

# ***SE Proj1b1 - Group 19***

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## **Use Cases (UC-11 to UC-40)**

### **UC-11 WIC (Special Supplemental Nutrition Program for Women, Infants, and Children) Eligibility Verification (Account & Session)**

#### **11.1 Preconditions**

- WIC integration enabled; access to state WIC eligibility APIs.
- Customer profile verified with required identifiers (name, DOB, address).

#### **11.2 Main Flow**

1. Customer signs in [Start Session].
2. System queries the state WIC registry [Validate Eligibility].
3. System tags account with WIC status and active benefit period [Attach Entitlement].
4. Menu automatically filters to WIC-eligible catalog [Restrict Catalog].

#### **11.3 Subflows / Extensions**

- [Start Session] Run Multi-Factor Authentication (MFA)/identity checks; load household members.
- [Validate Eligibility] Match identifiers; retrieve active benefits and categories.
- [Attach Entitlement] Cache benefit balances; set tender priority.
- [Restrict Catalog] Hide ineligible SKUs (Stock Keeping Unit); display WIC badges and filters.

#### **11.4 Alternative / Error Flows**

- [No Match] Prompt user for updated ID or case number; mark account “pending.”
- [Benefit Lapsed] Display renewal call-to-action; allow non-WIC checkout.
- [Partial Household] Let user pick household member; filter catalog per package.

### **UC-12 WIC Benefit Application (Checkout & Split Tender)**

#### **12.1 Preconditions**

- UC-11 completed successfully.

- Basket contains WIC-eligible items.

## **12.2 Main Flow**

1. System separates basket into WIC vs. non-WIC items [Split Basket].
2. WIC tender applied to eligible items by priority [Apply WIC Tender].
3. Customer pays remaining balance via card, cash, or EBT (Electronic Benefit Transfer)-cash [Collect Alternate Payment].

## **12.3 Subflows / Extensions**

- [Split Basket] Map UPCs (Universal Product Code) to benefit categories; compute limits.
- [Apply WIC Tender] Deduct from benefits; update ledger.
- [Collect Alternate Payment] Present wallet; authorize non-WIC payment.

## **12.4 Alternative / Error Flows**

- [Insufficient Benefits] Suggest substitutions; allow partial fill.
- [Ineligible Modifiers] Remove or reprice upcharges.
- [Reversal Needed] Restore benefits if item later unavailable.

# **UC-13 Nutrition & Allergen Labeling (Item Detail)**

## **13.1 Preconditions**

- Vendor has provided nutrition and allergen data.
- Schema for allergens configured.

## **13.2 Main Flow**

1. Customer opens product detail page [Open PDP].
2. System displays calories, macros, allergens, and symbols [Render Panel].

## **13.3 Subflows / Extensions**

- [Open PDP] Fetch latest revision; show source and date.
- [Render Panel] Display per-serving and per-item details; highlight allergens.

## **13.4 Alternative / Error Flows**

- [Missing Data] Flag vendor; show “data pending.”
- [Recipe Change] Force re-verification; version prior labels.

# **UC-14 Healthy-Choice Nudges (Ranking & Swaps)**

### **14.1 Preconditions**

- Nudge engine enabled; items scored by health attributes.

### **14.2 Main Flow**

1. System boosts healthier items in search results [Re-rank].
2. At add-to-cart, system suggests healthier swaps [Suggest Swap].

### **14.3 Subflows / Extensions**

- [Re-rank] Combine search relevance with health score.
- [Suggest Swap] Offer low-calorie, low-sugar alternatives with one-tap replace.

### **14.4 Alternative / Error Flows**

- [User Opt-Out] Store preference; revert to neutral ranking.
- [Medical Flag] Prioritize medically appropriate suggestions.

## **UC-15 Calorie & Wellness Tracking (User Journal)**

### **15.1 Preconditions**

- User has consented to health tracking; personal targets defined.

### **15.2 Main Flow**

1. After checkout, system logs nutrition totals [Log Meal].
2. System shows progress vs. goals and provides recommendations [Coach].

### **15.3 Subflows / Extensions**

- [Log Meal] Aggregate nutrients; timestamp entry.
- [Coach] Provide contextual nudges (e.g., hydration reminder on high-sodium day).

