiene steps)
- Are there seasonal peaks (back-to-school, semester start, graduation, weather shifts)? What items spike, and when?
- For pricing, when do buyers/sellers treat $8–$15 as “firm” vs. negotiable (OBO, bundles)?
- Are there categories explicitly excluded by social norms (e.g., certain intimate apparel), and how is that communicated?
- Which language (Spanish vs. English) dominates in each channel, and does that affect participation?

2.1.2 - Terminology

The following terminology consolidates entities, events, functions, and behaviors in the domain. Each entry specifies the type of concept it represents and the phase in which it is introduced (domain, requirements, design, implementation). This approach avoids circular definitions and

ensures alignment with both domain knowledge and system concerns.

Term	Concept Type	Phase Introduced	Definition / Notes
Donator	Entity	Domain	A person who provides clothing items for donation.
Collector	Entity	Domain	A person who purchases or claims a clothing piece. A person who will potentially purchase or claim a clothing piece.
Piece	Entity	Domain	An individual clothing item, defined independently of the system.
Listing	Representation	Design	A published representation of a Piece in the platform.
Donation	Event	Domain	Instantaneous occurrence when a Donator has just made a clothing item available.
Collection	Event	Domain	Instantaneous occurrence when a Collector has just taken possession of a Piece.
Condition Rating	Attribute / Function	Domain	A measure (e.g., scale 1-10) of quality for a Piece.
Review	Artifact	Domain	Annotation (usually written text) associated with a transaction that complements a rating.
Locale	Entity	Domain	Physical location or organization where donations are deposited or distributed.
Type	Attribute	Domain	Category of clothing (dress, pants, shirt, etc.).
rate(Piece, ConditionRating) → ConditionRating	Function	Design	Updates the condition rating of a Piece using the new rating value; no pre-existing rating is required.
donate(Piece, Donator, Locale) → Donation	Event Function	Design	Function that triggers the event of donation: "A Piece has just been donated by a Donator at a Locale."
donate(Piece, Donator, Collector) → Donation	Event Function	Design	Function that triggers the event of donation: "A Piece has just been donated by a Donator to a Collector."
collect(Piece, Collector) → Collection	Event Function	Design	Triggers the event: "A Piece has just been collected by a Collector."

2.1.3 Domain Terminology in Relation to Domain Rough

This section explains how several of the terms defined in **2.1.2 – Terminology** were derived through the analysis of the material captured in **2.1.1 – Domain Rough Sketch**. Its purpose is to make explicit the reasoning that transformed informal notes, phrases, and anecdotes into the concepts that organise our description of the hand-me-down clothing domain. It does not repeat the glossary presented in 2.1.2; instead, it narrates the steps that led from raw wording to stable vocabulary.

The rough sketch included an observation that students commonly **"look up an item, contact the seller, agree on price, size, and place, then pick up the item."** This line was analysed as evidence of a recurring, recognisable structure in how people organise exchanges. Rather than a random set of moves, it revealed a social routine for transferring garments: identify an article, reach out to whoever offers it, negotiate its value, fit, and logistics, and complete the hand-off face-to-face. From this analysis emerged the term **Exchange Flow**, which designates the sequence of actions that gives shape to informal clothing transactions in the Mayagüez/UPRM setting.

Several fragments in the sketch referred to sellers showing **a photograph of the size tag and full images of the garment, including any flaws**. These snippets suggested an implicit rule: before an exchange, the giver is expected to disclose enough detail to reassure the taker about size, hygiene, and hidden damage. By organising these remarks, we formulated the term **Condition Disclosure Norm**, a name for the informal convention that garments be represented honestly, with visual evidence, before a meeting occurs. This term encapsulates how participants try to manage uncertainty and build trust.

Price information appeared in multiple places. Notes such as **"symbolic prices between eight and fifteen dollars are common reference points"** hinted at an unwritten valuation practice.The figures were neither arbitrary nor fixed by any authority; they functioned as a social guideline for what counts as reasonable in low-cost exchanges among students. Processing this evidence produced **Student Resale Price Band**, a phrase describing the monetary interval that frames negotiations and distinguishes a resale from a donation or a commercial sale.

Other material dealt with what happens when garments do not re-enter circulation. Mentions of **discarded clothes left in open areas or delivered directly to landfill, with only rare opportunities for recycling** highlighted a backdrop of disposal routes. These lines were interpreted as documenting the "exit channels" of clothing once it ceases to be worn. We named this phenomenon **Textile Waste Stream**, referring to the set of pathways — municipal collection, careless dumping, or limited recycling — through which clothing leaves everyday use. This term anchors the environmental dimension of the domain.

