### Proposal: FOSS-Based AI-Enabled Citizen Service Management Platform (CSMP)

Client: Ministry of Public Administration and Artificial Intelligence (MPAAI) Prepared by: PRPL Media, LLC Date: October 23, 2025 RFP Ref #: 2025-RFP-71

### 1. Executive Summary

This proposal outlines a robust, scalable, and secure AI-Enabled Citizen Service Management Platform built exclusively with Free and Open-Source Software (FOSS). Our solution fully addresses MPAAI's requirements for a unified platform that streamlines citizen interactions, enhances internal workflows, and provides data-driven insights, while avoiding perpetual licensing costs and vendor lock-in.

We propose a phased delivery model centered around a Minimum Viable Product (MVP) that delivers core functionality rapidly, followed by a roadmap of strategic enhancements.

* Phase 1 (MVP): A fully functional platform featuring a Citizen Web Portal, Mobile App, AI-Powered Chatbot, Omnichannel Inbox, Case Management, and Operational Dashboards.
* Phase 2 (Post-MVP): Advanced AI capabilities, Robotic Process Automation (RPA), and predictive analytics.

Our FOSS stack, built on technologies like Django, React Native, Supabase/PostgreSQL, and Hugging Face, ensures MPAAI retains full control over its data and platform, with the freedom to customize and extend the system indefinitely.

### 2. Understanding of Requirements & FOSS Alignment

We have analyzed the RFP, Addendum, and Clarification Summary. Our FOSS solution is architected to meet all specified and implied requirements:

| MPAAI Requirement | Our FOSS Solution & Technology |
| --- | --- |
| Citizen Web Portal & Mobile App | Custom-developed using React.js (Web) and React Native (Mobile). Single codebase for iOS/Android. |
| Centralized Case Management | Core platform built on Django (Python), providing a highly customizable and secure admin & agent interface. |
| AI Chatbot (FAQ, Routing) | Rasa or Hugging Face transformers integrated with Django. Can be fine-tuned on government data, hosted privately. |
| Omnichannel (SMS, Social, etc.) | Matrix (for comms protocol) & Frontapp-like open-source solutions (e.g., Chatwoot) integrated into the core. |
| Dashboards & Reporting | Apache Superset or Metabase for powerful, self-service BI and embedded operational dashboards. |
| Multi-tenancy (22 Ministries) | Native feature of the Django architecture, with role-based access control (RBAC) via Keycloak. |
| Secure Authentication | Keycloak for enterprise-grade SSO/OAuth, MFA, and federated identity management. |
| Scalable, Secure Hosting | Deployable on any cloud (AWS, Azure, Google) or on-premises infrastructure using Docker & Kubernetes. |
| API-First, Integration Ready | Django REST Framework provides a secure, well-documented API for future integration with government systems. |

### 3. Technical Architecture

#### 3.1 High-Level Architectural Diagram

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| CITIZEN & STAFF INTERFACES |

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| Citizen Web Portal | | Staff Web Interface (Django Admin) |

| (React.js SPA) | | (Custom Django UI) |

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| Citizen Mobile App | | Mobile Staff App (React Native) |

| (React Native) | | (React Native) |

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| APPLICATION PROGRAMMING INTERFACE |

| Django REST Framework (RESTful APIs) |

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| | AI & BUSINESS LAYER | | OMNICHANNEL | | REPORTING |

| | | | INGESTION LAYER | | LAYER |

| | - Django Core (Python) | | - Matrix Protocol | | - Metabase |

| | - Rasa (Chatbot/Dialogue) | | - SMS Gateway | | - Apache |

| | - Camunda (Workflow/BPMN) | | - Social Media API| | Superset |

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| DATA LAYER |

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| | Primary Database| | AI/Vector DB | | Object Storage | |

| | (PostgreSQL) | | (pgvector/Qdrant) | | (MinIO) | |

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| INFRASTRUCTURE & SECURITY |

