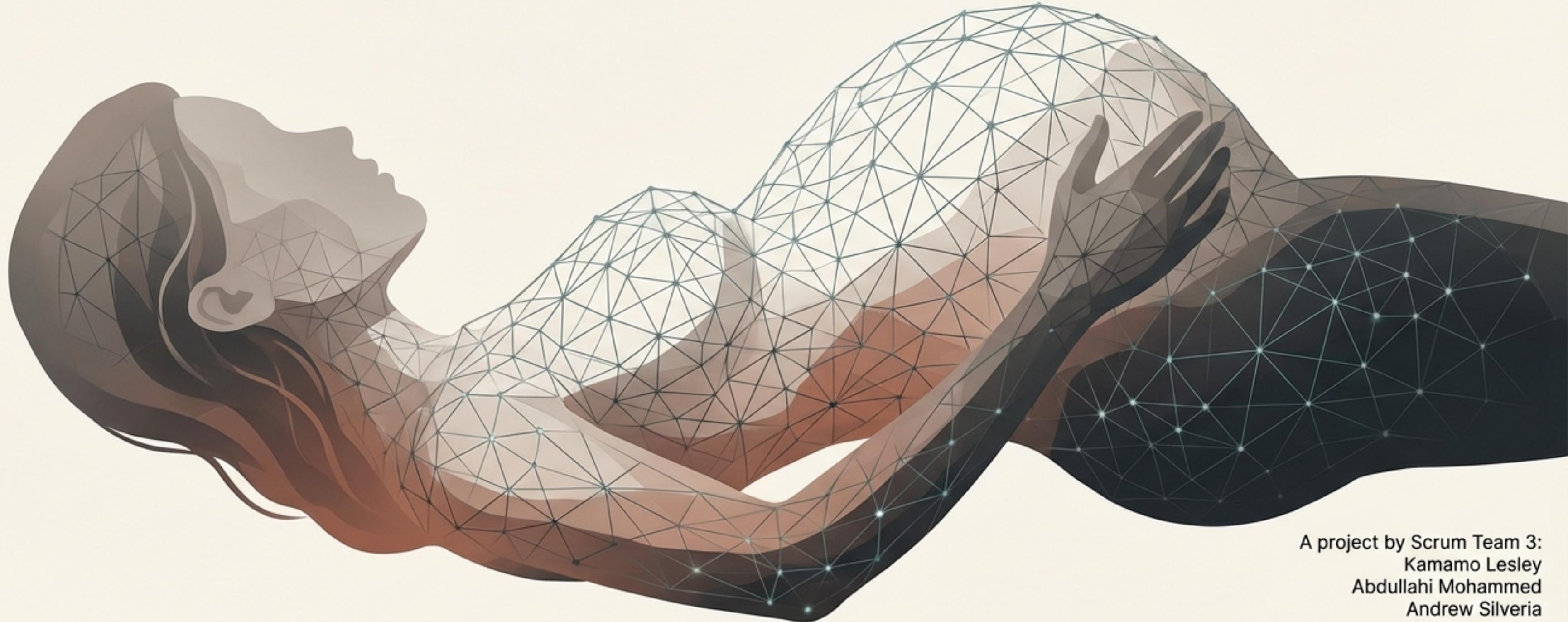


# Nurture Joy: AI-Enabled Emotional & Pregnancy Support

Bridging the gap between clinical data and maternal well-being.



A project by Scrum Team 3:  
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Course Context: INFO8665-26W-Sec1 - Projects in Machine Learning



# The Maternal Support Gap

## The Mother's Struggle



**Delayed Support:** Pregnant women lack timely emotional reassurance, leading to isolation.



**Missed Signals:** Without continuous monitoring, early warning signs of distress are invisible until they become emergencies.



**Lack of Safety:** Unmoderated online spaces expose users to toxic misinformation.

## The Provider's Challenge



**Data Overload:** Providers cannot efficiently identify distress signals in raw patient data.



**Engagement Blind Spots:** No visibility into well-being between scheduled appointments.

**Bottom Line:** Nurture Joy addresses these gaps by operationalising empathy through machine learning.

# Vision, Mission & Core Philosophy



## Vision (Long-Term)

Throughout pregnancy, every mother receives individualized, knowledgeable, and caring support—anytime, anywhere.



