

Agentic WhatsApp Customer Engagement & Lead Automation Platform

Full-Stack Agentic AI · Open-Source Generative AI · RAG · Voice & Media Intelligence · ERP / CRM Integration · Composible CMS & Marketing Cloud

Date: September 2026

Provider: Associative, Pune, Maharashtra, India

PART 1: COMMERCIALS, TIMELINE & LEGAL POLICIES

1.1 Project Investment & Deployment Timeline

Total Deployment Time:

This is a fully completed, ready-to-deploy enterprise product. The end-to-end customization, integration, local AI model provisioning, testing, and deployment timeline is **18 to 24 weeks** from the date of order confirmation and receipt of the advance payment. This accounts for your bespoke integrations, server setups, and rigorous testing before final handover.

One-Time License, Setup & Deployment Cost:

Due to the enterprise-grade complexity of deploying a 100% open-source, self-hosted Agentic AI architecture (which completely eliminates all recurring third-party AI API fees for your business), the one-time engineering, licensing, and implementation cost is structured as follows:

- **For Indian Clients:**
 - Base Cost: ₹24,00,000 INR
 - GST (18%): ₹4,32,000 INR
 - **Total Deployment Cost: ₹28,32,000 INR**
- **For International Clients:**
 - **Total Deployment Cost: \$35,000 USD** (GST not applicable)

1.2 Estimated Monthly Operating Costs (Cloud Hosting & Messaging APIs)

Note: The following are estimated direct operational costs for cloud infrastructure (AWS/GCP) to self-host the Open-Source AI models, plus the Meta WhatsApp Cloud API messaging costs. These are paid directly to your chosen cloud/API providers.

- **For Indian Clients (Estimated for ~10,000 conversations/month):**
 - AWS / GCP Hosting (GPU Instance for Local AI + App + DB): ~₹45,000
 - Meta WhatsApp API Charges: ~₹5,000
 - **Subtotal: ₹50,000 + 18% GST (₹9,000) = ₹59,000 INR / month**
- **For International Clients (Estimated for ~10,000 conversations/month):**
 - **Total: ~\$600.00 USD / month**

1.3 Maintenance, Support & Updates

- **First Year (Months 1-12):** 100% FREE Maintenance and Support (Included in the core cost).
- **Second Year Onwards (Updates & Support Cost):** 18% of the core deployment cost per annum (Approx. ₹4,32,000 INR + GST / \$6,300 USD per year). This Annual Maintenance Contract (AMC) covers ongoing bug fixes, security patches, open-source model updates, server health monitoring, and general technical support.

1.4 Client Onboarding Details

To initiate the deployment, kindly provide us with the following details:

1. **Full Name:** For generating the invoice.
2. **Company Name:** If you require the invoice to be billed to your company.
3. **GST Number:** If applicable, so you can claim GST Input Tax Credit (ITC).
4. **Mobile and WhatsApp Number:** For regular work-related discussions and updates.
5. **Email ID:** For sharing invoices, important communications, and handing over the final project source code.
6. **Complete Postal Address:** Your current business or residential address for sending any documents and project files via courier.
7. **Accepted Payment Modes:** We accept safe electronic bank payments within India via RTGS, NEFT, IMPS, UPI, PayPal, and Bank Transfer.

To Initiate Your Order:

- **WhatsApp:** +91 9028850524
- **Email:** info@associative.in

1.5 Terms of Service & Policies

- **Payment Terms:**
 - 50% Advance Payment required at deployment initiation.
 - 50% Remaining Balance due at the time of the final handover of app files and submission/deployment.
- **Accepted Payment Modes:** We accept safe electronic bank payments including RTGS, NEFT, IMPS, UPI, PayPal, and International Bank Wire Transfers.
- **Cancellation & Refund Policy:** Due to the bespoke nature of enterprise software deployment and the immediate allocation of integration engineers, **once an order is initiated, it cannot be cancelled or refunded under any circumstances.**
- **Support SLA:** All technical support queries will be addressed within 72 hours during standard working days via WhatsApp chat or Email.
- **Demo Policy:** As we deploy 100% custom-integrated applications tailored to your specific business logic and secure ERP environments, **we do not provide public product demos.**