### **15.4 Alternative / Error Flows**

- [Withdraw Consent] Stop tracking; purge optional history.
- [Data Inaccuracy] User corrects log; system recomputes.

## **UC-16 Personalized Dietary Recommendations (Filters & Plans)**

### **16.1 Preconditions**

- User has stored dietary preferences or restrictions.

### **16.2 Main Flow**

1. System filters browse results to match diet [Apply Diet Filters].
2. System recommends meal plan bundles [Build Plan].

### **16.3 Subflows / Extensions**

- [Apply Diet Filters] Exclude conflicting items/ingredients.
- [Build Plan] Generate balanced, budget-aligned menus.

### **16.4 Alternative / Error Flows**

- [No Matches] Offer closest compliant items with warnings.
- [Conflict Override] Require explicit confirmation.

## **UC-17 Youth Marketing Guardrails (Promo Controls)**

### **17.1 Preconditions**

- Age data or gating enabled.

### **17.2 Main Flow**

1. System suppresses unhealthy promotions [Filter Promos].
2. System defaults to healthier promotions [Replace Offers].

### **17.3 Subflows / Extensions**

- [Filter Promos] Apply standards (e.g., WHO guidelines).
- [Replace Offers] Insert healthy alternatives (fruit, water).

### **17.4 Alternative / Error Flows**

- [Unknown Age] Default to conservative policy.
- [Parental Consent] Adjust based on local law.

## **UC-18 Mindful Ordering (Impulse Controls)**

### **18.1 Preconditions**

- User opted in; behavior analytics enabled.

### **18.2 Main Flow**

1. Detect repetitive high-calorie orders [Detect Pattern].
2. Prompt mindful reminders and quick healthy alternatives [Intervene].

### **18.3 Subflows / Extensions**

- [Detect Pattern] Use thresholds and time windows.
- [Intervene] Offer swaps or snooze controls.

### **18.4 Alternative / Error Flows**

- [Opt-Out] Disable feature; save preference.

- [High-Risk Flag] Provide resource links if concerning patterns arise.

## **UC-19 Vendor Nutrition Compliance (Policy & QA)**

### **19.1 Preconditions**

- Vendor has agreed to nutrition compliance policy.

### **19.2 Main Flow**

1. On menu publish, validate completeness [Validate].
2. Gate or flag non-compliant items [Gate].

### **19.3 Subflows / Extensions**

- [Validate] Check calories, allergens, serving size.
- [Gate] Block or soft-block with deadline; log SLA.

### **19.4 Alternative / Error Flows**

- [Grace Period] Temporarily show with “info pending.”
- [Repeat Offense] Demote vendor items; notify manager.

## **UC-20 Dietary Conflict Detection (Cart Guardrail)**

### **20.1 Preconditions**

- User restrictions stored; ingredient database available.

### **20.2 Main Flow**

1. At add-to-cart, scan item for conflicts [Scan].
2. Alert customer and suggest alternatives [Alert & Suggest].

### **20.3 Subflows / Extensions**

- [Scan] Cross-check ingredients against restrictions.
- [Alert & Suggest] Show substitutions; deep link to alternatives.

### **20.4 Alternative / Error Flows**

- [Override] Customer confirms risk and proceeds.
- [Strict Mode] Block checkout if severe allergens are detected.

## **UC-21 Multistate Sales Tax Calculation (Jurisdiction Engine)**

### **21.1 Preconditions**

- Tax engine active; customer address validated.

### **21.2 Main Flow**

1. Determine jurisdiction [Resolve Jurisdiction].
2. Classify items and fees [Classify].
3. Compute and apply taxes [Calculate & Apply].

### **21.3 Subflows / Extensions**

- [Resolve Jurisdiction] Factor state and local rules.
- [Classify] Distinguish prepared food, groceries, supplements, fees.

### **21.4 Alternative / Error Flows**

- [Local Meals Tax] Add special local tax lines.
- [No Nexus] Vendor remits tax; show disclosure.

## **UC-22 Order Tax Breakdown (Transparent Checkout)**

### **22.1 Preconditions**

- UC-21 completed.

### **22.2 Main Flow**

1. Render line-level tax breakdown [Render Breakdown].
2. Provide explanations of charges [Explain].

### **22.3 Subflows / Extensions**

- [Render Breakdown] Separate taxable vs exempt.
- [Explain] Cite jurisdiction rules; link resources.

