PROAGENTIC: MULTI-AGENT AI ECOSYSTEM

WHAT IS PROAGENTIC

ProAgentic is an agentic ecosystem comprising of interconnected and evolving multi-agent systems, custom tools, and protocols. ProAgentic enables rapid construction of domain-specific agentic workflows through reusable components and automated development processes.

BINARY MULTI-AGENT SYSTEM (BMAS) DEVELOPMENT APPROACH

BMAS underpins how we build new systems. When developing a multi-agent system, the building agents connect to another fully functional system or import patterns from it. This means new agents inherit proven architectures, communication protocols, and component libraries from day one. Systems are inherently connected across the ecosystem, enabling immediate component reuse and cross-system collaboration rather than building in isolation.

DEVELOPMENT WORKFLOW:

- **Test-Driven:** AI agents generate failing tests first, then write minimal code to pass them, then refactor
- **Parallel Swarms:** 3-5 agents simultaneously search codebases, debug issues, analyse patterns, deploy updates
- **Automated UAT:** AI controlled isolated browser agents simulate end-user journeys, capture evidence, a feed reports into shared memory
- **User Journey Led:** Every feature validated against defined user scenarios before implementation begins

TIMELINE & VALIDATION

Foundation (October 2020 - Mar 2024): Ongoing research into intelligent workflows, multi-agent concepts and protocol design.

Protocol Development (April 2024): Novae.Travel launched as a vehicle to evolve our core agent architecture and communication protocols.

Active Deployment (April 2024 - Present): 3 Innovate UK funded feasibility studies, 13 systems deployed or in active trials across infrastructure monitoring, document intelligence, acoustic sensing, and workflow automation

QUANTIFIED RESULTS

3X

FASTER DEVELOPMENT

Than traditional methods (validated across 3 Innovate UK feasibility studies)

5X

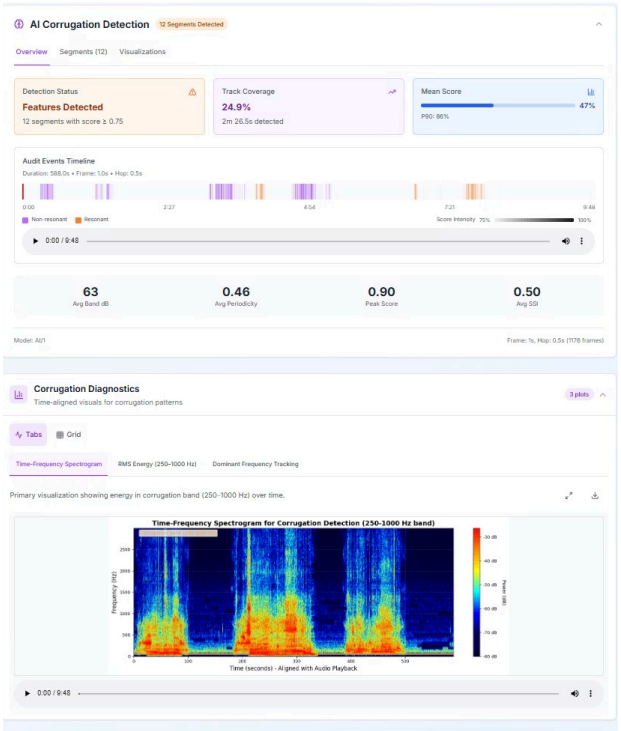
EFFORT REDUCTION

Full ProAgentic Portfolio has been developed in 12 months with a team of only 2 FT Engineers

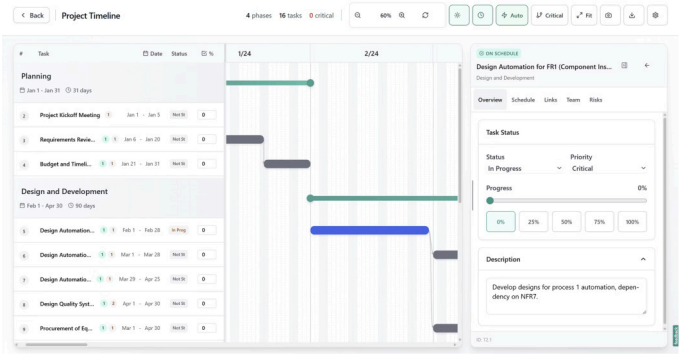
UK OWNERSHIP & EXPLOITATION

Core codebase is 100% Proaptus IP. IP audit conducted in April 2025 confirmed a number of patentable inventions . All systems developed in-house with full codebase control. Targeting UK manufacturing productivity transformation through sensor fusion and agentic workflow deployment.

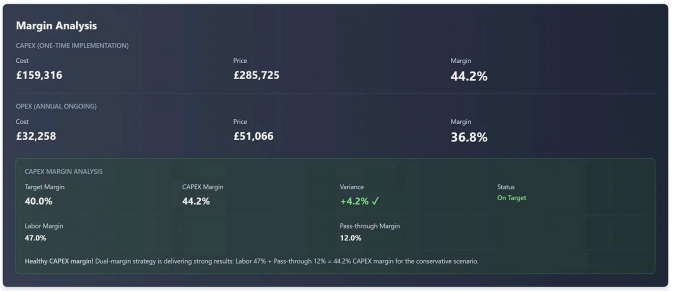
The Innovation: ProAgentic uses AI agents to build complex AI systems fast and cost-effectively through our proprietary BMAS process. Development tools are themselves agentic, creating compounding innovation velocity. Each system contributes reusable components to the Memory Bank. Each pattern learned becomes available across the ecosystem.