1.6 Legal Protections & Licensing

To protect the integrity of our source code and bespoke architecture, the deployment is governed by strict legal frameworks:

Measure	Description
Master Service Agreement (MSA)	A strict MSA will be drafted explicitly defining severe financial penalties for reverse engineering, code extraction, or unauthorized distribution of the application.
Source Code Ownership	Associative retains full intellectual property (IP) and source code ownership of the core architecture.
EULA & Licensing	The app is legally licensed solely for the client's specific brand and end-users. Repackaging, reselling, or white-labeling the application to third parties is strictly prohibited.
License Definition	Delivery is strictly classified as a "Single-Entity, Non-Transferable, Non-Sublicensable Lifetime License for Internal Business Operations."
Compiled Production Build	Clients receive the compiled, minified, and heavily obfuscated production build of the React.js web application. The web source is strictly bound to the client's authorized domain, ensuring unauthorized copying or local reverse engineering of the frontend is prohibited and non-functional.
API Whitelisting & Obfuscation	Hardcoded, encrypted API tokens ensure the apps can only communicate with the client's registered domain. Binaries and React web builds are heavily obfuscated to make reverse-engineering nearly impossible.

PART 2: TECHNICAL PLATFORM OVERVIEW · v4

Architecture Summary

v4 — Engineered to utilize 100% open-source and free-to-use technologies. It includes a Strapi-powered dynamic knowledge base, open-source Mautic marketing automation syncing, proactive AI-initiated outbound campaigns, live call sentiment analysis with auto-escalation, and approved ERP write actions (leave, tickets, expense claims). This completed architecture eliminates third-party AI APIs (OpenAI, Twilio, HubSpot, Adobe) in favor of self-hosted, royalty-free alternatives.

1. Platform Overview

The Agentic WhatsApp Customer Engagement & Lead Automation Platform is a fully built AI-powered automation system that connects a business's WhatsApp communication channel — and its phone line as well — to an intelligent agent capable of understanding customers, answering questions, qualifying leads, and escalating to a human when necessary.

Rather than replying with fixed, scripted messages, the platform uses a locally hosted Open-Source Large Language Model (LLM) coordinated by an agentic workflow. The system does not just generate text — it listens, sees, plans, retrieves, decides, acts, and remembers, within a controlled and auditable framework, ensuring 100% data sovereignty.

Core capabilities:

- Understand customer messages and identify intent (support question, sales inquiry, lead, complaint, etc.).
- Answer questions using the business's own knowledge base (RAG).
- Understand voice messages, images, and documents sent by the customer via local Vision/STT models.
- Answer and hold live phone calls, listening and responding in real-time via open-source telephony.
- Qualify potential customers and capture structured leads.
- Execute controlled tools/actions (e.g., create a lead, book a calendar meeting via Cal.com).
- Maintain conversation context across multiple messages, calls, and sessions.
- Escalate conversations to a human agent and support full human takeover.
- Serve verified employee and customer records live from the company's own self-hosted ERPNext, in chat, after OTP verification.
- Sync leads to the open-source CRM (Frappe CRM).
- Keep its product, pricing, and FAQ knowledge current from a Strapi-managed content source.
- Push qualified leads into Mautic (Open-Source Marketing Automation) for personalized follow-up.
- Reach out first — proactive WhatsApp messages and outbound calls for reminders, follow-ups.
- Detect caller frustration in real time during a phone call and escalate to a human automatically.
- Let a verified employee not just view but act — raising a leave application, expense claim, or support ticket in ERPNext from WhatsApp.

