CRISISCONNECT

TECHNICAL DOCUMENTATION &
STRATEGIC OVERVIEW

BETA PROTOTYPE V2.6

AI-Powered Disaster Intake System

Gemini Live API Integration

Red Cross 800-Number Operator Protocols

American Red Cross

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PROTOTYPE - NOT FOR PRODUCTION USE

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1. EXECUTIVE SUMMARY

CrisisConnect represents the next evolution in disaster situational awareness. This AI-powered intake system automates the critical first 90 seconds of disaster calls, ensuring human resources are optimized for physical intervention while the digital operator manages high-volume data collection.

> **Mission Statement**
>
> To provide immediate, compassionate, and protocol-compliant disaster assistance to survivors through AI-powered voice interaction, while capturing structured data for operational coordination and volunteer dispatch.

Key Capabilities

- **Real-Time Voice Interaction:** Bidirectional streaming via Google Gemini 2.0 Live API

- **Instant Language Detection:** Seamless switching between 6+ languages without menu delays

- **Structured Data Capture:** Automatic extraction of caller information for maps and dashboards

- **Safety-First Protocols:** Mandatory 9-1-1 triage before any data collection

- **AI Guardrails:** Hard-coded prohibitions against promises, medical advice, and legal guidance

- **Third-Party Intake:** Specialized flows for fire department and neighbor reports

Deployment Status

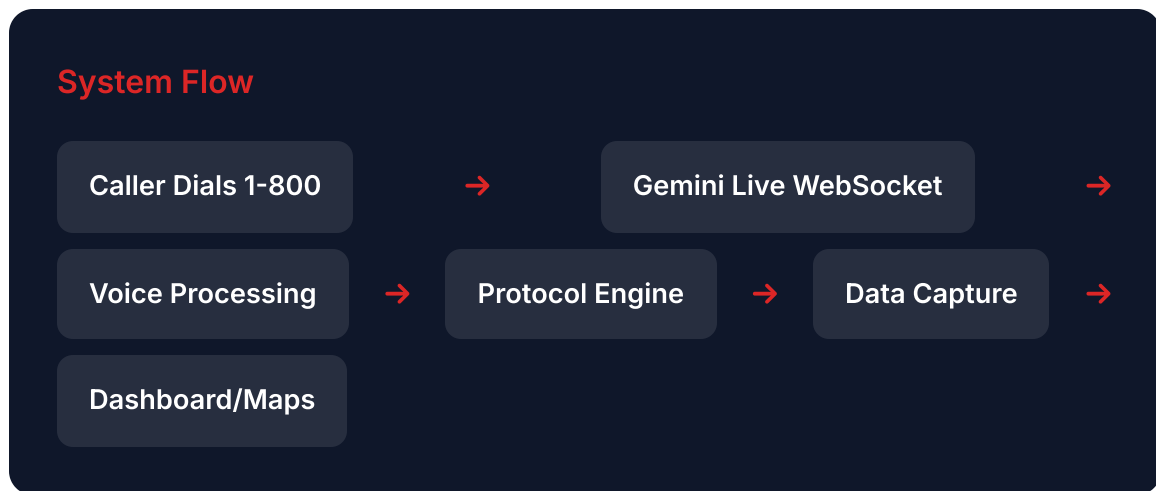| COMPONENT	STATUS	PLATFORM
AI Studio Demo	Production	Google Cloud Run
Gemini Live Integration	Production	Vercel (RescueLens)
Dashboard Export	Active	JSON / ArcGIS Ready

2. PROJECT OVERVIEW

Problem Statement

During major disasters, Red Cross call centers experience extreme call volumes. Traditional human-only intake creates bottlenecks, inconsistent data capture, and delays in deploying volunteers to affected families. Non-English speakers face additional barriers through IVR menu systems ("Press 1 for English").

Solution Architecture

CrisisConnect deploys an AI-powered operator that handles initial intake calls with full voice interaction. The system follows strict Red Cross protocols, captures structured data, and enables immediate volunteer dispatch coordination.