Acoustic Corrugation Detection System (in live trial)



Manufacturing Project Schedule Created by ProAgentic AI Project Manager



Custom Margin Analysis Generated by the Pricing/Costing Agent

PORTFOLIO OF PROAGENTIC SYSTEMS & TOOLS

FEASIBILITY STUDIES - INNOVATE UK

SENTRY RAIL - EDGE-AI MULTI-MODAL VALIDATION FOR RAIL SAFETY

CNN-LSTM Anomaly detector for track defects, obstructions and activity. Sentry orchestrator coordinated distributed acoustic sensing (DAS) with semi-autonomous drone and cameras for verification. Four-layer architecture from data acquisition through edge processing to cloud analysis. Field validation achieved **94% accuracy** with <10 minute response time**. Manufacturing application**: predictive maintenance using multi-sensor fusion, equipment condition monitoring.

LIGHTHOUSE - ENVIRONMENT & INFRASTRUCTURE MONITORING

CNN-based Seismic Detection system trained by our Acoustic Simulation Engine achieved **>95% detection rate** of Micro-seismic P and S waves; streamed data from a past geothermal field trial to simulate live conditions. Validated platform reusability: three additional specialised agents (Submerged Cable detection, Vehicle Detection, Voice Detection) developed at **30% of initial effort**. **Manufacturing application**: equipment vibration analysis, condition monitoring across facilities.

SENTRY 5G POC - EDGE-AI ENABLING 5G COMMUNICATIONS

Sentry Edge Agent achieves **>99% data reduction** (8TB/day raw sensor data → actionable alerts). Included a field trial with Silixa iDAS unit, 1km fibre cable, and EE 5G network validated detection of human movement, drone flights at 10m altitude, and equipment sounds. Proves edge processing essential for wireless IIoT deployment where raw data transmission is non-viable. **Manufacturing application**: wireless sensor networks for factory floor monitoring.

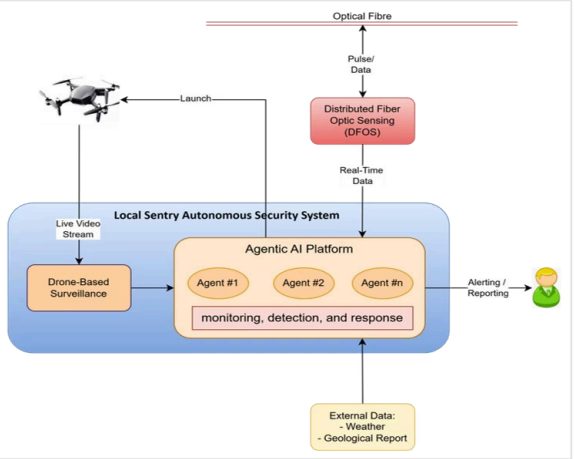
LIVE DEPLOYED SYSTEMS

SENTRY CABIN - ACOUSTIC DETECTION OF MECHNICAL DEFECTS

ProAgentic system built from first principles to detect signals of mechanical anomalies without training data. Uses spectrogram analysis & Fourier transforms for signal processing, time-series analytics, and models like YAMNet for acoustic classification. **Singapore metro trial ongoing** for rail corrugation detection and passenger comfort noise compliance. **Manufacturing application:** product quality inspection via acoustic signature analysis, defect detection on production lines.

DOCINTEL MULTI-AGENT SYETEM

Agentic data ingestion, analysis and retrieval system. Vision module analyses technical drawings and extracts CAD data. QA/QC agent suite performs accuracy scans, conflict detection, anomaly detection, reference checking, and confidence scoring. Enterprise version deployed in Azure for a client. **Manufacturing application:** data management, technical drawing analysis, contract management, automated compliance verification and reporting



Sentry system architecture for live 5g PoC (March 2025)

PROAGENTIC.AI - AI PROJECT MANAGER

Public deployment, live and free-to-use. 12+ specialised agents (inc. charter, scope, budget, quality, risks, dependencies, architecture, testing, deployment, agile, anomaly) coordinate autonomously via MAS Hub. Agent Mode provides chat/canvas interface for human-AI co-creation. **Manufacturing application:** production scheduling, resource allocation, workflow automation.

LUNA LISTENS - SPEECH-TEXT FREE SEN APP

AI transcriber for children with special educational needs. **95% built by ProAgentic agents** from requirements through deployment, validating the development methodology. Actively used by a UK school and by other pupils. Demonstrates swarm development patterns and cross-project Memory Bank component reuse.

SPECIALISED AGENT TOOLS

STANDARDS & POLICIES RULES (SPR) MODULE

Dynamically injects ISO 9001, AS9100, OSHA, and GD&T standards into agent context when relevant. Ensures outputs automatically comply with regulatory requirements without hardcoding rules. **Manufacturing critical:** automatic compliance checking across quality, safety, and engineering workflows.

ACOUSTIC SIGNAL SIMULATION ENGINE

Generates synthetic training data from minimal real examples. Plots detected acoustic signals then creates variants across different environments and conditions. Trains CNNs with few-shot learning, validated in Lighthouse seismic detection and Sentry acoustic monitoring. **Manufacturing application:** rapid model training for new equipment types where failure data is scarce.

PRICING MODELS PLATFORM

Agentic system builds interactive pricing models from documents, meeting notes, or standardised approaches. Live models for CAPEX/OPEX analysis and deliverables-based value-day allocations. ProAgentic workflow integration in progress to enable autonomous cost estimates across domains. **Manufacturing application:** project cost estimation, budget planning, ROI modelling, margin analysis.