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Smart Grocery Shopping Assistant

by Group 5
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Use Case Definition

The Smart Grocery Shopping Assistant is an AI-driven planning tool integrated into the Instacart app.

It supports:

- Meal planning based on user diet, time, and budget constraints
- Grocery list generation optimized for cost, nutrition, and availability
- Pantry tracking to avoid unnecessary purchases
- Real-time pricing through retailer APIs
- Conversational interaction, e.g., “What meals can I make with $50 this week?”

The assistant simplifies the user experience by offering a personalized, end-to-end grocery planning solution—from idea to cart—making shopping faster, cheaper, and less wasteful.

Objective

To build an AI-powered assistant that automates:

- Personalized meal planning
- Smart grocery list generation
- Real-time inventory & pricing optimization

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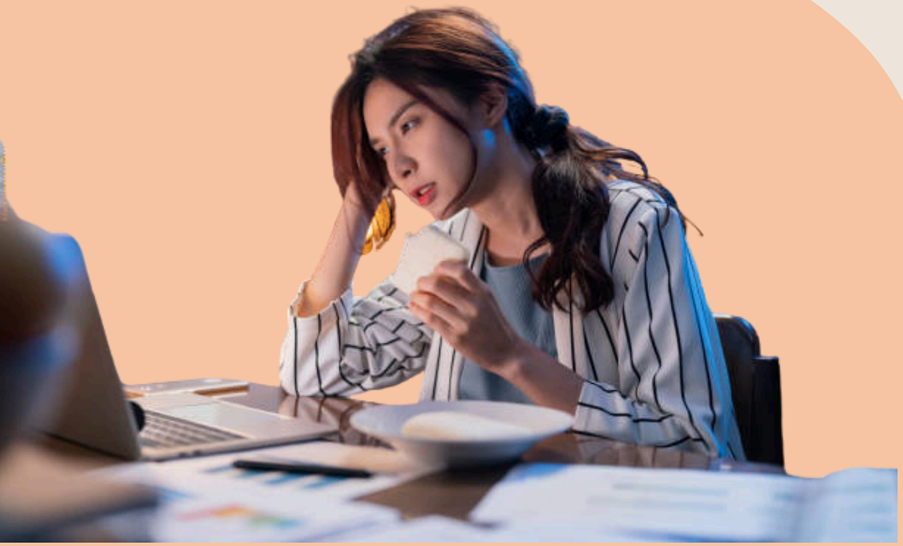
USER PERSONA



- **Name:** Samantha Chen
- **Age:** 29
- **Job:** Technology Consultant
- **Company Type:** Mid-sized consulting firm (B2B digital transformation software)
- **Location:** Urban metropolitan area in San Francisco
- **Income Bracket**: $90K–$120K/year
- **Living Situation:** Lives alone or with a roommate; limited kitchen storage
- **Education:** Bachelor’s in Engineering
- **Work Hours:** 40–50 hours/week; frequent client meetings and travel
- **Work Style:** Fast-paced, problem-solver, mobile-first workflow
- **Tech Proficiency:** High – frequent user of mobile productivity
- **Behavioral Traits:** Time-constrained, health-conscious, budget-aware, sustainability-minded

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USER Needs

- **Automated Meal Planning**

▸ Requires a system that removes the cognitive overhead of deciding what to eat.

▸ Must factor in dietary preferences, caloric intake, available ingredients, and prep time.

- **Budget-Constrained Optimization**

▸ Needs a tool to enforce a $100 weekly grocery limit dynamically.

▸ Prefers to see cost breakdowns and real-time trade-offs.

- **Inventory-Aware Smart List**

▸ Tool must prevent redundant purchases by integrating pantry inventory into list generation.

- **Time Efficiency**

▸ Expects shopping and cooking workflows to be reduced to a minimum through automation and guided assistance.

Day in Life / Concept Demonstration

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6:30 AM – Morning Briefing

- AI push notification: “You have oats, eggs, and spinach — here’s your $13 day plan”
- Budget usage to-date: $34.80 / $100

→ Value: No planning stress, aligns with weekly budget

→ Business Hook: Morning notification = high open rate & habit anchoring

12:00 PM – Deal Sync + List Adjustment

- Quick break between client calls
- Alert: “Salmon 25% off at Trader Joe’s — want to swap dinner plan?”
- Adjusts plan & grocery list in 3 taps

→ Value: Makes smart trade-offs in real-time

→ Business Hook: Sponsored product insertion + dynamic pricing optimization

5:30 PM – One-Click Checkout

- On her way home, opens the app
- AI-generated cart: $92.70 total, no duplicates, all in stock
- Schedules pickup for 7 PM