### **22.4 Alternative / Error Flows**

- [Fee Exempt] Mark non-taxable fees clearly.
- [Address Change] Recalculate on-the-fly.

## **UC-23 Marketplace Facilitator Role Management**

### **23.1 Preconditions**

- WolfCafe active in multiple states; contracts in place.

### **23.2 Main Flow**

1. Assess facilitator obligations [Assess Role].
2. Configure tax remitter (platform vs restaurant) [Set Remitter].

### **23.3 Subflows / Extensions**

- [Assess Role] Parse thresholds, exclusions, elections.
- [Set Remitter] Update invoices and filings.

#### **23.4 Alternative / Error Flows**

- [Optional Election] Vendors may override defaults.
- [Mixed Models] Handle state-specific roles.

### **UC-24 Employee Meal Fringe Benefits (IRS Compliance)**

#### **24.1 Preconditions**

- Employees use platform for meals; HR/payroll integration active.

#### **24.2 Main Flow**

1. Track employee meals [Track].
2. Categorize as taxable or exempt [Categorize].
3. Report taxable meals to payroll [Report].

#### **24.3 Subflows / Extensions**

- [Track] Associate orders with employee ID.
- [Categorize] Apply IRS (Internal Revenue Service) tests and thresholds.

#### **24.4 Alternative / Error Flows**

- [Exceed Threshold] Mark excess as taxable.
- [Non-qualifying Site] Automatically mark as taxable.

### **UC-25 Tax-Exempt Customer Processing (Certificates)**

#### **25.1 Preconditions**

- Customer registered as exempt; valid certificate uploaded.

#### **25.2 Main Flow**

1. Validate certificate [Validate Cert].
2. Apply exemption at checkout [Apply Exempt].

#### **25.3 Subflows / Extensions**

- [Validate Cert] OCR and review; track expiration.
- [Apply Exempt] Exempt qualifying items; maintain audit log.

#### **25.4 Alternative / Error Flows**

- [Expired Cert] Revert to taxable; notify user.
- [Mixed Basket] Apply exemption selectively.

## **UC-26 Driver Expense & Deduction Tracking (1099 Support)**

### **26.1 Preconditions**

- Driver onboarded as independent contractor.

### **26.2 Main Flow**

1. Driver logs expenses [Log].
2. System calculates deductible totals [Compute].
3. Generate year-end report [Export].

### **26.3 Subflows / Extensions**

- [Log] Mileage, gas, tolls, insurance, repairs.
- [Compute] Compare IRS (Internal Revenue Service) standard vs. actual method.

### **26.4 Alternative / Error Flows**

- [Missing Receipts] Flag unverified expenses.
- [Quarterly Estimates] Remind for 1040-ES filings.

## **UC-27 Regulatory Audit Logging (Tax & Fees)**

### **27.1 Preconditions**

- Audit logging module enabled.

### **27.2 Main Flow**

1. Record tax calculation decisions [Log Decision].
2. Store immutable records [Seal Ledger].

### **27.3 Subflows / Extensions**

- [Log Decision] Capture rates, classifications, timestamps.
- [Seal Ledger] Store securely with retention policy.

### **27.4 Alternative / Error Flows**

- [Discrepancy] Trigger reconciliation task.
- [Audit Request] Export scoped logs.

## **UC-28 Delivery/Service Fee Tax Treatment (Rule Engine)**



### **28.1 Preconditions**

- Distinct fee categories configured.

### **28.2 Main Flow**

1. Assess fee taxability [Assess Fee].
2. Apply or exempt accordingly [Apply Treatment].

### **28.3 Subflows / Extensions**

- [Assess Fee] Delivery vs. service vs. processing fees.
- [Apply Treatment] Show taxes clearly on receipt.

### **28.4 Alternative / Error Flows**

- [Bundled Fees] Allocate portioned taxes.
- [Marketplace Share] Include facilitator-retained amounts.

## **UC-29 IRS Reporting & Benefits Limits (Payroll/Year-End)**

### **29.1 Preconditions**

- Employer benefits configured; payroll system linked.

### **29.2 Main Flow**

1. Aggregate employee benefits [Aggregate].
2. Validate against IRS limits [Validate].
3. Export W-2/1099 records [Export].