## Mission (Medium-Term)

To deliver a safe digital platform using machine learning to offer expectant mothers and healthcare professionals data-driven data driven decision decision support and personalized pregnancy insights.



## The Nurture Joy Philosophy

- 1. Decision Support, Not Decision Making:** The system augments human judgment; it never replaces it.
- 2. Non-Diagnostic:** All outputs are risk indicators, not medical diagnoses.
- 3. Safety First:** A commitment to explainable AI that prioritises user safety.

# End-User Archetypes: The Mothers

## The Anxious & New (Reassurance)



**Maya**  
(First-time)



**Lina**  
(Low-risk/Anxious)

## The Vulnerable (Early Detection)



**Aisha**  
(High-risk)



**Emily**  
(History of depression)



**Nadia**  
(Isolated)

## The Pragmatic (Efficiency)



**Sophia**  
(Working pro)



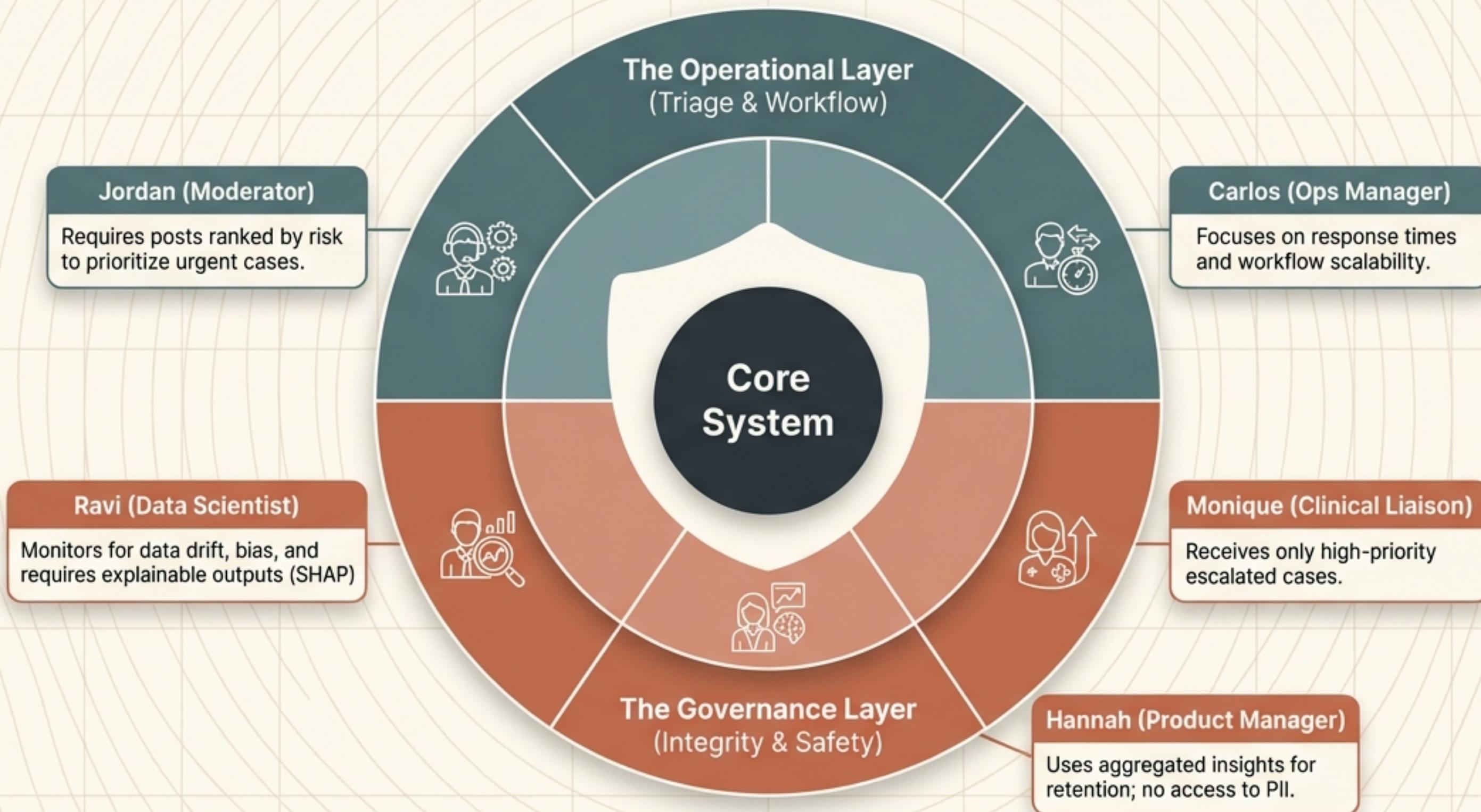
**Patricia**  
(Older mom)

