BAYINFOTECH

The Cyber Fusion Innovation Center (CFIC) – U.S. Army Cyber Command

Cyber Innovation Challenge (CIC) #5 - RFS: Automated, Artificial Intelligence (AI) – Enabled Help Desk

Submission on: Sep 26, 2025

CMMI DEV/3 CMMI SVC/3 ISO 14001:2015 ISO 9001:2015 ISO 17025 ISO/IEC 20000-1:2011 CERTIFIED SBA EDWOSB CERTIFIED SBA 8(a) CERTIFIED

Submitted To:

The Evaluation Team
Cyber Fusion Innovation Center
200 Grace Hopper Lane, Suite 5100
Augusta, GA

Submitted By:
Maulik Shyani
President

BayInfotech, LLC
2150 Portola Ave, Ste D # 2012,
Livermore, CA 94551
Email: Maulliks@bay-infotech.com
Phone: 408.480.8501

TABLE OF CONTENTS

COVER LETTER

To: Cyber Fusion Innovation Center (CFIC)
Program Executive Office Simulation, Training and Instrumentation (PEO STRI)

Subject: White Paper Submission – Automated, Artificial Intelligence (AI)–Enabled Help Desk (CIC #5 Assessment Event)

Dear Evaluation Team,

BayInfotech LLC is pleased to submit our White Paper in response to the Request for Solutions (RFS) titled *"Automated, Artificial Intelligence (AI)– Enabled Help Desk" (CIC #5),* issued on August 18, 2025, with a submission due on September 26, 2025.

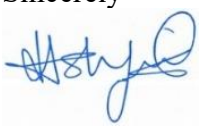
BayInfotech LLC is an *SBA 8(a) Certified, Economically Disadvantaged Women-Owned Small Business (EDWOSB), and Minority Business Enterprise (MBE)* with a strong record of delivering *AI/ML, automation, cloud, and IT modernization solutions* to federal, state, and defense clients. Our team combines technical depth in AI engineering with proven program delivery for mission-critical environments. Our Key Qualifications:

- **AI/ML Expertise:** Proven delivery of NLP, LLMs, predictive analytics, and automation for federal and defense clients.
- **Secure & Compliant Operations:** Experience operating in *FedRAMP, FISMA, and CUI-compliant environments,* aligned with NIST and DoD AI Ethical Principles.
- **Cloud-Native Integration:** Skilled in deploying AI solutions across AWS, Azure, and on-prem environments with DevSecOps and CI/CD pipelines.
- **Help Desk & Self-Service Solutions:** Track record implementing *AI-enabled chatbots and automated help desks* to reduce workload and improve SLA performance.
- **Data Governance:** Strong focus on *explainability, auditability, and bias mitigation* in AI operations.

Our proposed solution aligns with the Persistent Cyber Training Environment (PCTE) objectives by delivering an intelligent, scalable, and secure AI-enabled Help Desk that enhances mission readiness and optimizes Help Desk operations.

This submission has been prepared in accordance with the instructions provided in the White Paper guidance. The content is **unclassified**, developed exclusively by U.S. citizens, and focused on addressing the core requirements outlined in the RFS. This submission, including all proposed approaches, pricing estimates, and timelines, shall remain valid for a minimum period of 180 days from the date of submittal. We look forward to the opportunity to present and demonstrate our solution during the assessment and appreciate your consideration of BayInfotech's capabilities.