A different cluster of notes described **bags of outgrown clothing kept at home while owners decided whether to donate or sell them**. Here the sketch captured a liminal state: garments were no longer needed, yet had not been re-assigned. Analysing this condition produced **Dormant Stock**, a concept for clothing retained in domestic spaces after its initial life, awaiting a new role or final disposal.

The sketch also documented preferred locations for handing over items: students mentioned

campus benches, apartment lobbies, and other familiar public corners. Rather than isolated remarks, these examples pointed to a shared concern for safety and practicality. We consolidated them under the term **Meetup Spot**, which denotes semi-public environments chosen because they balance accessibility, visibility, and comfort during an exchange.

Another strand involved the digital places where clothing is discovered. Notes cited **Facebook Marketplace, WhatsApp groups, and Instagram stories** as typical sources. Instead of treating each separately, we recognised a broader category — lightly moderated online venues where offers, requests, and quick negotiations happen. From this reasoning came the expression **Ad-hoc Channel**, describing the informal communication spaces that enable the visibility of available garments.

Scattered remarks highlighted how participants assess reliability. Seeing clear pictures, recognising a name, or receiving bilingual messages were all said to make people more comfortable proceeding with an exchange. Bringing these hints together led to the concept **Trust Cue**, a label for the small but influential signals that reduce perceived risk in peer-to-peer clothing transfers.

Finally, the rough sketch posed questions about changes in activity during **back-to-school periods, semester starts, or seasonal weather**. Even without full data, the presence of these queries suggested that demand for particular items is not constant. To represent this dynamic aspect we coined **Seasonal Demand Pulse**, a term for the predictable fluctuations in which garments are offered or sought as academic and climatic cycles progress.

By articulating these derivations, this section clarifies the analytical bridge between the exploratory material of the rough sketch and the structured vocabulary presented in the Terminology section. Understanding this path is essential for tracing how domain knowledge was built and for ensuring that later requirements remain anchored in the observed environment.

2.1.4 Domain Narrative

In Puerto Rico, the flow of clothing and accessories between individuals and families is shaped by pressing social, economic, and environmental realities. Each year, hundreds of millions of pounds of garments and textiles are discarded, adding to the nations mounting waste crisis and overwhelming local landfills. Despite the recyclability of most textiles, the majority end up as landfill waste, a reflection of both limited recycling infrastructure and a culture still transitioning toward sustainability. At the same time, clothing represents a basic need one that is often out of reach for families facing high rates of poverty and for individuals experiencing homelessness. Within this context, the exchange of pre-owned items is not a marginal activity, but a vital process that supports daily life, education, dignity, and well-being.

The domain of secondhand clothing exchange involves a variety of actors and natural processes. Donators individuals or families with surplus or outgrown clothing choose to make these items available for others, motivated by a mix of generosity, sustainability, and the desire to reduce waste. Before donating, a Donator may inspect each Piece for cleanliness and condition, sometimes annotating the garment with information about its type, fit, or history. Clothing is gathered and prepared for transfer, either to a known recipient or to a local organization or collection point (Locale). The act of donation is marked as a Donation event, signifying the moment a Piece enters the shared pool of resources accessible to the community.

Collectors those seeking clothing and accessories approach these shared spaces with specific needs or in hopes of finding unexpected treasures. A Collector may be a student whose family cannot afford frequent purchases, a parent searching for appropriate school attire, or an individual experiencing homelessness who relies on donated garments for protection against the elements. When evaluating Pieces, Collectors typically consider both the Condition Rating and the suitability of the item to their needs. The interaction is often personal and direct: questions may be asked about the garments wear, stories exchanged regarding its previous use, and informal advice offered about care or fit. Upon deciding to take an item, the act of Collection occurs, with the Collector assuming responsibility for the Piece and potentially providing feedback or a Review to acknowledge the utility or quality of the donation.

These exchanges are embedded in a broader cycle of reuse and redistribution. Items may pass through multiple hands and locales, with each transition adding to the collective history of the garment. Some pieces return to the cycle after outgrowing their current owner, while others are adapted or repaired to extend their lifespan. The community sustains informal norms of trust, fairness, and transparency Donators are expected to represent the condition of Pieces honestly, while Collectors are encouraged to respect the process by only taking what is needed and providing feedback when possible. Occasional disputes or misunderstandings are resolved through conversation, reinforcing the collaborative spirit that underpins successful secondhand exchanges.