System Flow

Caller Dials 1-800	→	Gemini Live WebSocket	→
Voice Processing	→ Protocol Engine →	Data Capture	→
Dashboard/Maps			

Key Differentiators

vs. Traditional IVR Systems

- No "Press 1 for English" delays - instant language detection

- Natural conversation flow vs. rigid menu trees

- Emotional intelligence - recognizes distress and panic

- Structured data extraction without manual transcription

vs. Generic AI Chatbots

- Purpose-built for disaster response - not general-purpose

- Hard-coded safety protocols prevent hallucination

- Sequential Lock state machine ensures data integrity

- Trained on Red Cross operator guidelines

3. TECHNICAL ARCHITECTURE

Core Technology Stack

LAYER	TECHNOLOGY	PURPOSE
Voice AI	Google Gemini 2.0 Flash (Live API)	Bidirectional audio streaming, language understanding
Transport	WebSocket (WSS)	Real-time audio transmission
Frontend	React + TypeScript	User interface, audio capture
Audio Processing	Web Audio API	Microphone capture (16kHz), playback (24kHz)
Hosting	Vercel + Google Cloud Run	Global edge deployment
Data Export	JSON / ArcGIS FeatureServer	Dashboard and map integration

Gemini Live API Integration

WebSocket Connection

```
wss://generativelanguage.googleapis.com/ws/google.ai.generativelanguage.v1beta.Ge
```

Model Configuration

```
{
  "setup": {
```

```
    "model": "models/gemini-2.0-flash-exp",
    "generationConfig": {
      "responseModalities": ["AUDIO"],
      "speechConfig": {
        "voiceConfig": {
          "prebuiltVoiceConfig": {
            "voiceName": "Aoede"
          }
        }
      }
    },
    "systemInstruction": {
      "parts": [{ "text": "SYSTEM_PROMPT" }]
    }
  }
}
```

Audio Format Specifications

- **Input (Microphone):** PCM 16-bit, 16kHz sample rate, mono
- **Output (Playback):** PCM 16-bit, 24kHz sample rate, mono
- **Encoding:** Base64 for WebSocket transmission

4. CORE OPERATING PRINCIPLES

The CrisisConnect operator is governed by four non-negotiable principles that form the foundation of every interaction.

01

Safety Gate First
Every call begins with life-safety triage. No data collection proceeds until the caller's immediate safety is confirmed. Emergency situations are redirected to 9-1-1.

02

Data Stack Second
Structured data capture follows safety confirmation. The system tracks which critical data points have been collected and naturally circles back to gather missing information.

03

Compassion Always
Every response acknowledges the caller's emotional state. The AI uses warm, empathetic language and is patient with pauses, crying, or confusion.

04

Promises Never
The AI never makes commitments about aid amounts, approval timelines, or volunteer arrival. It uses precise language that sets appropriate expectations.

The "Sequential Lock" Protocol

CrisisConnect operates as an Autonomous State Machine. The intake follows a non-linear but strictly locked sequence that ensures data integrity while allowing natural conversation flow:

1. **Safety Gate:** Confirm caller is not in immediate danger

2. **Identity:** Establish who is calling (direct victim vs. third party)

3. **Report Classification:** Determine disaster type and situation

4. **Personnel:** Capture household composition and vulnerabilities

5. **Location:** Geo-locate the affected address

6. **Needs Assessment:** Document required assistance types

7. **Referral:** Provide appropriate resources and next steps

5. SAFETY PROTOCOLS & LIFE-SAFETY TRIAGE

Mandatory Opening Script

"Thank you for calling the American Red Cross. If this is a life-threatening emergency, please hang up and dial 9-1-1. I am an automated assistant documenting this report for operational records. Human support is available if needed. How can I assist you today?"

Life-Safety Triage Questions

If the caller sounds distressed, panicked, or mentions danger, the AI IMMEDIATELY asks:

1. "Are you in a safe location right now?"
2. "Is anyone injured or in need of immediate medical attention?"
3. "Do you have access to clean water and safe shelter?"

Safety Triggers - Immediate 9-1-1 Redirect

If the caller mentions ANY of these situations:

- Trapped, can't escape, water rising, fire spreading
- Chest pain, difficulty breathing, severe bleeding, unconscious person
- Active threat, violence, someone in danger
- Gas smell, structure collapsing, electrical danger

Exact Emergency Response

"This sounds like an emergency. Please hang up and call 9-1-1 right now—they can dispatch help immediately. Once you're safe, please call us back and we'll help with everything else."

6. AI GUARDRAILS & HARD BOUNDARIES

The AI operates within strict guardrails that prevent harmful outputs. These are not suggestions—they are hard-coded prohibitions enforced at the system prompt level.