Sincerely



Maulik Shyani, President - BayInfotech, LLC

1 CORE REQUIREMENTS

1.1 AI-ENABLED HELP DESK

BayInfotech proposes to *deploy an existing, mature AI/ML-enabled Help Desk platform* explicitly tailored for the Persistent Cyber Training Environment (PCTE). The AI Help Desk integrates seamlessly with **Jira Service Management** for ticket lifecycle management, **Confluence** and **MKDocs** for knowledge base retrieval and updates, and **Mattermost** for secure, real-time collaboration and notifications. By leveraging APIs and connectors, the solution ensures that enriched tickets, knowledge recommendations, and escalations flow natively into PCTE's existing ecosystem without disrupting current workflows. Key features of our proposed Help Desk capability include:

- **AI-Powered Virtual Assistance:** Natural Language Processing (NLP) and Large Language Model (LLM) capabilities deliver context-aware, conversational responses to user inquiries, reducing Tier 0 and Tier 1 support workload while ensuring consistent, accurate answers.
- **Adaptive Learning:** The system continuously improves through supervised and reinforcement learning, enabling dynamic response generation and knowledge base expansion aligned to PCTE use cases.
- **Automated Ticketing & Resolution:** Intelligent triage assigns tickets based on issue type, urgency, and resource availability, while automation workflows resolve common issues without human intervention.
- **Integration with PCTE Services:** Pre-built connectors and APIs allow seamless interoperability with PCTE's training, simulation, and user management systems. This ensures support personnel and trainees can access the Help Desk without disruption to ongoing cyber training operations.
- **Scalability and Resilience:** The solution is designed to scale horizontally to support large user volumes and sustain operations across unclassified and classified environments, ensuring readiness for eventual deployment at higher classification levels (up to TS/SCI).

1.2 SELF-SERVICE AI HELP DESK ASSISTANT

BayInfotech proposes a *self-service AI-powered virtual assistant* that delivers Tier 0 support through conversational interfaces, enabling users to resolve common issues without requiring live Help Desk intervention. The interface is designed for **both technical and non-technical users**, featuring an intuitive, conversational self-service portal with guided prompts, search-enhanced KB recommendations, and role-based dashboards. Administrators access drag-and-drop configuration panels, while end-users interact through familiar chat-style interfaces integrated with Mattermost. This reduces the training curve and maximizes adoption across PCTE roles. Key Capabilities:

- **Conversational AI and NLP:** Leveraging advanced Natural Language Processing (NLP) and Large Language Models (LLMs), the assistant interprets user questions in natural language, provides precise answers, and guides users step-by-step through troubleshooting processes.
- **Knowledge Base Integration:** The assistant connects to curated PCTE knowledge repositories (FAQs, technical manuals, training materials), ensuring users receive accurate, context-specific responses. Content is continuously updated using supervised learning and reinforcement techniques, adapting to evolving system usage and user feedback.
- **24/7 Multi-Channel Availability:** Accessible via web, chat, and voice-enabled interfaces, the assistant provides always-on support across PCTE platforms, ensuring immediate resolution to routine inquiries.
- **Automated Workflows:** The assistant can execute scripted actions, such as password resets, account unlocks, and navigating the training portal, thereby minimizing downtime and reducing the human workload of the Help Desk.

- **Human-in-the-Loop Escalation:** When issues exceed Tier 0 scope, the assistant automatically escalates to Tier 1/2 staff, passing along complete interaction logs and context to ensure continuity and faster resolution.
- **Explainability and Auditability:** Each AI-driven interaction is logged with reasoning traces and compliance safeguards, in alignment with DoD AI Ethical Principles and NIST 800-53 standards for transparency and accountability.

1.3 Natural Language Processing of Help Requests

Recognizing PCTE's **closed-network, GPU-free environment**, BayInfotech's solution is optimized for **CPU-only inference** using lightweight NLP models and distilled LLMs. Containerized deployment ensures portability across on-prem environments without dependency on external cloud resources. Where advanced model retraining requires GPUs, training will occur in approved external environments, with only validated models deployed back into the PCTE enclave. This hybrid approach strikes a balance between performance and compliance, taking into account the limitations of the infrastructure. Our key capabilities:

- **Conversational Understanding & Prompting:** The system processes natural language inputs from users, enabling fluid, human-like conversations. It recognizes intent, extracts key entities, and identifies the root cause of issues across technical and operational domains.
- **Context Retention:** The AI assistant maintains conversation context across multiple interactions, ensuring continuity and allowing users to refine their questions without restating details. This capability mirrors our work with AI-enabled QA frameworks and recruitment chatbots, where multi-turn dialogue was essential for accuracy
- **Clarifying Interactions:** If a request is ambiguous, the assistant asks follow-up questions to refine understanding before providing a solution. This iterative dialogue reduces misclassification, accelerates problem resolution, and increases user satisfaction.
- **Tailored Responses:** Responses are dynamically adapted to the user's role, environment, and prior interactions. For example, a trainee requesting lab access troubleshooting may receive different guidance than an instructor requesting system reporting support.
- **Domain-Specific Adaptation:** NLP models are fine-tuned with PCTE-specific terminology, training scenarios, and system workflows to improve accuracy and relevance. Our experience fine-tuning LLMs for compliance-driven federal use cases (Army declassification, SEC AIML operations) ensures secure, domain-focused adaptation.
- **Explainability and Compliance:** Each AI-driven response is logged with reasoning steps and confidence scores. This transparency aligns with DoD AI Ethical Principles and NIST 800-53 requirements for traceability and accountability.

1.4 Tiered AI Help Desk Assistant

BayInfotech's solution introduces a **Tiered AI Help Desk Assistant** that intelligently classifies, tags, and routes requests to the most appropriate support tier (Tier 0–3). Key Capabilities:

Automated Classification & Tagging

Requests are analyzed in real-time using NLP and ML-based classifiers to identify the request type (e.g., account, access, technical error, system outage).	Tickets are automatically tagged with urgency, priority, & domain (training, simulation, infrastructure, administrative).	Context-aware models, like our SEC AIML and QA automation deployments, reduce misclassification and accelerate routing.

Sentiment & Urgency Detection

User sentiment (e.g., frustration, urgency) is detected through tone and phrasing analysis, influencing prioritization.	Escalation triggers are activated for high-severity issues (e.g., system failures, training disruptions) to route requests to higher tiers immediately.

Dynamic Tiered Routing

Tier 0 (Self-Service)	Tier 1 (Basic Technical Support)	Tier 2 (Advanced Support	Tier 3 (Specialized/ Engineering Support)
Common issues resolved by the AI chatbot or automated workflows (e.g., password reset, lab access navigation).	Tagged issues escalated with context and AI logs to human staff for routine technical problems.	Complex system or integration issues are escalated to subject matter experts, who have a complete interaction history.	Mission-critical or novel issues directed to development/engineering teams with annotated diagnostic data.

Escalation Triggers & Audit Trails

Predefined rules and ML-driven anomaly detection trigger escalation to prevent delays.	All ticket handoffs include structured metadata, classification results, and reasoning logs to support transparency and faster resolution.

Continuous Learning & Optimization

The system refines classification models based on resolution feedback, ensuring improved accuracy over time.	Lessons learned from past escalations are incorporated into Tier 0 and Tier 1 workflows to reduce recurrence.

1.5 ESCALATION LOGIC

BayInfotech's ***Escalation Logic*** delivers a *mission-aware, SLA-driven escalation framework* that combines automation with oversight, ensuring PCTE operations remain resilient, responsive, and aligned with warfighter readiness goals. Our key capabilities:

Severity & Mission Criticality Detection: Issues impacting mission training operations, classified exercises, or platform availability are automatically tagged as *critical*. High-severity incidents are escalated directly to Tier 2 or 3 engineers with immediate notifications.

SLA-Driven Prioritization: The system continuously monitors resolution timelines against pre-defined Service Level Agreements (SLAs). When an SLA breach risk is detected, the request is escalated proactively to the next support tier. This SLA-first escalation aligns with our automation strategies in federal QA environments, where proactive monitoring has reduced high-priority defect leakage.

Unresolved Context Handling: If the AI Help Desk cannot resolve an issue after multiple clarification attempts, an automatic escalation is triggered. Full context—including interaction logs, diagnostic tags, and attempted resolutions—is passed to human staff to minimize rework and user frustration.