Through these ongoing activities, the domain supports not only the circulation of goods but also the cultivation of sustainability, mutual aid, and social connection. The exchange of clothing and accessories in Puerto Rico is thus a living narrative one shaped by economic hardship, environmental necessity, and the enduring will of its people to support one another through challenging times. This narrative frames the motivation for structured, equitable, and transparent approaches to secondhand exchange, ensuring that all members of the community can access the resources they need with dignity and trust.

2.1.5 Events, Actions, and Behaviors

This section presents the main events, actions, and behaviors observed in the environment of informal hand-me-down exchanges around the University of Puerto Rico at Mayagüez. They were derived from the material collected in **2.1.1 – Domain Rough Sketch** and organised to separate:

- **Events** – instantaneous occurrences (“has just …”),
- **Actions** – individual, intentional steps, and
- **Behaviors** – extended patterns composed of multiple actions.

All descriptions are domain-oriented and independent of any future system.

Exchange of Clothing

Event

> The instant a garment has just changed possession for example, a student hands a jacket to another at a campus bench. This marks the conclusion of an informal transaction and the start of a new phase in the garment’s life.

Action

Steps such as replying to an inquiry, confirming size or colour, agreeing on a price, and finally giving or receiving the garment. Each is purposeful and can succeed or fail (e.g., a missed appointment).

Behavior

The broader social practice of recirculating clothing among students, families, and neighbours. It involves searching for items, advertising availability, negotiating conditions, arranging logistics, and physically meeting to complete the hand-off. This behaviour sustains a micro-economy of reuse and helps reduce the volume of textiles heading to landfill.

Disclosure of Item Condition

Event

A seller has just provided evidence about a garment's state — e.g., sending a tag photo or mentioning a stain. The recipient gains new knowledge that may influence their decision.

Action

Taking photographs of the size tag or fabric, writing short notes about wear or washing, mentioning that an article is "lightly used" or "like new," or warning of a missing button.

Behavior

An established norm of transparency in which participants consistently present information about cleanliness, durability, or flaws. By embedding honesty into exchanges, this behaviour fosters trust and helps avoid disputes over quality.

Pricing and Valuation

Event

A price has just been named, accepted, or renegotiated for a garment.

Action

Comparing a proposed amount with informal references, adjusting for size or condition, or confirming that an item will be free rather than sold.

Behavior

A continuing process of social valuation. Participants rely on a tacit "student resale price band" often eight to fifteen dollars to anchor expectations while allowing room for negotiation or bundles.

Management of Dormant Stock

Event

A household member has just set aside garments that no longer fit or are not in active use.

Action

Reviewing wardrobes, classifying items as "keep," "give away," or "maybe later," placing them in bags or boxes, and storing them out of daily reach.

Behavior

The tendency for unused clothing to accumulate in homes. Owners postpone decisions about destination, creating an intermediate state between active use and disposal. This behaviour feeds both donation opportunities and, if left too long, textile waste.

Disposal and Environmental Impact

Event

An item has just been thrown into a rubbish container, left on a curb, or deposited in a landfill skip.

Action

Carrying worn garments to bins, abandoning them in vacant lots, or delivering unusable pieces to a charity or municipal collection point.

Behavior

All practices by which textiles exit the local circulation of reuse. Some are responsible donation of damaged goods for recycling while others are harmful, such as illegal dumping. Together they define the “textile waste stream” that runs parallel to reuse networks.

Arranging and Conducting Meetups

Event

Two participants have just arrived at a chosen place to finalise an exchange.

Action

Selecting a bench, lobby, or café corner as the site; confirming time via message; travelling to the location; greeting and checking the garment.

Behavior

A familiar choreography in which actors choose semi-public, convenient spots that reduce risks of theft or fraud while making hand-offs efficient. This behaviour reflects unwritten safety norms within the community.

Use of Ad-hoc Channels

Event

A new offer or request for clothing has just been posted or noticed in an online group.

Action

Opening a marketplace app, composing a caption, adding photos, scrolling through listings, or sending a direct message to express interest.

Behavior

The regular reliance on lightly moderated platforms Facebook Marketplace, WhatsApp groups, Instagram stories to discover, promote, and coordinate exchanges. This behaviour keeps circulation active and widens the reach beyond immediate acquaintances.

Building Trust

Event

A participant has just received a reassuring sign, such as recognising a familiar name, seeing unedited pictures, or receiving a message in their preferred language.

Action

Choosing clear, well-lit photos; greeting bilingually (Spanish/English); mentioning mutual contacts or personal references to confirm credibility.

Behavior

The underlying social effort to manage uncertainty in face-to-face swaps. By scanning cues of reliability, people decide whether to meet and complete a transaction. Trust-building behaviours make the informal market viable despite the lack of formal guarantees.