2. Problem Statement

Businesses that rely on WhatsApp and phone calls for customer communication consistently run into the same operational problems as volume grows:

- Repetitive, common questions overwhelm the team.
- Promising leads get lost in the noise of routine conversations.
- Business knowledge is scattered across PDFs, websites, and employee memory.
- Voice notes, photos, and scanned documents go unread or take time to review manually.
- Inbound calls are missed entirely outside business hours.

- Leads are not qualified consistently and rarely make it into the CRM automatically.
- Employees repeatedly ask HR for routine details (leave balance, attendance) that already sit in the ERP.
- Customers repeatedly ask for invoice status that sits in the accounting system.
- Third-party AI APIs (like OpenAI) are expensive, leading to high recurring operational costs and data privacy concerns.

3. Solved Objectives

- Automate repetitive customer communication across chat and voice securely on self-hosted infrastructure.
- Provide business-specific AI responses grounded in RAG.
- Understand voice messages, images, and documents shared by customers.
- Answer and manage live inbound phone calls with an open-source AI voice agent.
- Capture structured customer information and sync it automatically to self-hosted Frappe CRM.
- Automate meeting and demo scheduling via open-source Cal.com.
- Give verified employees/customers self-service access to ERPNext records over WhatsApp.
- Verify identity with a WhatsApp OTP before any personal/financial data is shared.
- Keep the knowledge base current using a headless CMS (Strapi).
- Extend CRM data into Mautic for marketing retargeting.
- Move from reactive to proactive engagement with AI-initiated outreach.
- Detect and act on customer frustration in live calls before it escalates.
- Allow safe, approved write-back to the ERP for routine employee requests.

4. Major Features Delivered

A. WhatsApp Integration

- WhatsApp Business Cloud API for sending and receiving messages.
- Webhook integration to receive real-time events.
- Customer opt-in / opt-out handling for compliant messaging.

B. Voice, Image & Document Understanding (100% Open-Source)

- **Voice messages:** Incoming WhatsApp voice notes are transcribed via Faster-Whisper.
- **Image / document understanding:** A local vision model (LLaVA/Qwen-VL) extracts meaning from photos, forms, and IDs.
- **Spoken replies:** Outgoing AI responses generated as voice notes using Piper TTS.

C. AI Voice Call Agent

- Inbound calls are answered automatically using FreeSWITCH/Jambonz (Open-Source Telephony).
- Streaming Speech-to-Text and Text-to-Speech allows natural back-and-forth conversation.
- Every call is recorded, transcribed, and logged alongside the customer's WhatsApp history.

D. CRM & Calendar Automation

- **Frappe CRM:** Qualified leads are automatically created or updated in self-hosted Frappe CRM.
- **Calendar booking automation:** AI checks availability and books meetings via Cal.com without human involvement.

E. Enterprise Self-Service — Frappe CRM & ERPNext

- Connects to the company's self-hosted ERPNext.
- Employee and Customer self-service via OTP verification on WhatsApp.

F. Dynamic Knowledge Base via Strapi

- Backed by Strapi, an open-source headless CMS. Marketing teams update pricing/FAQ content in Strapi, and the AI reads the published content in real-time.

G. Marketing Cloud Sync — Mautic

- Qualified leads and behavioral data are pushed to Mautic (Open-Source Marketing Automation) for personalized email/ad-retargeting journeys.

H. Proactive Outbound Campaigns

- AI can initiate contact (reminders, invoice follow-ups, ERP-triggered events) via WhatsApp or Voice Call.

I. Live Sentiment Analysis on Calls

- Real-time sentiment tracking. Sustained negative trends trigger automatic human escalation.

J. ERP Write Actions

- Supported actions for verified employees: raise a Leave Application, submit an Expense Claim, or open a Support Ticket natively inside WhatsApp via confirm-then-submit flow.

5. Agentic AI Capabilities

The platform uses multiple specialized AI agents coordinated through a central Supervisor Agent.