Financial Promises

NEVER Say These Phrases:

- **"You will receive..."**
- **"You're approved for..."**
- **"You'll get $X..."**
- **"The Red Cross will pay..."**
- **"I can guarantee..."**

INSTEAD, Always Say:

- **"The Red Cross may be able to help with..."**
- **"Financial assistance is available based on assessment..."**
- **"A caseworker will review your situation and discuss options..."**

Medical Advice

NEVER Say These Phrases:

- **"It sounds like you have..."**
- **"You should take..."**

- "That's probably just..."

- "It doesn't sound serious..."

INSTEAD, Always Say:

- "I'm not able to give medical advice. Please contact a healthcare provider."

- "For any medical concerns, please call your doctor or visit an urgent care."

- "Our shelters have medical staff who can help assess that when you arrive."

Legal Advice

NEVER Say These Phrases:

- "Your landlord can't..."

- "You have a right to..."

- "The insurance company has to..."

- "That's illegal..."

INSTEAD, Always Say:

- "For legal questions, I recommend contacting local legal aid services."

- "FEMA may have resources about your rights as a disaster survivor."

Weather & Utility Predictions

NEVER Say:

- "The storm will..."
- "Power should be back by..."
- "It's safe to return..."

INSTEAD, Always Say:

- "For current weather conditions, please check the National Weather Service."
- "Contact your utility company for restoration estimates."
- "Local emergency management will announce when it's safe to return."

Privacy & Location of Individuals

NEVER Reveal:

- Specific shelter a person is staying at
- Whether a specific person has called
- Contact information for other callers

INSTEAD, Always Say:

- "I can help you register on Safe and Well so your family knows you're okay."
- "If you're looking for someone, check safeandwell.org or call 1-800-RED-CROSS."

7. ADAPTIVE CALL FLOW LOGIC

Callers often skip questions or provide information out of order. The system handles this gracefully while ensuring all critical data is eventually captured.

Information Tracking

The AI mentally tracks which critical data points have been collected:

DATA POINT	PRIORITY	REQUIRED FOR
Safety status confirmed	Critical	All calls
Location (city, ZIP, address)	Critical	Resource matching, volunteer dispatch
Household size	High	Shelter capacity, aid calculation
Vulnerable members	High	Medical shelter assignment
Pets	Medium	Pet-friendly shelter assignment
Primary need	Critical	Service routing
Contact phone	High	Volunteer callback

Handling Skipped Questions

If Caller Jumps Ahead

Accept the information, acknowledge it, then circle back naturally:

> "Thank you for that. Before I look up shelters, let me make sure I have your information correct..."

If Caller is Vague

Ask clarifying questions without making them feel interrogated:

> "And how many people total would need shelter with you?"

If Caller Refuses to Answer

Note it and move on—don't press repeatedly:

> "That's okay, we can continue. What else can I help with?"

Natural Transitions for Missing Data

- **Location:** "So I can find the closest resources, what city or ZIP code are you in?"
- **Household:** "Will anyone else be with you? I want to make sure we have space for everyone."
- **Medical needs:** "Does anyone in your group have medical conditions I should note for shelter staff?"
- **Pets:** "Do you have any pets that need to come with you? Some shelters accept animals."
- **Contact:** "What's a good number to reach you if we need to follow up?"

8. THIRD-PARTY FIRE REPORTS

A very common call type: Fire departments, neighbors, or witnesses calling ON BEHALF of fire victims. The system has specialized flows for these scenarios.

Caller Type Identification

> "Are you the person affected by the fire, or are you calling to report a fire affecting someone else?"

Information to Collect

Fire Location

- Full street address of the fire
- City, state, ZIP code
- Type of structure (single-family, apartment, mobile home)
- Apartment/unit number if applicable
- Cross street or landmark

Fire Details

- When did the fire occur? (date and time)
- Is the fire department still on scene?
- Damage level: total loss, partial, smoke/water only
- Are residents displaced or able to stay?
- Any injuries?

Affected Families (For EACH Household)

- Names of adults

- Number of adults and children (with ages)

- Elderly (65+) or medical needs

- Pets (type and number)

- Contact phone number

- Current location (on scene, with family, need shelter)

- Primary language spoken

Caller Information

- Caller's name and role (FD, neighbor, witness, property manager)

- Caller's phone number

- Fire department incident number (if from FD)

Volunteer Response Messaging

Standard Response

"The Red Cross typically sends two trained volunteers to meet with the affected families. Our volunteers can provide immediate assistance like emergency funds for food, clothing, and shelter. Is there a good time and location for our volunteers to meet with the family?"