**Need:** Simple explanations of stress; mood check-ins; anxiety trend monitoring.

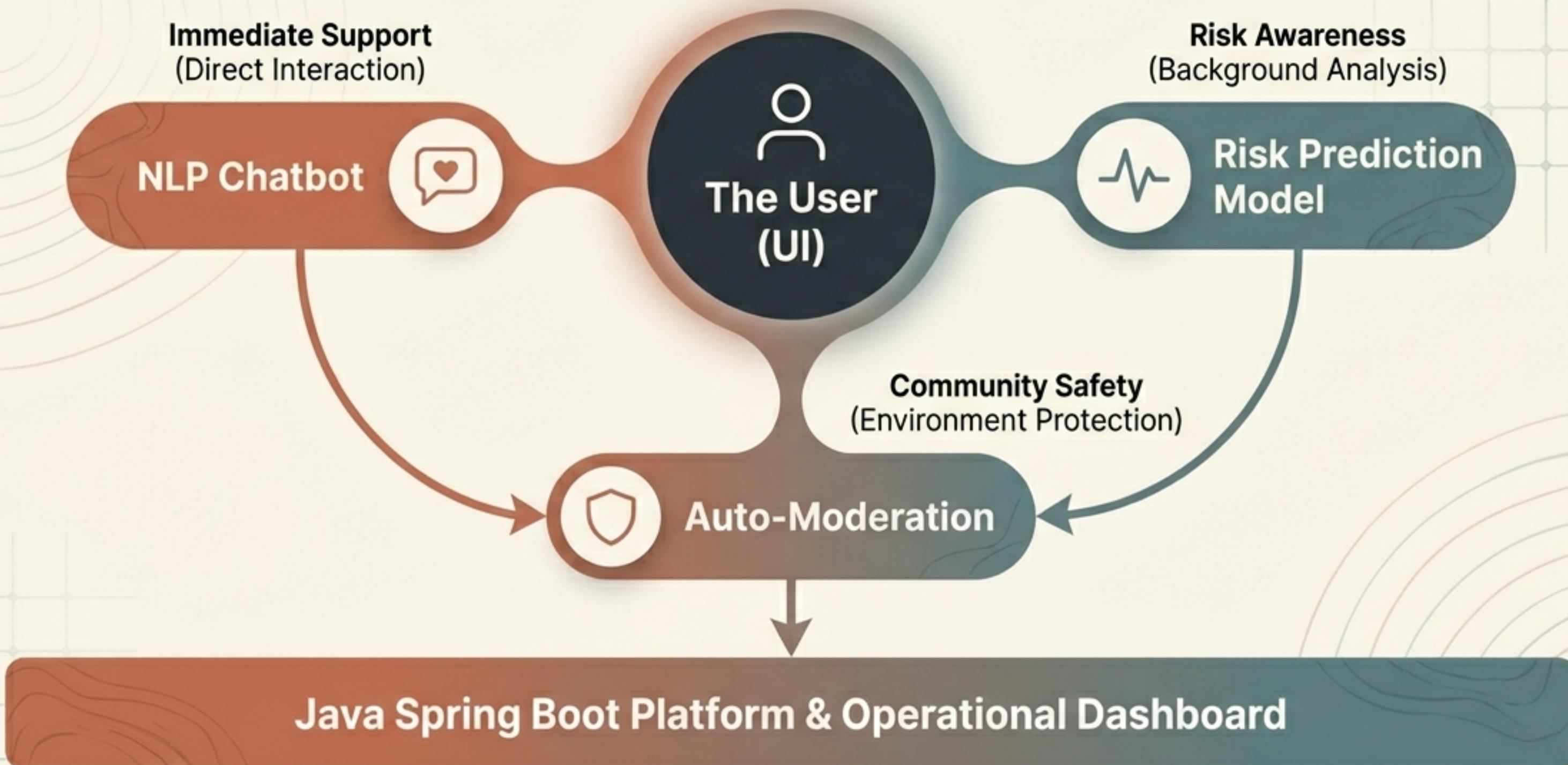
**Need:** Proactive detection of mood declines; connection; clear advice on when to seek help.