Agent	Responsibilities
Supervisor Agent	Intent detection, agent routing, workflow coordination, tool selection, error handling, across chat and voice.
Knowledge Agent	RAG retrieval from the knowledge base, product/service information, producing grounded answers.

Agent	Responsibilities
Media Understanding Agent	Transcribing voice notes (Faster-Whisper), analyzing images/documents (LLaVA).
Sales/Lead Agent	Detecting purchase intent, extracting structured lead data, syncing leads to Frappe CRM.
Support Agent	General customer support, FAQs, common customer issues.
Voice Call Agent	Answering inbound phone calls via SIP, running real-time STT/TTS.
Outbound Campaign Agent	Initiating outbound WhatsApp messages or voice calls for reminders/follow-ups.
Sentiment Monitoring Agent	Scoring caller sentiment turn-by-turn and notifying the Human Escalation Agent on frustration.
Scheduling Agent	Checking calendar availability via Cal.com and booking meetings.
Enterprise Data Agent	Managing OTP verification, fetching authorized fields from ERPNext, executing ERP write actions.
Human Escalation Agent	Detecting low confidence, handling explicit requests for a human, triggering live call transfers.

Example Tool Calling: `search_knowledge()`, `transcribe_voice_message()`, `analyze_image()`, `create_lead()`, `sync_to_crm()`, `send_whatsapp_otp()`, `get_employee_details()`, `book_calendar_event()`, `submit_leave_application()`.

6. Knowledge Base and RAG

Retrieval-Augmented Generation (RAG) grounds AI responses in real business information.

- **Data Flow:** Data Source → Text Extraction → Chunking → Embeddings (Local open-source embedding model) → PostgreSQL + pgvector → Similarity Search → Relevant Context → Local LLM → Grounded Response.
- **Sources:** PDFs, URLs, Manual Text, FAQs, and Strapi CMS content.
- **Unanswered Questions feature:** Questions the AI fails to answer are logged for admins to review and add to the knowledge base.

7. Voice & Media Intelligence

- **Voice Message Pipeline:** Voice note → Faster-Whisper STT → Transcript enters normal pipeline → LLM Response → Piper TTS generates voice note back.
- **Image & Document Pipeline:** Customer sends image/PDF → LLaVA Vision model analyzes content → Extracted text/description merged into conversation context.

8. AI Voice Call Agent

- **How it works:** Incoming Call → FreeSWITCH (SIP) → WebSocket Audio Stream → Streaming STT → Voice Call Agent → Supervisor Agent → Streaming TTS → Audio to Caller.
- **Capabilities:** Handles interruptions/barge-in so the caller can speak naturally. Records and logs every call into the central dashboard.

9. Frappe CRM & ERPNext Integration

Data stays on the company's own infrastructure.

- **ERPNext:** System of record for customers, invoices, payments, and employee master.
- **Frappe HR:** Leave, attendance, and payroll data.
- **Frappe CRM:** Destination for AI-captured leads and deals.
- **Integration Architecture:** WhatsApp Chat → Supervisor Agent → Enterprise Data Agent → OTP Verification Service → Frappe REST API (over TLS / IP allowlist) → Self-hosted ERPNext.

10. OTP-Verified Self-Service on WhatsApp

Employee Self-Service:

1. Employee sends Employee ID.
2. ERPNext check ensures mobile number matches WhatsApp sender.
3. OTP is sent on WhatsApp.
4. Employee replies with OTP (5-minute expiry).
5. Verified 15-minute session opens. Details fetched live from ERPNext.

Customer Invoice Lookup:

1. Customer sends Invoice ID + WhatsApp number.
2. System matches invoice contact mobile to WhatsApp sender.
3. OTP verification flow.
4. Invoice details fetched live from ERPNext.

Security Controls: Deterministic verification in app code (not LLM), rate-limiting, masked data logging.

