Legacy System Analysis and Requirements Gathering

Objective:

Assess current VXML-based systems and define technical and functional integration requirements.

Introduction:

- Interactive voice response (IVR) is widely used in the hospitals mainly to manage the patients calls for services such as appointment booking, lab report inquiries, billing, and emergency support .
- The traditional IVR's were menu-driven and rely on rigid VoiceXML(VXML) for patient call flows, which result in poor user experience and longer calling times.
- They lack flexibility and conversational intelligence which is the main advantage of modern IVR.
- Modern AI based IVR introduces Natural Language processing with Conversational AI.
- With the increasing demand for faster and more intuitive healthcare services, there is a need to modernize legacy IVR systems.
- This project focuses on introducing an AI-enabled conversational IVR framework that integrates modern Conversational AI platforms with existing IVR systems to improve usability while minimizing re-development effort.

Problem Statement:

- The existing IVR systems are menu-driven and time consuming.
- It becomes difficult for patients to navigate through whenever necessary.
- Difficult for patients to navigate
- Not scalable during peak call volumes
- Complete replacement of IVR systems is costly and risky
- Lack of integration with modern AI platforms limits user experience
- There is a need for a **modern, conversational IVR framework** that minimizes redevelopment effort
- It leads to data insecurity.

Objectives:

- Modernize legacy VXML-based IVR systems with
- Enable conversational voice interaction for hospital services
- Integrate IVR with Conversational AI platforms (ACS & BAP)
- Reduce patient call handling time
- Improve user experience without replacing existing backend systems
- Using these AI platforms integrate the IVR of the hospitals.

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Proposed System Overview:

- Conversational AI layer added on top of legacy IVR
- Patients interact using natural speech
- Uses cloud-based telephony and AI services
- Existing backend systems remain unchanged
- Gradual and low-risk modernization approach

Role of ACS & BAP:

- ACS: Call handling and media services
- BAP: Conversational AI, intent recognition, dialogue management
- Enables intelligent, context-aware conversations

Present Strategy:

1. Legacy IVR is not removed
2. Conversational AI intercepts user interaction
3. Existing VXML logic reused for backend processes
4. Middleware bridges AI and legacy systems
5. Step-by-step migration without service disruption

Architecture Overview:

Caller → Telephony Gateway → VXML IVR → HMS Database

Limitations:

- Static menu
- No contextual understanding
- Difficult to scale
- Hard to maintain VXML scripts

My Proposed Architecture:

- Caller
- ACS
- BAP
- Integration Layer
- HMS
- Response

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System Architecture:

Layer 1: Telephony Layer (ACS)

- Handles call lifecycle

- Converts speech to text

- Streams media

Layer 2: Conversational AI Layer (BAP)

- Intent recognition

- Dialogue management

- Context retention

Layer 3: Integration Layer

- REST APIs

- Middleware

- Data transformation

Layer 4: Backend Systems

- Appointment system

- Lab system

- Billing system

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Workflow:

1. Patient calls hospital number
2. ACS receives and streams audio
3. BAP performs speech-to-text
4. Intent identified
5. API call made to HMS
6. Response returned
7. Text converted to speech
8. Voice response delivered

Implementation Plan:

Phase 1: Requirement analysis & architecture design

Phase 2: Setup Azure ACS

Phase 3: Develop conversational bot in BAP

Phase 4: Develop integration APIs

Phase 5: Testing & validation

Features:

My implementation will include :

- AI-driven voice interaction

- Context-aware conversation

- Cloud scalability

- Reduced operational cost

- Enterprise-grade architecture

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Architecture Constraints:

The main constraints I think would be in this process are :

- Real-time latency requirements
- HIPAA/healthcare compliance
- Legacy integration complexity
- API rate limits
- Network dependency
- Conversational Loop will exist

Conclusion:

The proposed system of mine modernizes traditional IVR systems by introducing AI-driven conversational voice interaction using Azure Communication Services and Bot Application Platform. My solution will ensure better user experience, improved scalability, and enterprise-ready architecture.