**Need:** Quick, time-efficient check-ins; summaries of stress patterns; age-specific support.

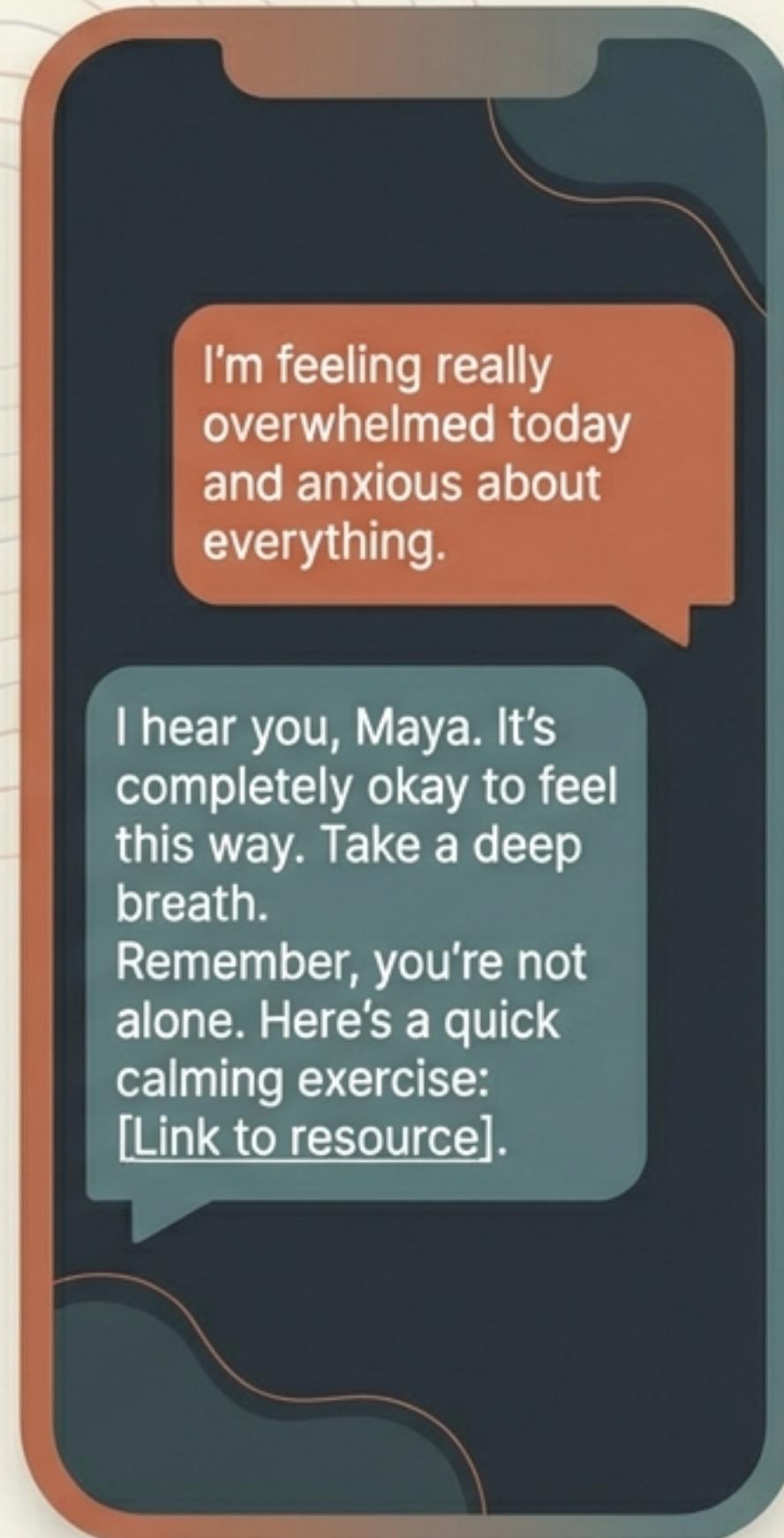
# The Guardians: Operations & Governance



# The Nurture Joy Ecosystem



A closed loop of support, detection, and protection.