Responding to Seasonal Demand

Event

Interest in a category of garment (e.g., uniforms, sweaters, raincoats) has just increased due to academic or weather cycles.

Action

Sorting and preparing clothes needed for the coming semester, advertising jackets before the rainy season, or searching for graduation attire.

Behavior

A cyclical pattern in which attention to certain garments rises and falls. Back-to-school weeks, semester openings, and cooler months create pulses of activity, stimulating donations, sales, and borrowing at predictable times.

2.1.6 - Function Signatures

Objective

Define domain-level function signatures that describe how actions are carried out, including inputs, outputs, and possible changes in the domain.

Description

Function signatures are formal specifications of functions or actions that define:

- **The name of the function**: The action being performed.
- **The input parameters**: The information required by the action.
- **Output**: Type of data the function produces.
- **State changes**: How the action affects the domain.

The general format of a function signature is:

- FunctionName: Input1 >< Input2 >< ... → OutputType

This expresses the action's name, its input parameters with their types, the output type it produces and any state changes in the domain.

Function signatures do not describe how the function is implemented. Instead, they focus on the relationship between inputs, outputs, and possible state changes.

Examples

donate : Piece >< Donator >< Locale → Donation, A Donator provides a Piece in a given Locale, producing a Donation event.

collect : Piece >< Collector → Collection
A Collector claims a Piece, producing a Collection event.

rate : Piece >< ConditionRating → ConditionRating
A Piece receives a ConditionRating, producing or updating the ConditionRating.

review : Collection >< Review → Review
A review is attached to a completed collection.

transaction : Piece >< Collector >< Locale → Review >< (Option Ignore)
A transaction requires a Piece (the item being transacted), Collector (the entity who initiates the transaction), and the locale (the locale in which the transaction is taking place) in order to produce a Review. If the transaction were to fail, produces no outcome (Ignore).

categorize : Piece >< Type → Piece
A piece is assigned a type, returning the updated piece.

discard : Piece → Void
Removes a piece from active circulation.

2.2.1 Epics, Features, and User Stories

Epics

Epics are a higher level overview of goals that are large enough in scope that they can be broken down into multiple sprints. They provide direction and group related work together.

Buyer Epics

1. Product Search
    a. As a buyer, I want to search for items by category, filters, and keywords, so that I can quickly find products that meet my needs.
2. Purchase Management
    a. As a buyer, I want to manage potential purchases by saving items in my cart, so that I can review and buy them later.

3. Trust and Transparency
    a. As a buyer, I want to access detailed seller information and provide feedback through reviews, so that I can make informed and confident purchasing decisions.

Seller Epics

1. Listing Management
    a. As a seller, I want to create, edit, and delete listings with many details, so that I can effectively manage my items for sale.
2. Sales Notifications
    a. As a seller, I want to receive notifications when my items are sold, so that I can promptly respond and complete the transaction.
3. Seller Profile and Trust
    a. As a seller, I want to build a profile with personal and location details, so that I can establish trust with buyers and encourage sales.

Features

Features specify the functionality required to deliver the goals described in the epics to the user. They serve to provide more concrete goals related to development.

Buyer Features

1. Product Search
    a. Filtering (clothing type, size, color, price, condition, brand, etc.).
    b. Keyword search.
    c. Sorting options (price low to high, new to old, etc.).
2. Purchase Management
    a. Shopping cart functionality (add and remove items).
    b. Cart persistence across sessions (items remain after logging out).
3. Trust and Transparency
    a. Seller profile page (location, account age, bio).
    b. Seller ratings & reviews system.
    c. Buyer-to-seller review submission flow.
    d. Reporting mechanism for problematic sellers.

Seller Features

1. Listing Management
    a. Create listing form (title, description, tags, price, category).
    b. Image upload with multiple pictures per item.

    c. Edit listing functionality (update price, description, images).
    d. Delete or deactivate listing.
2. Sales Notifications
    a. Push/email/in-app notifications for new orders.
    b. Notification history center (list of past alerts).
3. Seller Profile and Trust
    a. Editable seller profile page (profile picture, name, location, bio).
    b. Seller dashboard with active listings and ratings overview.

User Stories

User stories are derived from Features, breaking them down into smaller, individual tasks to be added to the backlog. These stories focus on user needs and help make development more user-focused.

Buyer User Stories

1. As a buyer, I want to browse items by category to find a specific type of item I want.
2. As a buyer, I want to filter my search by things like size and price to tailor my search to my needs.
3. As a buyer, I want to search for items using keywords to find specific items that can't be narrowed down by category or filters alone.
4. As a buyer, I want to add items to my cart to buy later.
5. As a buyer, I want to see a seller's information such as location, ratings, and account age to feel sure that my purchase will be successful.
6. As a buyer, I want to leave reviews for sellers so other buyers know what to expect.