### **29.3 Subflows / Extensions**

- [Aggregate] Track monthly by employee.
- [Validate] Flag overages; mark taxable vs. exempt.

### **29.4 Alternative / Error Flows**

- [Multiple EINs] Consolidate across entities.
- [Retro Changes] Apply adjustments with notes.

## **UC-30 Marketplace Contract Compliance (Onboarding)**

### **30.1 Preconditions**

- Vendor onboarding active; clause library available.

### **30.2 Main Flow**

1. Generate state-aware contracts [Generate].
2. Capture signatures [Execute].
3. Sync terms with tax engine [Sync].

### **30.3 Subflows / Extensions**

- [Generate] Insert facilitator/indemnity clauses.
- [Execute] Sign and store contract artifacts.

### **30.4 Alternative / Error Flows**

- [Restaurant Remits] Update obligations accordingly.
- [Policy Change] Trigger contract addendum.

## **UC-31 Supplier Lab Certification Check (LAAF/FSMA)**

### **31.1 Preconditions**

- Supplier uploaded test results; accreditation feed enabled.

### **31.2 Main Flow**

1. Verify lab accreditation [Verify].
2. Approve or quarantine ingredient lots [Gate Lots].

### **31.3 Subflows / Extensions**

- [Verify] Confirm lab ID, scope, methods.
- [Gate Lots] Approve release; block failures.

### **31.4 Alternative / Error Flows**

- [Expired Accreditation] Reject results; request retest.
- [Inconclusive Results] Require confirmatory test.

## **UC-32 Contamination Alert Handling (Regulatory Bulletins)**

### **32.1 Preconditions**

- Subscribed to FDA/CDC alerts; lot tracking active.

### **32.2 Main Flow**

1. System ingests alert [Ingest Alert].
2. Match affected lots [Match Lots].
3. Suspend items and notify stakeholders [Notify].

### **32.3 Subflows / Extensions**

- [Match Lots] Match by UPC, lot, or date range.
- [Notify] Send alerts to customers, staff, vendors.

### **32.4 Alternative / Error Flows**

- [False Positive] Vendor proof clears issue.
- [Unclear Scope] Default to conservative quarantine.

## **UC-33 Product Recall Execution (Disable, Refund, Recover)**

### **33.1 Preconditions**

- UC-32 has identified affected items.

### **33.2 Main Flow**

1. Disable recalled items [Disable].
2. Refund impacted orders [Refund].
3. Arrange returns/disposal [Recover].

### **33.3 Subflows / Extensions**

- [Disable] Remove items; cancel pending orders.
- [Refund] Notify and credit customers.
- [Recover] Arrange returns; log disposal chain.

### **33.4 Alternative / Error Flows**

- [Consumed Product] Provide safety guidance.
- [Partial Recall] Allow safe variants with labels.

## **UC-34 Food Waste Tracking (Operational Logging)**

### **34.1 Preconditions**

- Waste tracking module enabled.

### **34.2 Main Flow**

1. Staff logs waste [Record Waste].
2. System aggregates data for analysis [Analyze].

### **34.3 Subflows / Extensions**

- [Record Waste] Include reason, portion, photos.

- [Analyze] Generate dashboards, trends, hotspots.

#### **34.4 Alternative / Error Flows**

- [Missing Data] Prompt completion before closing.
- [Unusual Spike] Trigger audit workflow.

### **UC-35 Community Donation Flow (Surplus Redistribution)**

#### **35.1 Preconditions**

- Donation partners onboarded; food safe to donate.

#### **35.2 Main Flow**

1. Publish donation lots [Publish].
2. Schedule pickup or delivery [Dispatch].
3. Log chain-of-custody [Log].

#### **35.3 Subflows / Extensions**

- [Publish] Include quantity, expiry, conditions.
- [Dispatch] Assign rider; issue handoff code.

#### **35.4 Alternative / Error Flows**

- [No Partner Available] Route to compost/animal feed.
- [Quality Failure] Cancel donation; dispose safely.

### **UC-36 Eco-Friendly Packaging Selection (Default Green)**

#### **36.1 Preconditions**

- Vendors configured eco-packaging options.

#### **36.2 Main Flow**

1. Default orders to eco packaging [Default].
2. Show impact estimate; allow opt-out [Educate].

#### **36.3 Subflows / Extensions**

- [Default] Apply vendor's eco option.
- [Educate] Show CO<sub>2</sub>/waste reduction metrics.