# Use Case 1: NLP Emotional Well-Being Chatbot

Real-time support for Maya and Sophia.

## The Function

- **Input:** User free-text reflections.
- **Process:** NLP categorisation of text into emotional sentiments (Stress, Anxiety, Sadness).
- **Output:** Supportive, non-clinical feedback and resource suggestions.

## The Value

- Scalable mental health support that bridges the gap between clinical appointments.

## Differentiation

- Unlike static FAQs, this system listens to emotional tone to validate feelings immediately.

# Use Case 2: Non-Diagnostic Risk Prediction

Early awareness for Aisha and Patricia.



## The Function

- **Input:** Demographic data, trimester, symptoms, history.
- **Process:** Machine Learning classification (Logistic Regression/Decision Tree).
- **Output:** Predicted risk level pattern (Low/Medium/High).



## The Value

- Encourages early clinical consultation.
- Identifies patterns that warrant professional attention.



**ALERT: High Risk Pattern Detected.**

**Action Required:** Consult your healthcare provider.

## Safety Protocol

All high-risk predictions trigger a "Consult your Provider" disclaimer.  
This system does NOT diagnose.

# Use Case 3: AI-Assisted Community Moderation

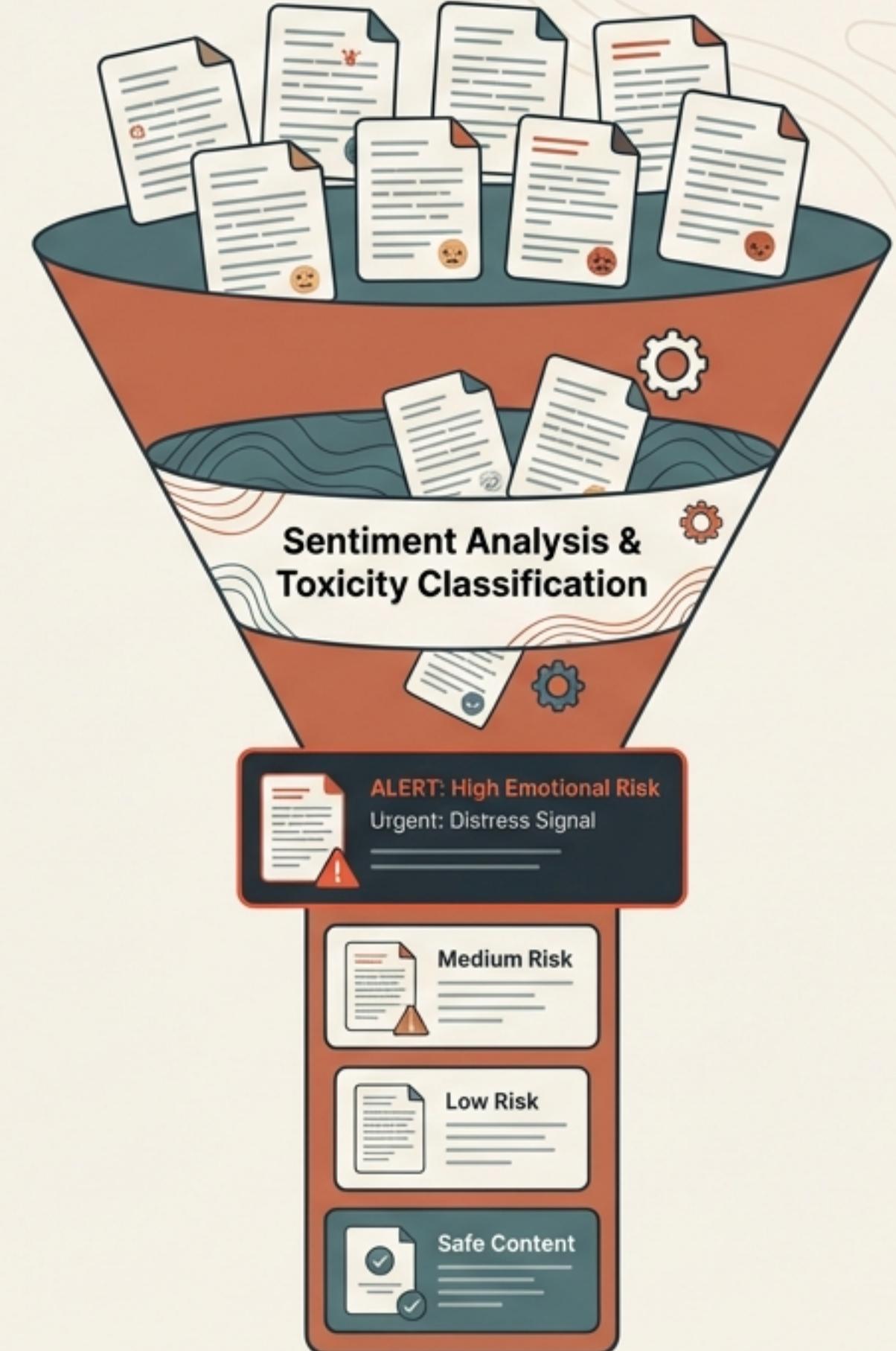
Safety for Nadia; Efficiency for Jordan.

