# **Product Requirements Document (PRD)**

## **Product Name**: **HNI-Pseudo Insights Engine (HPIE)**

## **1. Problem Statement**

High-value brands need a reliable way to **predict how high-net-worth individuals (HNIs)** perceive their products. Traditional market research fails to replicate the nuanced thinking patterns of HNIs, especially across **diverse professions, genders, and ethnicities**. There’s a need for a **real-time simulation engine** that can generate actionable insights before launching premium products.

## **2. Proposed Solution**

The **HNI-Pseudo Insights Engine (HPIE)** creates **200 AI-driven pseudo-HNI personas** based on real-world data (social signals, news, public statements). Brands can interact with these personas via a chat interface to understand **sentiment, approval rates, and likelihood of product success**. Visual dashboards will display insights stratified by **profession, gender, and ethnicity**.

## **3. Goals & Success Metrics**

### **Goals**:

* Create a **realistic, diverse set of 200 HNI personas** reflecting the US population.
* Provide **real-time, validated responses** to brand queries.
* Deliver **rich, interactive visualizations** for actionable insights.

### **Success Metrics**:

* **Persona realism**: Human evaluators agree >85% persona authenticity.
* **Response latency**: <5 seconds for 200 responses.
* **Insight accuracy**: Alignment with market surveys (>80% correlation).

## **4. Core Features**

### **4.1 Persona Generation Module**

* **Data Sources**: Social media posts, Google/Firefox news scraping (5–10 recent news articles per individual).
* **Stratification**: Based on US census data.
  + **Professions**: Lawyers, Doctors, Businessmen, Investment Bankers, Politicians, Sports Stars.
  + **Gender & LGBTQ+ representation**.
  + **Ethnicity**: White, Black, Latino, Hispanic, Asian (including Indian), Native American.
* **Few-Shot Training**: Persona agents trained to mimic tone, preferences, and opinions.

### **4.2 Core Engine (N8N Orchestration)**

* **One persona = one N8N workflow**.
* **Primary LLM**: GPT-4o or LLaMA 3.
* **Validation Layer**: Secondary LLM (Claude Sonnet or GPT-4o-mini) to reduce hallucination.
* **Guardrails**: Bias detection, toxicity filtering.

### **4.3 Brand Chat System**

* **Glassmorphic UI** for premium look.
* Filters by **profession, race, gender**.
* **Real-time conversation** with personas.

### **4.4 Visualization Layer**

* Sentiment trends.
* Word cloud.
* Share of voice (profession-wise, race-wise).
* Product success probability.

## **5. Technical Architecture**

### **5.1 Components & Technology**

| **Component** | **Technology** | **Purpose** |
| --- | --- | --- |
| **Core Orchestration** | N8N | 200 persona workflows (agents). |
| **Primary LLM** | GPT-4o / LLaMA 3 | Generates persona responses. |
| **Validation LLM** | Claude Sonnet / GPT-4o-mini | Hallucination & bias check. |
| **Scraping** | Scrapy / SerpAPI | News & social data collection. |
| **Database** | PostgreSQL / Supabase | Persona profiles & updates. |
| **Vector Store** | Weaviate / Pinecone | Few-shot training & semantic search. |
| **Backend** | FastAPI (Python) | Optimized for speed. |
| **Frontend** | Next.js + TailwindCSS | Glassmorphic design. |
| **Visualization** | Plotly.js / Recharts | Interactive insights. |

### **5.2 System Flow**

1. **Persona Creation** → Collect data → Train persona → Store in DB.
2. **Brand Query** → N8N routes to all agents.
3. **Validation** → Secondary LLM cross-checks.
4. **Insights Engine** → Aggregates and visualizes results.

## **6. UX/UI Guidelines**

* **Glassmorphic Design**:
  + Transparent cards with frosted effects.
  + Premium typography & minimalistic layout.
* **Tabs**: **Responses | Insights | Filters | Visualizations**.
* Real-time filtering by demographics.

## **7. Risks & Mitigations**

| **Risk** | **Mitigation** |
| --- | --- |
| Hallucination | Secondary LLM validation. |
| Bias | Bias detection & re-generation pipeline. |
| Data scraping limits | Use APIs like SerpAPI, NewsAPI. |
| Scalability | Containerized agents, load balancing. |

## **8. Development Plan & Timeline**

| **Phase** | **Tasks** | **Duration** |
| --- | --- | --- |
| **1** | Data Collection & Stratification | 2 weeks |
| **2** | Core Engine (N8N + LLM) | 3 weeks |
| **3** | Validation & Guardrails | 1.5 weeks |
| **4** | Chat System + UI | 3 weeks |
| **5** | Visualization Layer | 2 weeks |
| **6** | Testing & Optimization | 2 weeks |

Total: **~12 weeks**

## **9. Acceptance Criteria**

* ✅ **Persona Data Accuracy**: Matches demographic % within ±5%.
* ✅ **Latency**: Query → Insights under 5 seconds.
* ✅ **Guardrails**: <1% hallucinated responses.
* ✅ **Visualization Accuracy**: Sentiment & probability >80% alignment with known studies.

## **10. Future Enhancements**

* Expand to global HNIs.
* Auto-updating personas with live feeds.
* Integration with **brand campaign simulators**.

## **11. System Architecture Diagram**

[Brand Query]  
 |  
 v  
[N8N Orchestrator] --> [200 Persona Agents]  
 | |  
 |--> [Primary LLM] |  
 |--> [Validation LLM] |  
 v  
[Aggregation & Insights Engine]  
 |  
 v  
[Glassmorphic Dashboard]

## **12. Developer Task Breakdown (Epics & Stories)**

### **Epic 1: Persona Generation**

* Story 1.1: Implement scraping & ingestion pipeline.
* Story 1.2: Build stratification logic & database schema.
* Story 1.3: Fine-tune persona agents.

### **Epic 2: Core Engine & Guardrails**

* Story 2.1: N8N workflow setup (200 agents).
* Story 2.2: Primary & Validation LLM integration.
* Story 2.3: Guardrail implementation (bias & hallucination).

### **Epic 3: Chat System & Frontend**

* Story 3.1: Build Glassmorphic UI (Next.js + TailwindCSS).
* Story 3.2: Implement brand query → persona response pipeline.
* Story 3.3: Add demographic filtering.

### **Epic 4: Visualization Layer**

* Story 4.1: Implement sentiment, word cloud, share-of-voice charts.
* Story 4.2: Build success probability estimator.

### **Epic 5: Testing & Optimization**

* Story 5.1: Load testing & latency optimization.
* Story 5.2: Persona realism validation.

## **13. Sample Glassmorphic UI Mockup**

(Will include in visual design phase: Glass cards with filters & charts).

**End of Document**