→ Value: Zero-friction execution after work

→ Business Hook: Boosts conversion & order frequency

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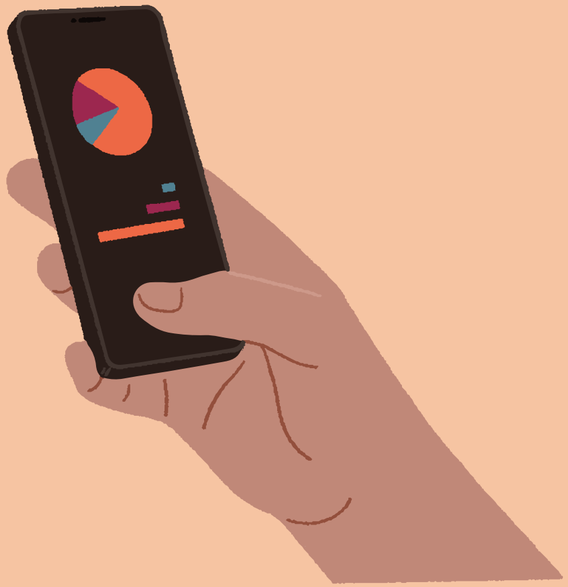
Day in Life / Concept Demonstration



6:45 PM – Guided Cooking Experience

- Uses voice assistant while preparing dinner
- AI says: “Step 1: Preheat your pan. Step 2: Season the salmon.”
- Option to switch to 20-min version

→ Value: Reduces effort, increases cooking satisfaction

→ Business Hook: Differentiates Instacart as a meal-execution platform

8:30 PM – Smart Logging + Weekly Recap

- Logs 1 leftover container; shelf life calculated
- “You saved $11.30 and cut waste by 27% this week!”
- Auto-seeds next week’s plan

→ Value: Reinforces positive behavior, builds trust in system

→ Business Hook: Loyalty reinforcement + personalization engine refinement

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Benefit Case

- **For Users:**
  - Saves hours/week through automated meal planning.
  - Improves dietary habits via nutritious recipe recommendations
  - Supports budgeting through personalized cost-saving tips
- **For Instacart / Retailers:**
  - Boosts loyalty and order frequency
  - Improves inventory management and reduces overstocking
  - Differentiates product with smart AI planning
- **For Grocery Industry:**
  - Reduces food waste across the supply chain
  - Increases efficiency and profitability
  - Drives competitiveness and innovation in the grocery space
- **Strategic Fit & ROI:**
  - Aligns with Instacart's vision to reduce user effort via personalization
  - Supports new monetization streams and enhanced user retention

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Stakeholders - External

Name/Category	Role/Responsibility	Interest in the Project
End Users / Consumers (Busy Professionals)	Use the assistant for meal planning, budgeting, and grocery shopping.	Convenience, time savings, healthy and budget-friendly meal planning.
Grocery Retailers (Supermarkets and Grocery Chains)	Provide inventory, pricing data; fulfill orders.	Increased sales, inventory optimization, and new customer acquisition.
Online Grocery Platforms (Instacart, Walmart.com, Amazon Fresh)	Enable ordering, delivery, and potential ad placement.	Boost in order volume, platform engagement, and potential ad revenue.
Nutrition Professionals (Dietitians, Health Experts)	Inform nutritional content and planning features.	Promoting health outcomes; credibility; professional exposure.
Data Providers (e.g., USDA Nutrient Database, Grocery Product APIs)	Supply food, recipe, and grocery product datasets.	Broad use of their datasets; partnership or licensing opportunities.
Regulatory Bodies (Data Privacy and Consumer Protection Agencies)	Ensure compliance with privacy and consumer protection laws.	Safeguarding user data and ensuring trustworthy AI use in consumer tools.