## The Function

- **Input:** Community forum posts.
- **Process:** Sentiment analysis and toxicity classification.
- **Output:** Posts ranked by emotional risk; flagging of toxic content.

## The Value

- **For Users:** A supportive space free from harassment.
- **For Ops:** Moderators treat urgent distress signals first, reducing burnout and response time.



Community Safety & Moderator Efficiency

# Scientific Validation & Literature Review



## Chatbot Efficacy

Editorial New

**Mythily et al. (2025):** Confirms AI-driven sentiment analysis is effective for scalable mental health support where professional access is limited.



## Risk Prediction Accuracy

**Scientific Reports (2025):** 'Prediction of high-risk pregnancy based on machine learning algorithms.' ML models (Multilayer Perceptron) can surpass rule-based methods.



## Moderation Efficiency

**Huh et al. (2013):** Text classification significantly improves safety and efficiency in online health communities by prioritising posts for expert attention.

# Technical Strategy & Architecture

## Tech Stack

### Explainability

#### Explainability (XAI)

- Implementation of Feature Importance / SHAP values.
- Goal: Transparent logic for Clinical Liaisons and Data Scientists.

### ML Services

#### Machine Learning Services

- Integration: Models exposed via secure Python REST API.
- Baseline Models: Logistic Regression, Decision Trees, Naive Bayes.

### Backend / Platform Core Platform

#### Core Platform

- Backend: Java Spring Boot application (Robust, scalable).
- Frontend: Integrated User Interface.

# Data Governance, Ethics & Safety

## Privacy

Aggregated insights only  
for Product Managers

Strict separation of PII  
from model training data.



## Fairness

Continuous monitoring  
for data drift.

Bias checks to ensure the  
model serves diverse  
demographics equally.

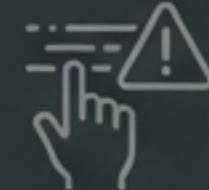


## Safety

(Human-in-the-Loop)

High-risk alerts are  
escalated to human  
workflows.

Clear labelling of all AI  
outputs as "Non-  
Diagnostic Support".



# Tactical Roadmap (Short-Term Execution)

## Step 1: Data Preparation

### Editorial New

Identify pregnancy features (age, symptoms) from public datasets. Data cleaning, preprocessing, and encoding.



## Step 2: Model Training

### Editorial New

Train baseline supervised models (Logistic Regression, Decision Tree). Validate using Precision, Recall, and Accuracy.



## Step 3: Integration

### Editorial New

Expose models via Python REST API. Integrate predictions into Java Spring Boot UI. Embed safety disclaimers.



# Strategic Roadmap (Medium to Long-Term)

## Expansion

Develop NLP-based decision-support dashboards for clinicians.  
Implement advanced 'Human-in-the-Loop' workflow tools.

## Refinement

Transition to complex architectures (Multilayer Perceptron) as data volume grows.  
Refine fairness metrics.

**Goal Statement:** Full realisation of the vision—individualised, knowledgeable support for every mother.

# “Nurture Joy”

Scrum Team 3

Kamamo Lesley | Abdullahi Mohammed  
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**“We are dedicated to ensuring every mother feels heard, supported, and safe. We do not replace the clinician; we empower the community and the patient through responsible, explainable AI.”**