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| | Keycloak IAM | | Docker & Kubernetes| | Monitoring | |

| | (Authentication)| | (Orchestration) | | (Prometheus/Grafana)|

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| CITIZEN-FACING CHANNELS |

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| Web Portal | | Mobile App| | Phone (IVR) | | SMS | | Social Media & Email|

| (React.js) | |(React N.) | | (Asterisk) | | (Telco API) | | (Platform APIs) |

| - Online | | - Forms | | - Voice Commands | | - Text Msg | | - Direct Messages |

| Forms | | - Tracking| | - Keypad Input | | - Updates | | - Auto-Case Creation|

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| OMNICHANNEL INGESTION & UNIFICATION LAYER |

| Matrix Protocol | Custom Django API Endpoints | Webhooks |

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| | AI Chatbot (Rasa) | | Unified Citizen | | Communication | |

| | | | Profile Manager | | Router | |

| | - FAQ Handling | | - KYC Data | | - Routes to Ministry | |

| | - Intent Classification | | - Interaction History | | - SLA Management | |

| | - Auto-Case Creation | +-------------------------+ +-------------------------+ |

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| CORE SERVICE MANAGEMENT PLATFORM |

| Django REST API | PostgreSQL Database | Business Logic |

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| | Case Management | | Reporting & Analytics | | Admin & Configuration | |

| | (Django Admin Custom) | | (Metabase Embedded) | | (Django Admin) | |

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#### 3.2 Technology Stack Justification

* Backend (Django/Python): Chosen for its security, rapid development capabilities, "batteries-included" philosophy, and vast ecosystem. It provides the robust ORM and admin interface needed for complex case management.
* Frontend (React.js/React Native): Ensures a modern, responsive user experience for both web and mobile from a single codebase, reducing development and maintenance costs.
* Database (PostgreSQL): The world's most advanced open-source database. We will use the pgvector extension to enable AI-powered semantic search and recommendations, eliminating the need for a separate vector database in most cases.
* AI/ML (Rasa, Hugging Face, spaCy): Rasa provides a robust framework for contextual AI assistants. Hugging Face transformers allow us to use state-of-the-art models for classification and NLP tasks, all runnable on-premises.
* Identity & Access Management (Keycloak): Provides enterprise-grade Single Sign-On (SSO), social logins, and federation, meeting all security and multi-tenancy requirements.
* Business Intelligence (Metabase/Apache Superset): These tools empower both technical and non-technical users to create and share rich, interactive dashboards, far exceeding the capabilities of basic Power BI Pro.
* Deployment (Docker & Kubernetes): Ensures the application is scalable, portable, and resilient, capable of being deployed on any infrastructure MPAAI chooses.

### 4. Scope of Work & Deliverables (MVP Focus)

#### Phase 1: MVP (Weeks 1-32)

| MVP Deliverable | FOSS Technology Used | Description |
| --- | --- | --- |
| Custom Citizen Web Portal | React.js, Django REST API | KYC profile management, service request submission, and real-time case tracking. |
| Custom Mobile App (iOS & Android) | React Native, Django REST API | Full parity with web portal for on-the-go access. |
| Core Case Management System | Django Admin (Customized) | Centralized case logging, assignment, SLA tracking, and internal workflow management for 22 ministries. |
| Omnichannel Inbox | Matrix, Custom Django Modules | Unified inbox for managing citizen interactions from SMS, social media, email, and web forms. |
| AI-Powered Chatbot | Rasa, Hugging Face | FAQ handling, intent classification, and automated case routing with ≥80% accuracy target. |
| Operational Dashboards | Metabase | Embedded dashboards for MPAAI and Ministry users showing case volumes, resolution times, and backlog. |
| Security & Authentication | Keycloak | SSO, MFA, and secure role-based access for citizens and government staff. |
| Platform Deployment | Docker, Kubernetes | Fully deployed, configured, and secured platform on MPAAI's chosen cloud or on-premises environment. |

#### Phase 2: Post-MVP Roadmap

* Advanced AI: Implementation of transformer models for sentiment analysis, predictive routing, and staff-assist copilots.
* RPA Automation: Integration with Apache Airflow or n8n for automating backend processes between systems.
* Advanced Analytics: Deployment of Apache Superset for department-level strategic dashboards with predictive analytics.