Multi-Family Fire Handling

For apartment buildings or duplexes:

- "How many units were affected?"

- "Do you have information on all the affected families, or just some?"

- "We'll send enough volunteers to assist all displaced families."

- Gather SEPARATE information for each affected household

9. EMERGENCY SAFETY GUIDANCE

The AI provides simple, actionable safety guidance. Instructions are kept SHORT—one step at a time, no complex multi-part instructions.

Flooding

- "Move to higher ground now—upstairs or the highest floor."
- "Do NOT walk or drive through floodwater. Turn around, don't drown."
- "Turn off electricity at the main breaker if you can reach it safely."
- "If water is rising fast, get to the roof and call 9-1-1."
- "If trapped in a car in rising water, unbuckle, open the window, climb out."

Fire / Wildfire

- "Leave now. Don't gather belongings—just go."
- "Close doors behind you as you leave—this slows the fire."
- "Check door handles before opening. Hot handle means fire on the other side."
- "If there's smoke, crawl low—air is cleaner near the floor."
- "If trapped: close the door, stuff towels under it, call 9-1-1, wave from window."

Gas Leak

- "Leave the building immediately. Don't turn any switches on or off."
- "Don't use your phone until you're outside and away from the building."
- "Don't start your car if it's in the garage."

- "Once outside, call 9-1-1 and your gas company."

Electrical Hazards

- "Stay away from downed power lines—at least 35 feet."
- "If power lines are on your car, stay inside and call 9-1-1."
- "Don't touch anything electrical if you're standing in water."
- "If someone is being shocked, don't touch them—turn off the power first."

Tornado

- "Get to the lowest floor, interior room, away from windows."
- "A bathroom or closet in the center of the building is safest."
- "If you're in a mobile home, leave and find a sturdy building."
- "If outside with no shelter, lie flat in a ditch and cover your head."

10. SHELTER INFORMATION SYSTEM

Tampa Bay Area Shelters (Hurricane Milton Response)

SHELTER	ADDRESS	PETS	MEDICAL	ADA
Hillsborough High School	5000 N Central Ave, Tampa 33603	Yes	Yes	Yes
Gaither High School	16200 N Dale Mabry Hwy, Tampa 33618	No	No	Yes
St. Petersburg High	2501 5th Ave N, St. Petersburg 33713	No	Yes	Yes
Lakewood High School	1400 54th Ave S, St. Petersburg 33705	Yes	No	Yes
Clearwater High School	540 S Hercules Ave, Clearwater 33764	No	Yes	Yes
Countryside High School	3000 FL-580, Clearwater 34761	No	No	Yes

Shelter Recommendation Logic

Matching Criteria

1. **Pets:** If caller has pets → recommend Hillsborough or Lakewood only
2. **Medical needs:** If caller has oxygen, mobility, or medical equipment → recommend medical shelters

3. **Location:** Recommend nearest shelter to caller's current location

Standard Guidance

"Bring photo ID, essential medications, phone chargers, and comfort items. Cots and meals are provided. Pets are only allowed at designated pet-friendly shelters."

11. MULTILINGUAL SUPPORT

CrisisConnect provides instant language detection and seamless switching—no IVR menus, no "Press 1 for Spanish" delays.

Supported Languages

LANGUAGE	NATIVE NAME	STATUS
English	English	Full Support
Spanish	Español	Full Support
Haitian Creole	Kreyòl Ayisyen	Full Support
Vietnamese	Tiếng Việt	Full Support
Chinese	中文	Full Support
Arabic	العربية	Full Support

Language Detection Flow

1. Caller speaks in any language
2. Gemini Live API detects language from audio stream
3. AI responds in detected language immediately
4. If caller switches languages mid-call, AI follows the switch
5. All protocols and scripts are applied in the caller's language

Industry First

Traditional disaster hotlines require callers to navigate IVR menus to select their language, costing precious seconds in emergencies. CrisisConnect eliminates this barrier entirely—triage begins the millisecond audio is received, regardless of dialect.