Seller User Stories

1. As a seller, I want to create listings for my items with options such as adding multiple pictures, a description and tags so interested buyers can find me.
2. As a seller, I want to edit listings so I can update details whenever necessary.
3. As a seller, I want to delete listings so I can stop selling an item.
4. As a seller, I want to receive notifications when one of my listings is sold so I can take action as fast as possible.
5. As a seller, I want to provide information on my profile such as my name and location to increase trust with buyers.

2.2.2 - Personas

A persona is a fictional yet plausible representation of a user for a platform. The following personas will help align development goals with user needs.

Adriana Gómez

- **Age**: 20 years old
- **Occupation**: University student on financial aid working part-time on campus
- **Build / Appearance**: Dark and straight hair, low to average height, dresses in vintage clothes and kitschy accessories
- **Personality**: Creative, unique, community-driven

Adriana loves expressing herself through her fashion, yet she struggles finding clothes that feel like her. She has an affinity for older clothing, so thrift stores are a common spot for her. However, she struggles finding thrift stores in her area given that most of them don't have an online presence and, between her studies and her job, she doesn't have a lot of time to go out and look for them.

- **Pain Points**: Difficulty finding unique clothing items and accessories that don't break the bank, difficulty finding local thrift stores
- **Needs**: Access to trustworthy online listings, a way to find local thrift stores
- **Platform Interaction**: Browses listings from her phone during her breaks between classes

Manuel Torres

- **Age**: 35 years old
- **Occupation**: Middle school teacher
- **Build / Appearance**: Brown and curly hair, average height, frequently seen in polo shirts or t-shirts with witty quotes on them.
- **Personality**: Patient, funny, good with kids, adventurous

Manuel is moving to a new location and wants a fresh start. Even if he doesn't want a lot of his belongings anymore, he'd rather not throw them away. He wants to sell whatever he has that's still in good condition to help out with the expenses involvd in the move but can't find a way to do so.

- **Pain Points**: No low-hassle way to sell his belongings
- **Needs**: Access to a way to sell his belongings on his own terms
- **Platform Interaction**: Creates listings from his work computer for his pre-loved clothes

Daniela López

- **Age**: 27 years old
- **Occupation**: Nurse practitioner
- **Build / Appearance**: Long and wavy brunette hair, tall, dresses in comfortable clothes like baggy jeans or athleisure
- **Personality**: Outspoken, understanding, eco-conscious

Daniela is the type of person to own something until it falls apart. She is vehemently against fast fashion and tries to not contribute to it to the best of her ability. She believes older clothing was made to last longer and buys second-hand whenever she can, but her favorite local thrift store has

just closed down and the closest is now too far away for her to visit frequently.

- **Pain Points**: Doesn't want to contribute to fast fashion, tired of the low quality of modern clothing items
- **Needs**: A way to purchase good quality vintage clothing items
- **Platform Interaction**: Browses listings using search filters to narrow down her results to her needs

2.2.3 Domain Requirements

The system shall manage listings according to the inherent properties of categories, items, and taxonomy structure in the domain of classified and donation listings.

- DR1: The system must classify every listing under exactly one primary category, ensuring consistent organization and discoverability across the taxonomy.
- DR2: The system must allow categories to have hierarchical subcategories, reflecting the domain property of multi-level classification used in established marketplaces.
- DR3: The system must distinguish between **Sell** and **Donate** listing taxonomies, preserving the domain difference in category depth and item grouping.
- DR4: The system shall provide means to enforce item-to-category compatibility, ensuring that each listing aligns with an appropriate category (e.g., vehicles cannot be placed under clothing).
- DR5: The system must support category evolution, allowing the taxonomy to incorporate new categories or subcategories without invalidating existing listings.

Each of these requirements directly ties to observed domain properties: - DR1 reflects the necessity of a single, authoritative classification per item. - DR2 enforces hierarchical structures present in all reference taxonomies. - DR3 respects the distinction between selling and donating, observed in multiple platforms. - DR4 ensures semantic alignment between items and categories, preventing domain violations. - DR5 supports the domain need for scalability and adaptability as marketplaces evolve.

Sources

- **eBay**: https://www.ebay.com/n/all-categories
- **Facebook Marketplace (Meta)**: https://www.facebook.com/marketplace/
- **OfferUp**: https://offerup.com/
- **Craigslist**: https://www.craigslist.org/about/sites
- **Goodwill (Donation)**: https://shopgoodwill.com/all-categories

2.2.4 Interface Requirements

Objective

The clothing marketplace must represent, initialize, and update domain concepts (e.g., clothing items, user accounts, transactions) in a consistent and testable manner. These requirements ensure

that real-world phenomena (buying, selling, searching clothes) are accurately modeled inside the system.