11. Unique & Future-Proof Capabilities

- **11.1 Strapi Headless CMS:** Marketing teams update pricing in Strapi. Strapi webhook triggers automatic re-indexing in PostgreSQL pgvector.

- **11.2 Mautic Syncing:** Qualified leads and behavioral data are pushed to self-hosted Mautic for email journeys and ad retargeting.
- **11.3 Proactive Outbound Campaigns:** AI can initiate WhatsApp messages/calls based on schedule, ERPNext event (invoice overdue), or CRM stage change.
- **11.4 Live Sentiment Analysis:** Sustained negative trend (frustration) automatically triggers transfer to a human.
- **11.5 ERP Write Actions:** Verified employees can use natural language to submit Leave Applications, Expense Claims, or IT Helpdesk Tickets. AI uses a strict "Confirm-then-submit" flow.

12. Business Persona Configuration

Customize AI agent name, role, tone (Professional, Friendly, Casual), language (English, Hindi, Marathi, Hinglish), voice persona, and escalation rules.

13. Lead Generation and Qualification

AI progressively collects structured data (Name, Service, Requirement, Budget, Timeline) and outputs JSON, instantly syncing it to Frappe CRM as a new Lead/Deal.

14. Human Takeover

Dashboard allows live monitoring of chats/calls. One-click human takeover pauses the AI, allows the human to chat, and resumes AI handling when finished.

15. React Dashboard

Operational control centre featuring:

- Inbox & Conversations (Full chat history).
- Calls (Recordings, transcripts).
- AI Agent & Knowledge Base configuration.
- Leads & Integrations (ERP/CRM/Calendar).
- Verification Logs & Employee Requests.
- Campaigns monitoring.

16. AI Playground

Sandbox environment to test prompts, agent routing, RAG retrieval, and simulated OTP flows without affecting live customers.

17. Analytics and Monitoring

Tracks resolution rates, human escalations, leads generated, API latency, OTP success rates, Strapi sync freshness, and OpenTelemetry tracing for full system observability.

18. Security and Governance

- Workspace isolation (multi-tenant data separation).
- PII protection and data redaction in logs.

- Tool permission control (LLMs cannot execute unverified tools).
- Identity-bound tools (Subject data comes from secure session, not model output).

19. Technology Stack (100% Open Source)

Layer	Technology
Frontend UI	React, TypeScript, Vite, Tailwind CSS, Zustand
Backend API	Python, FastAPI, Pydantic, SQLAlchemy, Alembic
AI LLM	Local Llama 3 / Mistral (via vLLM or Ollama)
Agent Orchestration	LangGraph, LangChain
Vision Model	LLaVA / Qwen-VL (Local Deployment)
STT / TTS	Faster-Whisper, Piper TTS / Coqui
RAG / DB	PostgreSQL, pgvector, PyMuPDF
Telephony	FreeSWITCH / Jambonz
Messaging	WhatsApp Business Cloud API
CRM / ERP	Frappe CRM, ERPNext, Frappe HR (Frappe REST API)
CMS / Marketing	Strapi, Mautic
Calendar	Cal.com
Queue / Background	Redis, Background Workers
Security & DevOps	JWT, RBAC, Docker, OpenTelemetry

20. Complete System Architecture

- **WhatsApp Message Pipeline:** Customer → WhatsApp Cloud API → FastAPI → Webhook Processor → Local STT/Vision (if media) → Redis Queue → LangGraph Supervisor → Local LLM + RAG → Response Validation → WhatsApp → Customer.

- **Live Call Path:** Caller → FreeSWITCH (SIP) → WebSocket Audio Stream → Streaming STT → LangGraph Voice Call Agent → Streaming TTS → Caller.
- **Enterprise Connector Path:** Agent → OTP Verification Service → Frappe REST API (TLS/VPN) → Self-Hosted ERPNext and Frappe CRM.
- **Data Syncs:** Strapi (webhook) → RAG Ingestion; Lead Agent → Mautic API; Outbound Campaign Agent → Voice/WhatsApp.