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Stakeholders

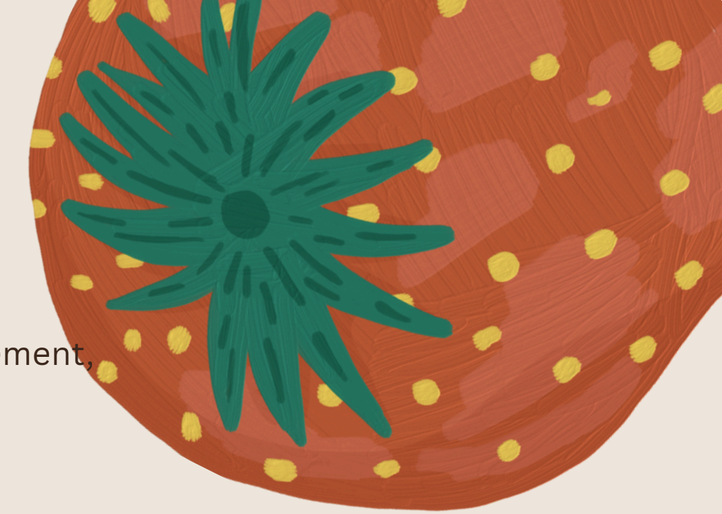
- Internal

Name/Category	Role/Responsibility	Interest in the Project
Project Sponsor / Product Owner	Initiates and funds the project; sets vision, goals, and scope.	Successful product launch and ROI; meeting project objectives and user adoption goals.
Tech Development Team (Engineers, Designers, Data Scientists)	Designs, builds, and tests the AI assistant (meal planner, pantry tracker, budget tool, etc.).	Professional interest in delivering an innovative, high-quality solution; meeting requirements and user expectations.

Data Source

Source	Description	Access	Size / Type / Frequency	Sample Fields / Values	Preparation Steps
Instacart Market Basket Dataset	Anonymized order and product data for modeling user behavior	Kaggle	~3 million orders Structured CSV	order_id, product_name, aisle_id, add_to_cart_order e.g., "Banana", aisle_id = 24	Join with products and orders; aggregate user baskets; filter frequent items
USDA FoodData Central	Nutrition data for over 300,000 food items	USDA	300K+ items Structured JSON Updated regularly	food_name, calories, protein, fat, serving_size e.g., spinach, 23 kcal/100g	Extract nutrient fields; normalize per 100g; map to product names
RecipeNLG Dataset	Recipe dataset with ingredients, steps, and categories	Hugging Face	20K recipes Semi-structured JSON Static	title, ingredients, steps, cuisine, diet e.g., Vegetable Stir Fry, [carrots, broccoli, soy sauce]	Parse ingredients; clean text; match to grocery SKUs
Retailer APIs (e.g., Walmart)	Real-time product price and inventory	Walmart API	Live API Structured JSON Dynamic	item_name, price, in_stock, store_id e.g., "Whole Milk", $3.49, in_stock = true	Query prices by name; filter by availability; update costs in list
Google Places / Yelp API	Store locations, hours, and services	Google Places API	Live API Semi-structured Dynamic	store_name, address, hours, services e.g., "Whole Foods", closes at 9PM	Pull stores by ZIP; filter by hours/service type (pickup, delivery)

Analytics Solutions



Objective

- Leverage data analytics to personalize grocery planning, optimize meal suggestions, monitor user engagement, and reduce waste and cost in the grocery shopping process.

Key Analytics Capabilities:

- Budget Optimization & Waste Reduction: Analyze past purchases and meal habits to recommend meal plans that align with user budgets and minimize leftover waste.
- Engagement & Behavior Monitoring: Track how users interact with the assistant (clicks, recipe saves, cart adds), monitor session frequency, and identify drop-off points in the grocery planning flow.
- User Segmentation Dashboards: Provide insights on user behavior by segment (e.g., health-focused, budget-conscious), visualized through dashboards showing purchasing trends, retention, and engagement scores.
- AI-Powered Personalization: Recommend meals and grocery items using collaborative filtering based on dietary preferences, shopping history, and contextual data like time and price constraints.

Example KPIs Tracked:

- Time Saved per User (hrs/week) ; Grocery Cost Reduction (%) ; Food Waste Reduction (%) ; Engagement Rate (sessions/week) ; Conversion Rate from Plan to Purchase (%) ; Drop-off Rate (step in planning funnel)

Generative AI Solution

Core Features:

- **AI-Generated Meal Plans:**
Automatically generate weekly meal plans and grocery lists based on user preferences, dietary goals, and seasonal product availability.

- **Context-Aware Recipe Suggestions:**
Leverage user budget, pantry inventory, and time constraints to generate customized and practical meal ideas.

- **Prompt-Driven Grocery Assistant:**
Built with LangChain and LLMs (e.g., GPT-4), enabling natural language interactions like “What can I cook with $50 this week?” to produce a full grocery list and meal breakdown.