Intelligent Routing & Notifications: Requests are routed to specific queues (e.g., Infrastructure SME, Training Content SME) based on classification tags. Stakeholders receive automated notifications for mission-impacting escalations, ensuring immediate visibility.

Audit & Feedback Integration: Every escalation event is logged with timestamp, reason code, and triggering criteria. Feedback loops enable AI models to learn from past escalations, thereby reducing false positives and enhancing future precision.

BENEFITS FOR PCTE
- ✓ Reduces downtime
- ✓ Increases SLA compliance
- ✓ Enhanced User Trust
- ✓ Improves overall efficiency

1.6 Accuracy and Completeness (Incl. Clarifying Prompting)

Our framework ensures that every AI Help Desk interaction is *reliable, validated, and mission-aligned,* providing PCTE users with the confidence that their inquiries will be addressed with precision, completeness, and contextual relevance. Our key capabilities:

Clarifying Prompts for Precision: Our conversational AI engages users with targeted follow-up questions when queries are ambiguous, incomplete, or broad. This ensures that responses are contextually precise, reducing the likelihood of misinterpretation.

Validated Knowledge Sources: The system integrates with structured, PCTE-approved knowledge repositories, training documentation, and technical manuals. This ensures that responses remain aligned with official guidance and operational standards, mirroring our approach in SEC AIML governance, where controlled knowledge bases were crucial to accuracy.

BENEFITS FOR PCTE

- ✓ Delivers *trustworthy, role-specific responses* that reflect current training and operational needs.
- ✓ Reduces user frustration by resolving ambiguity through *clarifying dialogue.*
- ✓ Maintains system credibility by *eliminating hallucinations* and irrelevant outputs.
- ✓ Provides an *auditable trail* of AI decision-making for compliance and accountability.

Controls Against Hallucinations: To prevent fabricated or irrelevant responses, BayInfotech employs retrieval-augmented generation (RAG) and fact-checking layers that restrict outputs to verified content. Guardrails ensure that AI responses are grounded in factual data rather than generative speculation.

Continuous QA and Monitoring: We apply automated QA dashboards and human-in-the-loop validation, similar to our Medicaid QA automation projects. Feedback loops from users and SMEs are incorporated to refine accuracy metrics, while anomaly detection flags deviations from approved content.

Explainability and Traceability: Each AI response includes reasoning metadata (confidence scores, knowledge source references, and decision traces). This aligns with the NIST AI Risk Management Framework and the DoD AI Ethical Principles, ensuring transparency and auditability.

1.7 Help Desk Ticket Enrichment

BayInfotech's **Help Desk Ticket Enrichment** capability transforms every user interaction into a source of operational intelligence supporting faster resolution today, while building a knowledge-driven foundation for continuous improvement across PCTE operations.

Automated Context Tagging: Utilizing NLP and ML classifiers, tickets are automatically tagged with attributes such as request type, severity, priority, system domain, and user sentiment. This improves routing accuracy and enables rapid triage across Tier 0–3 support layers.

Trend Analysis Enablement: Consistent tagging across thousands of tickets supports pattern recognition, root cause analysis, and forecasting of recurring issues. This mirrors BayInfotech's QA automation work, where metadata-driven analytics identified high-risk system modules and reduced defect leakage.

Knowledge Base Integration: Each ticket is automatically linked to relevant Knowledge Base (KB) articles, FAQs, or training materials. This allows users and Help Desk staff to attempt *self-remediation* before escalation, reducing resolution time and overall ticket volume.

Context Preservation for Escalation: Enriched tickets capture diagnostic context, prior interactions, and recommended KB resources. When escalated, higher-tier staff receive a complete picture of the issue, reducing rework and ensuring continuity of support.

Analytics and Continuous Improvement: Enrichment metadata feeds dashboards for supervisors and SMEs, enabling insights into workload distribution, SLA performance, and emerging problem areas. This aligns with BayInfotech's SEC AIML approach, where enriched data streams supported governance, monitoring, and compliance reporting.