21. End-to-End Examples

- **WhatsApp Lead:** Customer asks for price → AI queries RAG/Strapi → Extracts Lead Data → Syncs to Frappe CRM → Sends response.
- **Voice Note + Image:** Customer sends voice note & image of broken item → Faster-Whisper transcribes → LLaVA analyzes image → Supervisor identifies Support Intent → AI guides customer through return process.
- **Inbound Call:** Caller calls at 3 AM → FreeSWITCH answers → AI books follow-up meeting via Cal.com → Confirms on WhatsApp.
- **Employee Self-Service:** Employee texts ID → OTP flow → Verified Session → Asks for leave balance → AI fetches from Frappe HR.

22. Data Model Overview

Entity	Purpose
users / workspaces	Platform users and multi-tenant boundary.
business_profiles	Business persona configuration.
contacts / conversations	Customer profiles and message threads.
messages / media_assets	Inbound/outbound texts, stored voice notes, images.
calls / call_transcripts	Record of phone calls, duration, transcripts.
agents / agent_configs	AI agent definitions and parameters.
knowledge_sources / documents	PDFs, URLs, Strapi content chunks (pgvector).
leads / crm_syncs	Captured leads and sync status with Frappe CRM.
erp_connections / otp_challenges	Self-hosted ERPNext connection data, hashed OTPs.

Entity	Purpose
verified_sessions / erp_lookup_logs	Active verified identities, audit of ERP fetches.
strapi_sources / marketing_syncs	Connected Strapi CMS and Mautic marketing sync logs.
outbound_campaigns / sends	Proactive campaign configs and delivery logs.
erp_write_requests	Drafted/submitted ERP actions (leave, expense, tickets).

23. Backend API Overview

Endpoint	Purpose
POST /api/v1/auth/login	Authenticate user and issue JWT.
GET /api/v1/conversations	List conversations for workspace.
POST /api/v1/media/analyze	Transcribe voice note / analyze image.
POST /api/v1/voice/webhook	Receive real-time call events/audio stream.
POST /api/v1/knowledge/upload	Upload PDF to knowledge base.
POST /api/v1/crm/sync	Sync lead to Frappe CRM.
POST /api/v1/integrations/erpnext/connect	Register self-hosted ERPNext server credentials.
POST /api/v1/knowledge/strapi/connect	Register Strapi instance and content types.
POST /api/v1/marketing/mautic/connect	Connect Mautic for marketing automation.
POST /api/v1/erp/requests	Submit confirmed ERP write action (leave/expense).
POST /api/v1/calendar/book	Book an event via Cal.com.
POST /api/v1/whatsapp/webhook	Receive inbound WhatsApp events from Meta.

24. Project Folder Structure

Plaintext

backend/

- └─ agents/ # Supervisor and specialized agent implementations
- └─ workflows/ # LangGraph workflow/state graph definitions
- └─ rag/ # Chunking, embeddings, retrieval pipeline
- └─ media/ # Local Whisper STT, LLaVA image/document understanding
- └─ voice/ # FreeSWITCH streaming, live call handling
- └─ whatsapp/ # WhatsApp Cloud API client & webhook handlers
- └─ tools/ # Tool definitions callable by agents
- └─ services/ # Business logic (leads, conversations, etc.)
- └─ database/ # SQLAlchemy models, Alembic migrations
- └─ security/ # Auth, RBAC, permission checks
- └─ integrations/
 - | └─ crm/ # CRM adapter (Frappe CRM)
 - | └─ frappe/ # Frappe REST client (ERPNext)
 - | └─ calendar/ # Cal.com calendar booking client
 - | └─ webhooks/ # Generic outbound webhooks
- └─ verification/ # OTP issue/verify, verified sessions, rate limits
- └─ cms/ # Strapi client, publish-webhook handler
- └─ marketing/ # Mautic (Marketing Automation) client
- └─ campaigns/ # Outbound campaign scheduling, trigger evaluation
- └─ sentiment/ # Live call sentiment scoring
- └─ observability/ # Logging, tracing (OpenTelemetry)
- └─ config/ # Environment & settings management

frontend/

- └─ components/ # Reusable UI components
- └─ pages/ # Route-level views
- └─ layouts/ # Page/dashboard layout shells



