NeuroAssist AI – Detailed Product Requirements Document (PRD)

Version: 3.0 (Deep Dive) **Date**: 2026-01-10 **Status**: Implementation Reference

> *Purpose*: This document serves as the absolute source of truth, defining the exact behavior, data structures, and AI logic of the NeuroAssist platform.

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1. Document Control

(Unchanged from previous version)

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2. Product Overview

2.1 Product Vision

To build the world's most trusted AI Scribe for Neurology, reducing documentation time by 80% while increasing patient safety through active risk monitoring.

2.2 detailed Success Metrics

- **Performance**: 95% of SOAP notes generated < 10 seconds.
- **Triage Accuracy**: 0% False Negatives for "Stroke" and "Suicide" keywords.
- **User Retention**: Doctors use the tool for > 90% of their daily consults after 1 week.

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3. Detailed Scope & Feature Logic

3.1 Patient Intake (Voice)

- **Component**: `AudioRecorder`
- **Logic**:
  - **Input**: User click.
  - **Process**: Browser `MediaRecorder` API captures chunks (250ms).
  - **Constraint**: Max 60s. Auto-stop at 60s.
  - **Output**: Blob sent onto `/upload` endpoint with `source=PRE_VISIT`.

3.2 Triage Engine (The "Brain")

- **Algorithm**: Keyword Matching (Deterministic).
- **Logic Table**:

Metric	Condition	Result
Critical	Contains "paralysis", "slurred speech", "chest pain"	Score: 95, Category: CRITICAL
High	Contains "severe headache", "fainting"	Score: 75, Category: HIGH
Moderate	Contains "fever", "vomiting"	Score: 50, Category: MODERATE
Low	No keywords matched	Score: 20, Category: LOW

- **Edge Case**: If transcript fails, default to "Moderate" (Fail-safe).

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4. System Architecture

(Refer to `NeuroAssist_Technical_Documentation.md` for full diagrams)

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5. User Journeys (Step-by-Step)

5.1 Doctor Consultation (The "Happy Path")

1. **Doctor** logs in (`/login`).
2. **System** displays Dashboard.
3. **Doctor** clicks "Next Patient" (Top of Priority Queue).
4. **System** loads `ActiveConsultation` page.
   - *State*: "Ready to Record".
5. **Doctor** clicks "Start Recording".
   - *UI*: Waveform visualizer active. "Recording..." badge Pulse (Red).
6. **Doctor** conducts consult (1-15 mins).
7. **Doctor** clicks "Stop".
   - *System*: Uploads blob -> Triggers Transcribe Job.
8. **Doctor** sees "Processing..." state (Spinner).
9. **System** returns Transcript + SOAP Draft.
10. **Doctor** edits "Plan" section.
11. **Doctor** clicks "Finish".
    - *System*: Locks record, generates PDF, updates Status to `COMPLETED` .

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6. Detailed Functional Requirements

6.2 Transcription Module

- **Provider**: AssemblyAI Connection.
- **Config Parameters**:
  - `speaker_labels` : `True`
  - `speakers_expected` : `2` (Doctor, Patient)
  - `word_boost` : `["Levetiracetam", "Topiramate", "Ataxia"]`
  - `redact_pii` : `True` (Policies: `medical_process` , `us_social_security_number`)

6.4 SOAP Note Generation (AI)

- **Model**: Gemini 2.5 Flash.
- **System Prompt (Actual)**:

```
You the expert Neurologist's AI Scribe.
Input: A dialogue transcript between Doctor and Patient.
Output: A JSON object with keys 'subjective', 'objective', 'assessment',
'plan'.
Rules:
- Use professional medical terminology.
```

```
— Be concise.
— Do not hallucinate medications not mentioned.
```

7. UX / UI Requirements & States

7.1 Component States

- **Record Button**:
  - *Default*: Blue, "Start Recording", Icon: Mic.
  - *Active*: Red, "Stop Recording", Icon: Square, Pulse Animation.
  - *Disabled*: Gray (when uploading or processing).
- **Risk Flag**:
  - *Critical*: Red Background (`bg-red-50`), Red Border, Icon: Alert Triangle. Text: "CRITICAL CONTRAINDICATION".
  - *Caution*: Amber Background (`bg-amber-50`), Amber Border. Text: "Clinical Caution".

7.2 Error Handling UI

- **Network Fail**: Toast Notification "Connection lost. Retrying...".
- **Mic Access Denied**: Modal Dialog "Please allow Microphone access in browser settings."

8. Data Dictionary (Schema Specifications)

8.1 Table: `Consultations`

Field	Type	Required	Notes
`id`	UUID	Yes	Primary Key
`patient_id`	UUID	Yes	FK to Users
`status`	Enum	Yes	Default: SCHEDULED
`urgency_score`	Int	No	0-100. Computed by Triage Svc.
`triage_source`	String	No	"AI" or "MANUAL"

8.2 Entity: `SOAPNote` (JSONB)

JSON Key	Type	Description
`subjective`	String	Patient's reported symptoms.
`objective`	String	Vitals and physical exam findings.
`assessment`	String	Synthesis of S & O.
`plan`	String	Proposed treatment.
`risk_flags`	List	AI-detected safety warnings.

9. Security & Compliance Details

9.1 Data Protection

- **At Rest**: AWS EBS Encryption / DB Volume Encryption.
- **In Transit**: TLS 1.2+ forced on all Load Balancers.
- **Audio**: Files are presigned-URL access only (Time-limited).

9.2 Access Controls (RBAC Details)

- **Role**: `FRONT_DESK`
  - *Can*: Create Appointments, View Queue (Name/Score only).
  - *Cannot*: Open Consultation Details, View Transcripts, View SOAP (HIPAA "Minimum Necessary" Rule).

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10. Release & Testing Criteria

10.1 Acceptance Criteria (Gherkin)

- **Scenario**: Stroke Patient Check-in
  - *Given* a patient records "I have numbness in my left arm".
  - *When* the audio is processed.
  - *Then* the Triage Score must be > 90.
  - *And* the Front Desk Dashboard must show a "Critical" Red Badge.

10.2 Load Testing Goals

- Concurrent Consultations: 50.
- Max Audio Upload Size: 50MB. (Tested with 48MB WAV file).

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11. Appendices

(Visual Flowcharts included in PDF render)