Requirements

Representation Rules

- **Clothing items** - represented as a unique system entity with attributes: item ID, seller ID, title, description, category, size, price, condition, and availability status.
- **User account** - represented as a unique system entity with attributes: user ID, username, email, role (buyer, seller, or both), and transaction history.
- **Transaction** - represented as a unique system entity with attributes: transaction ID, buyer ID, seller ID, item ID, status (pending, confirmed, completed), and timestamp.

Initialization Rules

- **Listing a clothing item** - the system shall initialize the item entity with all required attributes. An item cannot exist in the system without a valid seller ID and price.
- **User registration** - when a new user registers, the system shall initialize a user entity with a unique user ID and default role “buyer.” Role changes to “seller” require additional verification (e.g., valid payment info).
- **Purchase initiation** - when a buyer initiates a purchase, the system shall initialize a transaction entity with status = “pending” until confirmation.

Update Rules

- Item availability shall update automatically when a purchase is confirmed: availability status changes from “available” to “sold.”
- Sellers may update item attributes (title, description, price). Updates to sold items are restricted.
- Transaction status shall update in predefined steps: “pending” → “confirmed” → “completed.” Skipping states is not permitted.
- User accounts may update certain attributes (email, profile details) but transaction history shall be immutable once recorded.

Examples

1. **Initialization**: A seller lists a jacket. The system creates an item entity with attributes (ID=1001, seller=U123, category=outerwear, price=$50, status=available).
2. **Update**: A buyer purchases the jacket. The system updates the transaction status (T555: pending → confirmed), and the item status (I1001: available → sold).
3. **Restriction**: The seller attempts to change the price of the sold jacket. The system prevents this update because item availability = “sold.”

Relation to Domain Requirements

- If a clothing item exists in the domain (a seller lists it), it must exist as a system entity with

required attributes.

- If a buyer interacts with the system (e.g., initiates a purchase), a transaction entity must exist and follow state transitions.
- If a user registers in the domain, their account must exist in the system with consistent properties.

Justification

These interface requirements ensure that the system remains synchronized with real-world buying and selling activities. Initialization rules prevent incomplete or invalid entities. Update rules enforce consistency and protect critical data (e.g., preventing edits to sold items or completed transactions).

Testing Plan

- Verify that all clothing items created by sellers initialize with complete required attributes.
- Simulate purchase flows and confirm item and transaction entities update correctly (status changes).
- Attempt restricted updates (e.g., editing sold items, altering completed transactions) and confirm the system rejects them.

2.2.5 Machine Requirements

Objective

The web server must support reliable and efficient operation of a React + JavaScript clothing marketplace, enabling users to buy, sell, and search for clothes. Requirements are defined in measurable, testable terms to ensure responsiveness, reliability, and scalability.

Requirements

Performance - The system shall return **search results within 2 seconds** on average, with a maximum of **4 seconds** under peak load (defined as 150 concurrent active users). - The system shall support **200 simultaneous browsing users** without response time exceeding 4 seconds, including actions such as searching, filtering, and viewing product details. - Checkout operations (add to cart, confirm purchase) shall complete within **3 seconds** on average.

Reliability - The web server shall maintain an uptime of **99.7% per month**, allowing no more than **2.1 hours** of unscheduled downtime. - Transaction integrity must be preserved: no more than **0.1% of transactions** may fail due to server errors. - Scheduled maintenance shall be limited to **3 hours per month**, announced with at least **48 hours of notice**.

Scalability - The system shall scale to support **500 concurrent users** performing mixed actions (browsing, searching, and checkout) while maintaining average response times ≤ 3.5 seconds. - The system shall handle a database of up to **50,000 clothing items** with no significant degradation (response time increase ≤ 20% compared to baseline). - The system shall allow vertical scaling (adding resources to a single server) and horizontal scaling (adding additional servers) without

major architectural redesign.

Clarifications

- “Peak load” is defined as ≥ **150 concurrent active users** browsing/searching, with at least **10% engaged in checkout**.
- “Minimal outages” is quantified as ≤ **2.1 hours per month** of unplanned downtime.
- “Acceptable performance” is defined as ≤ **3.5 seconds response time** for 95% of requests.

Areas for Refinement

- Stress tolerance for **extreme traffic spikes** (≥ 1000 users during promotions or seasonal sales) remains under evaluation.
- Requirements for **mobile vs. desktop optimization** need further benchmarking, especially under limited bandwidth conditions.