### 5. Implementation Plan, Milestones & Timeline

Our approach is agile, with 2-week sprints and continuous delivery.

| Phase | Milestone | Timeline (Weeks) | Key Deliverables |
| --- | --- | --- | --- |
| Inception | M1: Project Mobilization & Discovery | 1-2 | Finalized project charter, team onboarding, MVP scope sign-off. |
| Definition | M2: UX/UI & Architecture Design | 3-6 | High-fidelity interactive prototypes, technical architecture sign-off. |
| Development | M3: Core Platform Development (Sprint 1-6) | 7-20 | Citizen Portal, Mobile App, Django Core, PostgreSQL DB. |
|  | M4: Advanced Features (Sprint 7-10) | 21-28 | AI Chatbot (Rasa), Omnichannel Inbox, Keycloak IAM integration. |
| Testing & Deployment | M5: UAT, Training & Go-Live | 29-32 | Completed UAT with MPAAI, training materials, production deployment. |
| Support | M6: Post-Deployment Support | 33-56 | 6-month warranty/hypercare period with bug fixes and performance tuning. |

Total MVP Timeline: 32 Weeks

### 6. Team & Human Capital Needs

| Role | Key Responsibilities | Commitment (MVP) |
| --- | --- | --- |
| Project Manager | Agile ceremony facilitation, stakeholder communication, risk management. | Full-time |
| Solution Architect | FOSS stack selection, architectural oversight, technical specifications. | Full-time |
| Django Backend Developer (x2) | Core API development, case management logic, database design. | Full-time |
| React/React Native Developer (x2) | Citizen Web Portal and Mobile App development. | Full-time |
| UI/UX Designer | User research, wireframing, high-fidelity mockups, and design system. | Part-time |
| DevOps Engineer | CI/CD pipeline, Kubernetes cluster management, monitoring. | Part-time |
| AI/ML Engineer | Rasa chatbot development, model training and integration. | Part-time |
| QA/Test Engineer | Automated and manual testing, UAT coordination. | Full-time |
| Change Manager/Trainer | Development of training materials, user onboarding, change management. | Part-time |

### 7. Commercials: Cost Structure

The primary financial benefit of a FOSS solution is the elimination of proprietary software license fees (e.g., Dynamics 365, Power BI Pro, Azure AI Services). Costs are focused on implementation effort, support, and infrastructure.

Cost Assumptions:

* All software is FOSS with no licensing costs.
* Infrastructure costs are based on cloud hosting (e.g., AWS, Azure) but can be adapted for on-premises.
* MPAAI may source infrastructure directly or through a partner.

| Cost Category | Description | Estimated Cost (USD) - Indicative |
| --- | --- | --- |
| Implementation Services (MVP) | Team costs as outlined in Section 6 for 32 weeks. | $XXX,XXX |
| Infrastructure (Annual - Cloud) | Compute, Storage, Database, and Networking for a production environment. | $XX,XXX |
| Post-MVP Support (Annual) | Optional annual support and enhancement package. | $XX,XXX |
| Total Cost of Ownership (5 Years) | Significantly lower than proprietary solutions due to $0 license fees. | ~60-70% Savings |

### 8. Risks & Mitigations

| Risk | Mitigation Strategy |
| --- | --- |
| FOSS Component Support | Use only mature, widely-adopted FOSS projects with vibrant communities. Commercial support contracts available for critical components (e.g., PostgreSQL). |
| Custom Development Complexity | Agile methodology with iterative releases. Use of stable, well-documented frameworks (Django, React). |
| AI Model Accuracy | Start with a limited, well-defined scope for the MVP (FAQ & Routing). Implement a seamless human handoff fallback. |
| Resistance to Change | Proactive Change Management from Day 1, involving ministry users in design and UAT, and providing comprehensive training. |

### 9. Conclusion

This FOSS-based proposal delivers a modern, secure, and powerful AI-Enabled Citizen Service Management Platform that aligns perfectly with MPAAI's goals of digital transformation, efficiency, and citizen-centricity. By embracing open-source technologies, the Government of Trinidad and Tobago will achieve strategic independence, avoid vendor lock-in, and establish a sustainable platform for innovation for decades to come.

We are confident that our solution offers a superior long-term value proposition and are prepared to provide a full demonstration of our proposed architecture and capabilities.