- └─ hooks/ # Custom React hooks
- └─ services/ # API client layer
- └─ store/ # Zustand client-state stores
- └─ types/ # Shared TypeScript types
- └─ features/ # Feature-scoped modules (leads, inbox, calls, etc.)

- tests/ # Backend and frontend test suites
- docs/ # Technical documentation
- docker/ # Dockerfiles and compose configuration
- scripts/ # Developer and operational scripts

25. System Architecture & Deployment Modules

The platform is fully engineered and deployed across 33 sequential architectural modules:

Phase	Architecture Module	Main Technologies	Delivered Capability
1	Project Setup	Git, Docker	Runnable empty project skeleton
2	FastAPI Backend	FastAPI, Pydantic	Running backend service
3	PostgreSQL Database	PostgreSQL, SQLAlchemy	Persistent data layer
4	React Dashboard	React, TypeScript, Vite	Navigable dashboard skeleton
5	Auth & Workspace	JWT, RBAC	Multi-tenant login system
6	WhatsApp Integration	WhatsApp Cloud API	Working WhatsApp message loop
7	Local LLM Integration	vLLM, Llama 3	Basic AI text responses
8	LangGraph Supervisor	LangGraph	Working agent router

Phase	Architecture Module	Main Technologies	Delivered Capability
9	RAG	pgvector, open-source embeddings	Grounded knowledge answers
10	Specialized Agents	LangGraph, LangChain	Multi-agent conversation handling
11	Lead Management	FastAPI, PostgreSQL	Structured lead pipeline
12	Human Takeover	WebSockets	Functional human-in-the-loop system
13	Tools & Webhooks	Tool framework	Controlled agent actions
14	Redis Processing	Redis	Scalable async message handling
15	Security	JWT, RBAC, validation	Production-grade security baseline
16	Testing	pytest, Playwright	Automated test coverage
17	Observability	OpenTelemetry	End-to-end request visibility
18	Docker & Deployment	Docker, Docker Compose	Deployable production build
19	Media Understanding	LLaVA, OCR	AI understands images & documents
20	Voice Messages	Faster-Whisper, Piper TTS	Voice notes handled like text
21	AI Voice Call Agent	FreeSWITCH, Streaming STT/TTS	AI answers & holds live phone calls
22	Frappe CRM Integration	Frappe REST API	Leads sync to self-hosted Frappe CRM

Phase	Architecture Module	Main Technologies	Delivered Capability
23	Calendar Booking	Cal.com API	AI books meetings autonomously
24	CRM Provider Abstraction	Adapter pattern, FastAPI	Pluggable CRM layer
25	ERP Integration User	Frappe REST API	Integration keys, access scope defined
26	ERPNext Connector	httpx, Circuit breaker	Secure read access to employee/invoice data
27	OTP Verification Service	Redis, WhatsApp Auth templates	Verified-identity sessions
28	Employee Self-Service	LangGraph, ERPNext connector	OTP-verified ERP look-ups on WhatsApp
29	Strapi Knowledge Source	Strapi API, webhooks	Live, editable knowledge base
30	Mautic Integration	Mautic API	Leads flow into marketing automation
31	Proactive Campaigns	Background worker, Voice Call	AI-initiated reminders and follow-ups
32	Live Sentiment Analysis	Streaming transcript scoring	Frustrated callers auto-escalate
33	ERP Write Actions	Frappe REST API (write)	Verified employees can submit leave/expenses

26. MVP vs Advanced Version Breakdown

- **MVP Base:** Authentication, WhatsApp integration, Basic AI, RAG, Frappe CRM lead capture, Dashboard.