Justification

The clothing web marketplace requires fast, reliable interactions to maintain user trust and ensure successful transactions. Defined thresholds balance user expectations (quick searches, seamless checkout) with the limitations of typical hosting environments for web applications.

Testing Plan

- Conduct **load tests** at 150, 250, and 500 concurrent users simulating real-world actions (search, filter, checkout).
- Perform **stress tests** with artificial traffic spikes to measure degradation patterns.
- Monitor uptime and downtime logs to confirm 99.7% reliability.
- Validate database query performance against a dataset of **50,000+ clothing items**.

2.3 Implementation

Objective

Describe the overall architecture and design of the clothing repurposing application, showing how the React frontend, JavaScript logic, and Supabase database/storage/auth components work together. Include mockups and example code fragments to complement the explanation.

Description

The application is structured as follows:

- Frontend (React)
    - Handles the user interface, including browsing items, uploading clothes, and viewing

nearby donation centers.

- Planned pages/screens include:
  - Home Page: shows recent listings and quick navigation to other pages
  - Clothing Listing Page: displays a landscape list of available clothing items
  - Upload Page: allows users to upload clothes for resale or donation
  - Map Page: integrates with Leaflet to display donation centers
- Styling is done with standard CSS (or CSS-in-JS).

- Backend Logic (JavaScript functions)
  - Handles business logic directly in JavaScript functions.
  - Responsibilities include:
    - Validating form inputs.
    - Managing image uploads to Supabase Storage.
    - Authenticating users via Supabase Auth.
    - Querying data from Supabase Database.
- Database & Storage (Supabase)
  - PostgreSQL database stores user profiles, clothing items, and donation center data.
  - Supabase Storage stores images.
  - Supabase Auth manages authentication and access control.
- External Services
  - Leaflet.js for map display.
  - Optional geocoding APIs for donation center coordinates.

Architecture Diagram

The architecture of the application is designed to clearly separate concerns between the frontend, backend logic, and database/storage/auth services. This structure ensures maintainability, scalability, and clarity for both developers and users.

[Architecture Diagram] | *../../../../images/Architecture_Diagram.png*

1. Architecture Overview
   a. React Frontend
      - Provides the user interface where users can browse clothing items, upload new items and view nearby donation centers on a map powered by Leaflet.
      - User actions such as submitting forms or navigating the map will trigger the API calls to the backend logic.
   b. JavaScript Logic (Backend Logic)
      - Acts as the bridge between the frontend layer and Supabase.

- Responsible for validating inputs, formatting data, and sending queries to Supabase.
- Handles error responses and passes meaningful data back to the frontend.

c. Supabase Services

- Database (PostgreSQL) stores data like user profiles, clothing items, and donation center metadata in a structured manner.
- Cloud Storage manages image uploads securely and makes them easy to retrieve.
- Auth provides user authentication and access control, ensuring correct data privacy.

d. Data Flow

- Requests flow downward from the React frontend through the JavaScript backend layer into Supabase, while responses flow upward.
- Ensures clean separation between UI in React, business logic in JavaScript, and authentication in Supabase.
- Frontend updates with fresh data dynamically using React's state system.

2.3.1 Selected Fragments of the Implementation

This section provides selected fragments of the implementation that complement the architecture described in Section 2.3. Instead of full code listings (not yet implemented), this section includes visual representations of the application's main pages.

Home Page

[Home Page] | *../../../../images/HomePage.png*

The entry point of the application. Displays recent clothing items and quick navigation options for uploading, browsing items, liked clothing items, the user's cart, and the map page for local centers.

Clothing Listing Page

[Listings Page] | *../../../../images/ListingsPage.png*

Shows a landscape UI filled with different clothing items with their respective photo, price, size, condition, and category available for purchase. Each item links to a detail page. The page also includes search and filtering options by category, size, condition, and location. Users can also add items to a "liked list" to save for later viewing.

Item Detail Page

[Individual Listing] | *../../../../images/IndividualListing.png*

Provides detailed information about a specific clothing item selected from the listings page.

Includes images, description, size, condition, and location. Users can like, share, or contact the seller. Related items are displayed at the bottom.

Map Page

[Map 1] | *../../../../images/Map1.png*

[Map 2] | *../../../../images/Map2.png*

[Map 3] | *../../../../images/Map3.png*

Displays nearby donation and repurposing centers using Leaflet. Locations (stored in Supabase) include name, address, hours, and type of service (donation only or donation-for-credit).

These images complement the architecture by showing how the frontend components (React pages) map to backend logic (JavaScript functions) and data storage (Supabase).