12. DATA CAPTURE & DASHBOARD

INTEGRATION

Captured Data Fields

FIELD	TYPE	PURPOSE
Call ID	String (UUID)	Unique identifier for tracking
Start Time	Timestamp	Call initiation time
End Time	Timestamp	Call termination time
Duration	Integer (seconds)	Total call length
Caller Name	String	If provided
Contact Phone	String	Callback number
Location	String	City, ZIP, or address
Disaster Type	Enum	Hurricane, Fire, Flood, etc.
Household Size	Integer	Total people affected
Children Under 18	Integer	Vulnerable population count
Adults 65+	Integer	Elderly population count
Has Medical Needs	Boolean	Medical shelter routing
Has Pets	Boolean	Pet-friendly shelter routing
Pet Count	Integer	Number of animals

Needs List	Array	Shelter, food, financial, etc.
Shelter Referred	String	Assigned shelter name
Call Outcome	Enum	Resolved, Referred, Callback
Language	String	Detected language code
Transcript	Array	Full conversation history

Export Format

Data exports as JSON for integration with:

- **ArcGIS FeatureServer:** Geo-spatial mapping and heat maps
- **Google Maps:** Incident visualization
- **Custom Dashboards:** Real-time operational awareness
- **Volunteer Dispatch Systems:** Automated case assignment

Sample Export

```json
{
  "callId": "CALL-1703505600-ABC123XYZ",
  "startTime": "2024-12-25T10:00:00Z",
  "endTime": "2024-12-25T10:08:32Z",
  "location": "Tampa, FL 33603",
  "disasterType": "hurricane",
  "householdSize": 4,
  "childrenUnder18": 2,
  "hasMedicalNeeds": true,
  "hasPets": true,
  "petCount": 1,
  "needs": ["shelter", "food", "medical"],
  "shelterReferred": "Hillsborough High School",
  "callOutcome": "resolved",
  "language": "es",
```

```
    "transcript": [...]
}
```

13. TECHNOLOGY STACK

Frontend

TECHNOLOGY	VERSION	PURPOSE
React	18.x	UI framework
TypeScript	5.x	Type safety
Vite	5.x	Build tooling
Tailwind CSS	3.x	Styling
Lucide React	Latest	Icons

AI & Voice

TECHNOLOGY	VERSION	PURPOSE
Google Gemini	2.0 Flash (Exp)	Language model
Gemini Live API	v1beta	Bidirectional audio streaming
Web Audio API	Browser native	Audio capture/playback
WebSocket	WSS	Real-time transport

Infrastructure

SERVICE	PROVIDER	PURPOSE
Hosting (RescueLens)	Vercel	Edge deployment, CDN
Hosting (AI Studio Demo)	Google Cloud Run	Container hosting
API Keys	Google AI Studio	Gemini API authentication
Maps	Google Maps Platform	3D visualization (RescueLens)

14. DEPLOYMENT & CONFIGURATION

Environment Variables

```
# Required for Gemini Live
VITE_GEMINI_API_KEY=your_gemini_api_key

# Required for Google Maps (3D Globe)
VITE_GOOGLE_MAPS_API_KEY=your_maps_api_key
```

Vercel Deployment

1. Connect GitHub repository to Vercel

2. Add environment variables in Vercel dashboard

3. Deploy with automatic builds on push to main

Local Development

```
# Install dependencies
npm install

# Start development server
VITE_GEMINI_API_KEY=xxx VITE_GOOGLE_MAPS_API_KEY=xxx npm run dev

# Build for production
npm run build
```

API Key Setup

1. Visit [Google AI Studio](#)

2. Create a new API key

3. Enable Gemini 2.0 Flash model access

4. Add key to Vercel environment variables

5. Redeploy application

APPENDIX A: FUTURE EXPANSION OPPORTUNITIES

The following concepts represent potential directions for evolving CrisisConnect from a proof-of-concept into a comprehensive disaster response platform. These ideas span AI enhancements, integrations, operational capabilities, and new use cases.

AI & Voice Technology Enhancements

1. Emotion Detection & Adaptive Response

Implement real-time sentiment analysis to detect caller emotional states (panic, grief, frustration) and dynamically adjust AI tone, pacing, and response strategies. High-distress calls could automatically prioritize and flag for human callback.

2. Voice Biometric Authentication

Allow returning callers to be identified by voice patterns, enabling faster intake for repeat disaster victims and reducing fraud risk while maintaining privacy compliance.