- **Communication Expansion Tier:** Voice messages, LLaVA Image understanding, FreeSWITCH AI Voice Call Agent, Cal.com booking.
- **Enterprise Integration Tier:** Read-only ERPNext connector, OTP verification, Employee self-service.
- **Future-Proof Tier:** Strapi CMS, Mautic Sync, Proactive Outbound Campaigns, Sentiment Analysis, ERP Write Actions.

27. What Makes This Product Different From a Normal Chatbot?

Traditional Chatbot	This Ready-to-Deploy Agentic AI
Fixed, scripted responses	Open-Source LLM reasoning-based responses
Third-party API dependency (Expensive)	100% Local AI Models (Free/Zero-recurring cost)
No autonomous workflow	Multi-step agentic workflow with Supervisor
Text-only understanding	Multimodal (Text, Voice, Images via LLaVA/Whisper)
No phone/voice capability	Answers and holds live phone calls (FreeSWITCH)
No access to business records	OTP-verified, live look-ups from self-hosted ERPNext
Read-only automation	Can write to ERP (leave, expense) & proactively reach out
Static uploaded knowledge	Live, headless-CMS backed knowledge (Strapi)

28. Platform Capabilities

- **AI:** Natural language, Intent detection, RAG, Multi-agent orchestration, Multimodal (Voice/Image), Real-time voice.
- **Business:** Customer support, Lead qualification, Automated scheduling, Employee self-service (read/write), Invoice lookup.
- **Automation:** WhatsApp, AI Phone calls, Frappe CRM, ERPNext, OTP, Strapi CMS, Mautic Marketing, Background processing.
- **Management:** Dashboard, Call monitoring, Analytics, Audit logs.

29. Future Scope & Custom Expansions

While the base system contains 33 core architectural modules, the system is explicitly architected to support future custom expansions, including:

- Payroll / payslip look-ups with step-up authentication.
- ERP look-ups and write actions over live phone calls with voice OTP.
- Predictive, AI-scored campaign targeting.
- Payment workflows.
- Multi-channel support (Telegram / Web chat).

30. Technical Quality & Security Standards

Engineered as a production-ready enterprise product: Modular architecture, API-first design, Database migrations, Type safety (TypeScript, Pydantic), Input validation, Automated testing, Security by design, Observability (OpenTelemetry), and Privacy by design (100% self-hosted).

31. Important Terminology

- **Agentic AI:** An AI system that plans, decides, and acts autonomously.
- **RAG (Retrieval-Augmented Generation):** Retrieves relevant information from a knowledge base to ground answers.
- **Local LLM:** A Large Language Model (like Llama 3) running on your own servers to ensure data privacy.
- **STT / TTS:** Speech-to-Text (Faster-Whisper) and Text-to-Speech (Piper).
- **Telephony / CPaaS:** FreeSWITCH/Jambonz, connecting the app to public phone networks.
- **Frappe / ERPNext:** Open-source ERP framework for accounting, HR, and CRM.
- **Headless CMS:** Strapi, storing content via API rather than rendering websites.
- **OTP / Verified Session:** Short-lived codes proving identity before releasing ERP data.

32. Final Executive Summary

This ready-to-deploy product delivers a state-of-the-art Agentic AI automation platform for WhatsApp and telephony. By architecting the system exclusively on 100% open-source, self-hosted technologies (Llama 3, Frappe CRM, ERPNext, Mautic, Strapi, Cal.com, FreeSWITCH, Faster-Whisper, LLaVA), your business achieves absolute data sovereignty and **completely eliminates recurring third-party AI API costs**.

It transforms standard customer messaging into a proactive, multimodal, lead-qualifying, and ERP-integrated workforce multiplier, fully customized, integrated, and deployed within 18 to 24 weeks.