3 Analytic Part

3.1 - Concept analysis

Description

The domain rough sketch was reviewed to identify recurring ideas and terminology. Ambiguities were noted, compared, and resolved by introducing consistent abstractions. This ensures traceability from observations to domain-level concepts while avoiding system-to-be details.

Piece

- **Observation**: Notes reference “clothing,” “garments,” and “items” in different contexts.
- **Issue**: Terms overlap without clarity on whether they refer to a single piece or a category.
- **Resolution**: Standardized as **Piece**, representing any individual piece of apparel.
- **Justification**: Provides a neutral, unambiguous unit of exchange within the domain.
- **Concept**: `Piece` (entity).

Donation vs. Recycling

- **Observation**: Actions include “donating clothes,” “claiming items,” and “recycling textiles.”
- **Issue**: Donation and recycling are sometimes mentioned together, though they represent different flows.
- **Resolution**: — **Donation** = action of giving away clothing to others in the community. — **Recycling** = action of sending clothing to government/private services for textile reuse.
- **Justification**: Separation maintains clarity between peer-to-peer exchanges and organizational processes.

- **Concepts**: `Donation` (action), `Recycling` (action).

Services and Community

- **Observation**: Mentions of “government services,” “private services,” and “community sharing.”
- **Issue**: Ambiguity between individuals and organizations as actors.
- **Resolution**: — **User** = individual participant (donor or claimant). — **Service Provider** = organizational actor (government or private) that manages recycling/donation.
- **Justification**: Differentiation enables consistent treatment of human vs. institutional participation.
- **Concepts**: `User` (actor), `Service Provider` (actor).

Terminology Resolution

- **Clothes**, **garments**, **items**: standardized as **Piece**.
- **Donation** vs. **Recycling**: separated to reflect community exchange vs. institutional process.
- **Users** vs. **Services**: clarified as **User** (individual) and **Service Provider** (organization).

Conclusion

The domain analysis produced a clear vocabulary: - `Piece` as the primary entity. - `Donation` and `Recycling` as distinct actions. - `User` and `Service Provider` as actors.

3.2 Validation and Verification

Validation and verification activities ensure that the Hand Me Down project’s deliverables meet the intended quality standards, align with stakeholder needs, and remain consistent with the domain description, requirements, and architecture. These activities are conducted as an ongoing, shared responsibility across all teams.

Validation

Validation activities focus on confirming that our understanding of the domain and requirements is accurate and complete, even before implementation:

- **Scenario Walkthroughs**:: Draft scenarios were created and reviewed internally within the team to test whether our domain terminology, requirements, and workflows are coherent. For example, walkthroughs of donation and resale flows helped highlight whether our categorization and pricing assumptions were consistent.
- **Requirement Exploration**:: At this stage, no external validation with students or families has been performed. Instead, internal reviews are used to identify potential gaps, such as safety practices for meetups or the way condition disclosure norms are represented.
- **Planned A/B Testing**:: As the UI/UX evolves, A/B testing will be used to validate design hypotheses. Examples include testing filter placement in the item search page, or checkout button positioning. Metrics such as time-to-action and user satisfaction will guide design

decisions.

Verification

Verification ensures that system components behave as prescribed and that deliverables can be tested against measurable criteria:

- **Unit Testing**:: Individual components of the system will be tested using unit tests to verify correctness in isolation. This includes authentication functions, item listing logic, and condition rating updates.
- **Integration Testing**:: Selected flows (e.g., creating a listing, completing a transaction) will be tested across multiple modules to ensure interactions remain consistent.
- **Load Testing with k6**:: Performance and scalability will be evaluated using the k6 framework. Initial load tests will target ~150 concurrent users, scaling up to 500, to verify that response times remain within the defined machine requirements.
- **Traceability Checks**:: Deliverables will be reviewed against the requirements and terminology to ensure completeness and consistency. Each requirement will be linked to validation and verification artifacts (test cases, scenarios).

Roles and Responsibilities

Validation and verification are a **shared responsibility** across the team. While individual sub-teams focus on different aspects (e.g., listings, authentication, documentation), every member contributes to writing, reviewing, and executing tests and walkthroughs. This ensures that quality is embedded throughout the project rather than isolated in a single role.

Outcomes

The combination of walkthroughs, scenario-based validation, unit and integration testing, load testing, and A/B experimentation provides a balanced approach:

- **Validation** ensures that the concepts and requirements are correctly understood and aligned with the domain.
- **Verification** ensures that implementation artifacts conform to measurable standards and deliver the expected performance.

Together, these practices guarantee that the Hand Me Down project remains trustworthy, usable, and scalable in the context of secondhand exchanges.