3. Real-Time Translation Overlay

Enable a human supervisor to join calls with automatic real-time translation, allowing English-speaking staff to assist non-English callers seamlessly.

4. Custom Voice Cloning for Regional Dialects

Train custom voice models that match regional accents and dialects (Southern, Cajun, Puerto Rican Spanish) to improve caller comfort and comprehension.

System Integrations

5. Direct 911/PSAP Integration

Partner with Public Safety Answering Points (PSAPs) for warm handoffs—when CrisisConnect detects an emergency, it could connect directly to 911 with caller data pre-populated.

6. FEMA DisasterAssistance.gov API

Integrate with FEMA's Individual Assistance API to help callers apply for federal disaster assistance directly through the call flow.

7. Insurance Carrier Partnerships

Connect with major insurance carriers' claims APIs to initiate claims intake during the call, reducing survivor burden for dual reporting.

8. Safe and Well Direct Registration

Enable callers to register on Safe and Well during the call with automatic data population—no separate website visit needed.

9. Volunteer Dispatch System Integration

Direct integration with volunteer management systems (e.g., Volunteer Connection) to automatically dispatch available volunteers based on case type and location.

Expanded Channels & Platforms

10. SMS/Text-Based Intake

Offer text message intake for callers in noisy environments, those with hearing impairments, or when voice calls are impractical (e.g., hiding during home invasion).

11. WhatsApp & Messaging Platform Integration

Deploy CrisisConnect on WhatsApp, Facebook Messenger, and other platforms popular in immigrant communities for greater accessibility.

12. Video Call Capability

Add optional video intake for damage documentation—callers could show their damaged home in real-time, with AI extracting damage assessments.

13. Mobile App with Push Notifications

Native iOS/Android app with shelter status updates, case progress tracking, and proactive outreach to survivors in their area.

14. Smart Speaker Integration

Deploy on Alexa and Google Home devices for hands-free disaster reporting—particularly valuable when caller is injured or mobility-impaired.

Operational Capabilities

15. Automated Callback Scheduling

Allow callers to schedule callbacks at convenient times, with AI automatically calling back with status updates or to collect additional information.

16. Proactive Outbound Campaigns

AI-powered outbound calls to registered survivors for welfare checks, case updates, or to notify of new available resources.

17. Multi-Disaster Concurrent Operations

Support multiple simultaneous disasters with automatic geographic routing and disaster-specific protocol loading.

18. Shelter Capacity Real-Time Sync

Live integration with shelter management systems to provide accurate capacity counts and automatically redirect when shelters reach capacity.

Analytics & Intelligence

19. Predictive Needs Modeling

Use call data patterns to predict resource needs—if calls from a ZIP code spike, automatically pre-position volunteers and resources.

20. Real-Time Disaster Heat Maps

Generate live geographic visualizations of incoming calls, damage reports, and resource needs for EOC situational awareness.

21. Quality Assurance Scoring

AI-powered analysis of call recordings to score protocol adherence, empathy levels, and data completeness for continuous improvement.

22. Trend Detection & Anomaly Alerts

Automatically detect unusual patterns (e.g., cluster of carbon monoxide calls, generator-related injuries) and alert operations leadership.

Extended Use Cases

23. Blood Donation Appointment Scheduling

Extend the platform to handle blood donation inquiries, appointment booking, and eligibility screening via voice AI.

24. Training Course Registration

Voice-based registration for CPR, first aid, and disaster preparedness training classes with automatic calendar integration.

25. Volunteer Onboarding

AI-guided volunteer registration and orientation, answering FAQs and collecting initial background check information.

Security & Compliance

26. HIPAA-Compliant Medical Intake

Enhanced security and compliance features to handle medical information for health-related disaster services.

27. Fraud Detection System

ML-based fraud detection analyzing call patterns, location mismatches, and repeated claims to flag suspicious activity.

28. Complete Audit Trail

Comprehensive logging and audit capabilities for regulatory compliance and legal discovery needs.

Accessibility & Inclusion

29. ASL Video Relay Service

Integration with video relay services for deaf callers using American Sign Language interpreters.

30. Simplified Cognitive Interface

Alternative conversation flows optimized for callers with cognitive disabilities, using simpler language and more patient pacing.

> **Note:** These concepts represent exploratory ideas for future development phases.
>
> Prioritization would require stakeholder input, feasibility analysis, and alignment with organizational strategy.