#### **36.4 Alternative / Error Flows**

- [Customer Opt-Out] Record reason for analytics.

- [Stock Out] Use standard packaging; notify customer.

## **UC-37 Rider Safety Protocols (Pre-Shift Gate)**

### **37.1 Preconditions**

- Rider profile active; safety checklist required.

### **37.2 Main Flow**

1. Rider completes safety checklist [Checklist].
2. System grants or denies access [Gate].

### **37.3 Subflows / Extensions**

- [Checklist] Helmet, lights, brakes, insurance.
- [Gate] Block unsafe riders until compliant.

### **37.4 Alternative / Error Flows**

- [Emergency Override] Manager grants temporary access.
- [Incident Report] Rider files near-miss/accident.

## **UC-38 Delivery Condition Monitoring (Cold Chain Proof)**

### **38.1 Preconditions**

Orders contain perishable items; monitoring enabled.

### **38.2 Main Flow**

1. Capture temperature at pickup/drop-off [Capture].
2. Validate against thresholds [Validate].

### **38.3 Subflows / Extensions**

- [Capture] Use sensors, photos, geotags.
- [Validate] Trigger alerts if out-of-range.

### **38.4 Alternative / Error Flows**

- [Sensor Failure] Request manual reading.
- [Breach] Offer refund/replacement; block vendor if recurring.

## **UC-39 Environmental Impact Reporting (CO<sub>2</sub> & Waste)**

### **39.1 Preconditions**

- Delivery, packaging, and waste data collected.

### **39.2 Main Flow**

1. Compute environmental impact [Compute].
2. Publish dashboards and reports [Publish].

### **39.3 Subflows / Extensions**

- [Compute] Apply distance, packaging, vehicle metrics.
- [Publish] Show trends, vendor performance, CSR exports.

### **39.4 Alternative / Error Flows**

- [Missing Data] Use estimates with flags.
- [Target Missed] Trigger corrective programs.

## **UC-40 Supplier Sustainability Badging (Discovery Filter)**

### **40.1 Preconditions**

- Vendor certifications (organic, fair trade, eco) verified.

### **40.2 Main Flow**

1. Display certification badges [Badge].
2. Enable filter and sort by sustainability [Filter].

### **40.3 Subflows / Extensions**

- [Badge] Pull cert metadata; display expiry.
- [Filter] Persist preferences across sessions.

### **40.4 Alternative / Error Flows**

- [Expired Cert] Remove badge; notify vendor.
- [Unverified Claim] Hide claim; trigger verification.

## **Reflection on LLM-Generated Use Cases**

Both LLMs (**ChatGPT 5** and **Gemini Pro**) produced similar coverage (UC-11 to UC-40) but differed in style and depth. The Gemini set emphasizes clarity and stakeholder readability: short Preconditions/Main Flow/Alternative Flows with domain grouping (Health, Tax, Sustainability). It communicates “what” the system should do, making it useful for non-technical stakeholders, but lacks detail on “how” flows execute or handle complex exceptions.

By contrast, the ChatGPT-5 set is more technical and design-oriented. It consistently introduces subflows, control points, and explicit error handling (e.g., lapsed benefits, mixed baskets, strict allergy blocking). This decomposition supports modular design, test case generation, and compliance traceability, but the higher detail level can reduce readability for business users.

Overall, Gemini provides approachable summaries suited for early requirements discussions, while ChatGPT-5 offers engineering precision better aligned with system modeling, testing, and regulatory contexts.

## **LLM Usage Cost Report**

### **ChatGPT-5 Plus Subscription**

- A ChatGPT-5 Plus subscription was used for this project.
- Subscription cost: \$20 total per month.
- Divided evenly across 3 team members → \$6.67 per person per month.

### **Gemini Pro Access (NC State Student Account)**

- Google Gemini Pro was also used for supplementary work.
- This access was free of charge through the NC State student account.
- Usage was shared between 3 people, so no additional out-of-pocket cost was incurred.

### **Total Cost Summary**

- Total cost for LLM usage for a month: \$20.
- Per person share (ChatGPT-5 Plus, 3 members): \$6.67 each.
- Gemini Pro: Free (covered by NC State student account).

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