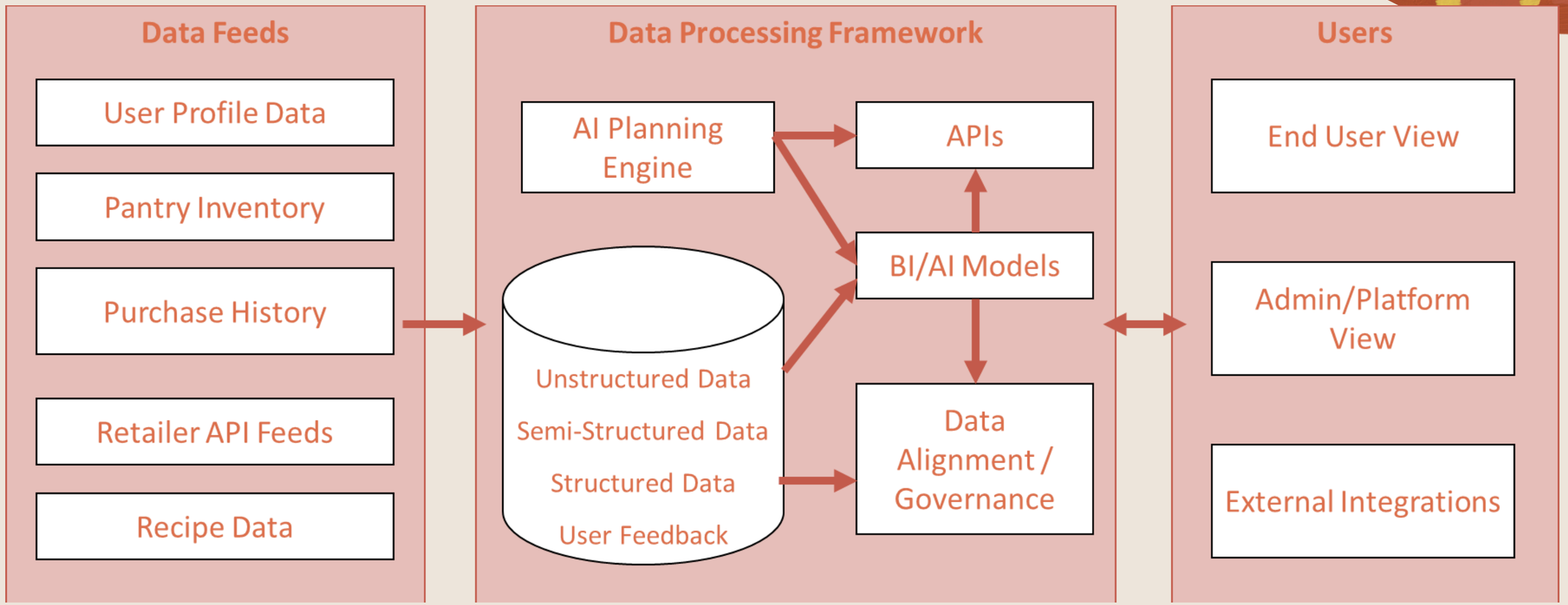
- **Dynamic Plan Versioning:**
Automatically updates plans when ingredient prices change, user schedules shift, or pantry status is refreshed.

- **Multilingual & Dietary Adaptability:**
Supports localization for diverse populations and adapts to allergies or cultural dietary restrictions (e.g., vegan, gluten-free, halal).

Technology Stack:

- **LangChain:**
Handles multi-step queries (e.g., plan, filter by price, check pantry) and interfaces with APIs like Instacart or Walmart.
- **GPT-4 / Claude / LLaMA:**
Generates recipe instructions, meal plans, nutrition explanations, and shopping tips using user-provided prompts.
- **Vector DB (e.g., Pinecone):**
Stores and retrieves user-specific meal preferences, past purchase history, and frequently used ingredients for personalization.
- **Retail API / Grocery Platform API:**
Connects with retailer APIs (Walmart, Instacart) to retrieve live product prices, stock info, and delivery times.
- **Example Use Case:**
“Create a 3-day meal plan for a user with a $75 budget, no dairy, and limited cooking time.”
→ AI returns optimized meals, shopping list, and links to cart checkout in seconds.

Solution Architecture



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Journey Map Phases

Research & Evaluation

- Identify core pain points
- Research ecosystem
- Locate data source

Interview

- Interview target users
- Develop personas and user need

Design

- Create solution architecture
- Define AI modules
- Map data pipeline

Build

- Build MVP
- Integrate nutrition and pricing dataset
- Develop a dashboard for demo and testing

Launch (MVP)

- Demonstrate prototype
- Gather feedbacks
- Prepare for enhancements

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Implementation Approach & MVP

Phase 1: MVP (3 months)

- Simple meal plan & static list generation
- User inputs: diet, budget, # of meals
- Output: recipe suggestions + one-click grocery list

Phase 2 : Enhanced (3–6 months)

- Add real-time pricing & deals
- Introduce pantry tracking and chat Q&A assistant

Phase 3: Full Rollout (6–12 months)

- Full inventory sync, advanced personalization
- Smart alerts, proactive suggestions, deeper health data sync

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Thank you! Any Questions?