1.8 KNOWLEDGE BASE AND SELF SERVICE

BayInfotech's solution delivers an *AI-augmented, interactive self-service portal* that empowers users to resolve issues independently while ensuring accuracy and consistency. The portal integrates advanced conversational AI with curated Knowledge Base (KB) repositories to provide *tailored, context-relevant responses* to each user. Our Key Capabilities:

Interactive Conversational Support: Users interact with an AI-powered assistant that interprets natural language questions, engages in clarifying dialogue, and provides real-time recommendations.

Dynamic KB Integration: The system automatically identifies and surfaces the most relevant KB articles, FAQs, and troubleshooting guides, enabling users to self-remediate without generating new tickets.

Personalized Experience: Responses are tailored to each user's role, activity history, and context within PCTE. For example, a trainee may receive step-by-step guidance on lab setup, while an instructor is directed to training management resources.

Continuous Learning: Usage data and feedback from self-service interactions inform the AI models, enhancing the precision of KB recommendations and facilitating proactive updates to content.

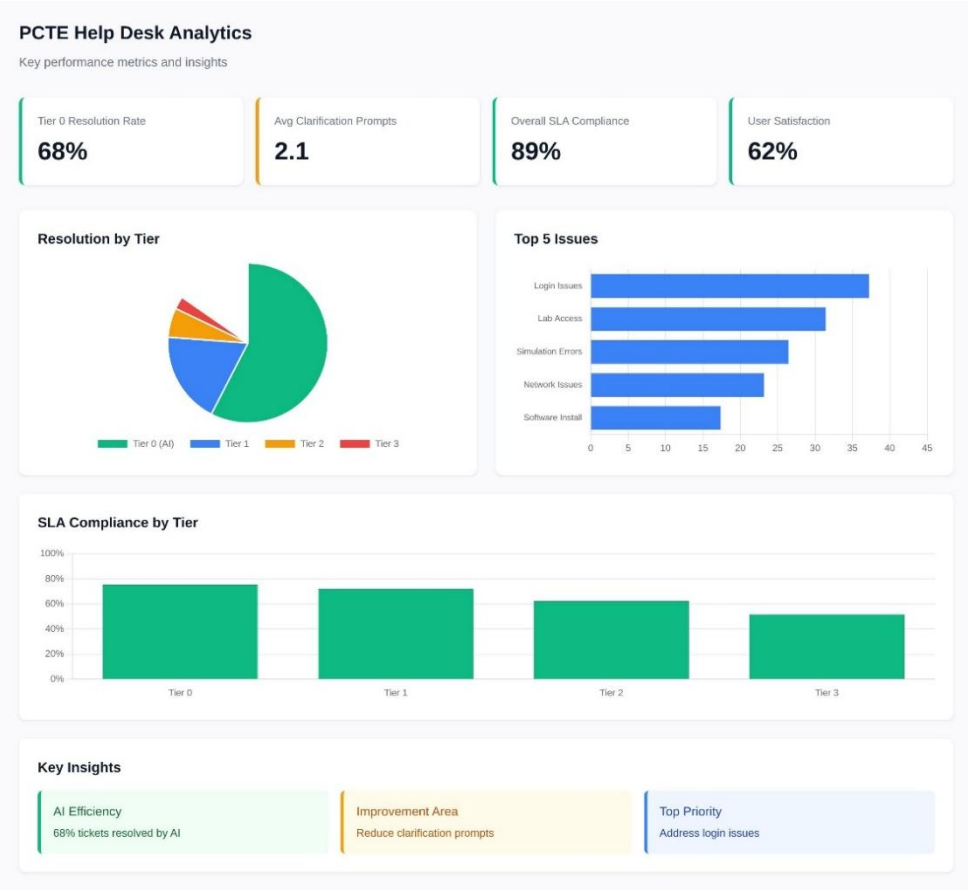
Seamless Escalation: If self-service does not resolve the issue, the interaction history and linked KB materials are preserved in the ticket, ensuring faster resolution at higher tiers.

1.9 MANAGEMENT AND MONITORING DASHBOARD

BayInfotech's AI Help Desk includes a *comprehensive management and monitoring dashboard* that provides administrators with interactive tools to configure, manage, and monitor the chatbot's performance and usage. This centralized capability ensures transparency, adaptability, and continuous improvement of the Help Desk environment.

1.10 Analytics and Predictive Insights

BayInfotech's AI Help Desk incorporates *advanced analytics and predictive insights* to transform routine support data into actionable intelligence. By continually analyzing Help Desk interactions, the system provides leaders and administrators with visibility into trends, recurring issues, and user experience challenges, empowering them to make proactive decisions. Our key capabilities:



Sample Metrics for Analytics and Predictive Insights

Trend Analysis: Dashboards display recurring topics, high-volume issues, and common escalation triggers. This enables supervisors to identify systemic problems and prioritize targeted improvements.

Resolution Path Metrics: The system tracks how often users require additional clarifications, corrective prompts, or escalations before a resolution is achieved, providing direct insight into knowledge base gaps and the accuracy of the AI model.

Predictive Insights: ML-driven analytics forecast emerging problem areas (e.g., spikes in access issues before training events) and recommend preventative measures. This mirrors BayInfotech's predictive QA frameworks, where defect patterns were anticipated and resolved before impacting production.

Performance Dashboards: Interactive visualizations provide Help Desk managers with SLA compliance tracking, ticket resolution efficiency, and AI accuracy trends. These dashboards can be customized by role, ensuring both technical staff and leadership have the insights they need.

Continuous Improvement Loop: Insights from analytics are directly fed into retraining AI models, updating KB articles, and refining escalation logic, ensuring the Help Desk evolves in tandem with PCTE's mission requirements.

1.11 Continuous Machine Learning Model

BayInfotech's **Continuous ML Model** ensures the Help Desk is not static, but *a living, adaptive system* that grows more precise, reliable, and mission-aligned with each cycle of learning—supporting PCTE's evolving operational and training requirements. Our key capabilities:

Incremental Retraining: The AI model is regularly updated with newly resolved tickets, escalation logs, and clarifying prompts, ensuring it learns from both successful and failed interactions.

Knowledge Base Synchronization: Whenever KB articles are added, updated, or retired, the ML model integrates these changes, improving accuracy and preventing outdated responses.

Feedback Loop Integration: User ratings, Help Desk staff annotations, and sentiment signals are incorporated into retraining cycles to refine AI accuracy and reduce false positives.

Historical Data Utilization: Past tickets and resolution trends are analysed to identify recurring issues and improve the prediction of high-risk queries, mirroring our predictive QA frameworks

1.12 Data Assurance and Security

BayInfotech's AI Help Desk is designed with *data assurance and security as foundational principles,* ensuring all user queries, chatbot responses, and system interactions remain secure and compliant within a **Controlled Unclassified Information (CUI)-compliant environment**.

Secure Data Handling: All data, including queries, tickets, and AI-generated responses, is encrypted in transit and at rest using **AES-256** standards, with multi-factor authentication (MFA) and Zero Trust Architecture (ZTA) enforced across the environment.

Access Control and Monitoring: Role-based access ensures that only authorized personnel can view or modify sensitive information. Continuous monitoring, audit logging, and anomaly detection provide real-time oversight and visibility.

Data Minimization: The AI system retrieves and processes only the minimum necessary information for resolution, preventing unnecessary data exposure.

Redaction and Sanitization: Sensitive or personal data within queries is automatically masked or sanitized before being stored or processed, thereby reducing the risk of inadvertent disclosure.

1.13 Proposed Timeline and Deployment

BayInfotech proposes a *phased deployment approach* to deliver the AI-Enabled Help Desk within a **24-month performance period**, ensuring rapid capability introduction while allowing for continuous refinement and scalability. This timeline provides a secure and mission-ready Help Desk capability, delivered with incremental