Project details

Application team

PROAPTUS LTD

Organisation details

Type	Business

Team members

Full name	Email	EDI survey
Chinedu Achara	chinedu@proaptus.co.uk	Complete

Application details

Competition name
The Agentic AI Pioneers Prize

Application name
ProAgentic: Multi-Agent AI Ecosystem

When do you wish to start your project?
1 December 2025

Project duration in months
3 months

Innovation area
Digital technology

Application questions

1. Applicant location (not scored)

Applicant location (not scored)

Proaptus - 1 Derwent Business Centre, ClarkeStreet,Derby,England, DE1 2BU

2. Animal testing (not scored)

Animal testing (not scored)

No

3. Permits and licences (not scored)

Permits and licences (not scored)

Yes

4. International collaboration (not scored)

International collaboration (not scored)

No International collaboration planned for this project - all work to be carried out in the UK.

5. Export licence (not scored)

Export licence (not scored)

No

6. Trusted Research and Innovation (not scored)

Trusted Research and Innovation (not scored)

Alignment with UKRI TR&I Principles

Our proposed project work relates to UKRI's Trusted Research and Innovation (TR&I) Principles due to the advanced nature of the Artificial Intelligence and autonomous systems being developed. We are fully aware of the risks associated with emerging technologies and maintain strict internal governance to protect our IP and ensure responsible application.

Dual-Use Applications

While our primary focus is strictly civil and industrial (Advanced Manufacturing and Infrastructure), we acknowledge that the underlying technologies in our Sentry platform have theoretical dual-use applications:

- **Surveillance & Monitoring:** The Sentry system's capability to coordinate autonomous drones and Distributed Acoustic Sensing (DAS) for anomaly detection could theoretically be adapted for perimeter security or defence surveillance.
- **Signal Analysis:** The Acoustic Signal Simulation Engine and recognition algorithms could technically be applied to signature detection in non-civil contexts.
- **Mitigation:** We strictly limit our research and commercial exploitation to **industrial predictive maintenance, rail safety, and manufacturing quality control**.

Relevance to UK National Security and Investment (NSI) Act

Our project falls under the following definitions within the 17 sensitive areas of the NSI Act:

- **Artificial Intelligence:** The project involves the development of "agentic" ecosystems, advanced machine learning models (CNN-LSTMs), and autonomous decision-making logic.
- **Advanced Robotics:** The project could involves the orchestration of semi-autonomous robots and sensor integration for remote inspection.
- **Transport:** The application of Sentry Rail specifically targets national rail infrastructure safety and monitoring.

Export Control & Licensing

- **Export Control License:** An export control license is **not required** for this project. The research outcomes and software generated are designed for open commercial use in the industrial sector and do not fall under military restrictions.
- **UK Strategic Export Control List:** This project does not utilise or produce any items or substances currently on the UK Strategic Export Control List.

Governance & Ownership

To mitigate TR&I risks, Proaptus Ltd is a 100% UK-owned entity. We hold 100% of the IP for the core codebase and conduct all research and development in-house, significantly reducing risks related to foreign interference or unintended technology transfer.

7. Sector alignment

Sector alignment

Advanced Manufacturing

8. Participation commitment

Participation commitment

Yes

9. Agentic AI experience

What relevant experience do you have in designing, implementing and validating Agentic AI systems?

System & Operational Deployment

ProAgentic is an ecosystem of interconnected multi-agent systems enabling rapid construction of domain-specific workflows. As detailed in the Appendix (p.2 Portfolio), the system has been operationally deployed since April 2024 across three Innovate UK feasibility studies and multiple live commercial environments.

- **Decisions Improved:** In **Sentry Rail**, the feasibility test system automated safety-critical safety and maintenance decisions, utilising CNN-LSTM anomaly detection to identify trackside events with **94% accuracy**. In **Sentry 5G**, Edge Agents make real-time data filtering decisions, reducing 8TB/day of raw sensor data by **\>99%** to enable wireless transmission. **ProAgentic.AI** automates complex project resourcing decisions, while **DocIntel** automates data ingestion and regulatory compliance verification.

Codebase Ownership & Control

We own 100% of the codebase (~1M lines, patentable IP). We control the MAS Hub orchestration and the Binary Multi-Agent System (BMAS) framework. As illustrated in the Appendix (p.1), this framework enables a shared Memory Bank, where proven architectures and patterns (e.g., acoustic signatures from Sentry) are inherited by new agents, ensuring immediate reliability and cross-system collaboration.

Evidence of Outcomes

Validated across three Innovate UK studies and 12+ agentic systems/tools, the ecosystem delivers 3x faster development and 5x effort reduction.

- **Efficiency:** A team of just two FT engineers delivered the full portfolio in 12 months - a workload typically requiring 10+ engineers.

Reliability: Luna Listens was 95% built by agents and is active used in a UK school. Field trials validated robustness: **Sentry Rail** achieved 94% accuracy in detecting human walking via fibre optic acoustics, and **Lighthouse** achieved \>95% seismic detection rates in live geothermal trials.

Proposal, Checking & Refinement

Our development workflow ensures rigor and transparency:

- **Proposed: Parallel Swarms** of 3-6 agents that communication through a shared memory bank simultaneously search codebases/projects/docs and analyse patterns to propose solutions.

Checked: We enforce **Test-Driven Development** (agents write failing tests before code) and **Automated UAT**, where AI-controlled browsers simulate user journeys to self-optimise the user experience.

Refined: Features are validated against defined user scenarios before implementation.

Guardrails & Integration

We address real-world constraints through the Standards, Policies & Rules (SPR) Module, which dynamically injects relevant guiding information, requirements and constraints into agent contexts to ensure compliance in all LLM generated outputs. We apply multi-modal validation (e.g., cross-referencing acoustic data with drone visuals) to prevent hallucinations. The system uses a validated edge-to-cloud architecture (Appendix p.2), packaged as containerised Rust services communicating via RESTful APIs for seamless integration.

ProAgentic-Multi-Agent-AI-Ecosystem.pdf (opens in a new window) (/application/10181048/form/question/50632/forminput/145201/file/879367/download).

10. Agentic AI Capability

What in-house Agentic AI capability do you own or control, for example owned codebases, models, evaluators?

Proprietary Assets Owned

We own 100% of the ProAgentic ecosystem (~1,000,000 lines of proprietary code), validated by an April 2025 IP audit confirming patentable inventions. Key assets include:

- MAS Hub: Proprietary orchestration engine for agent discovery, registration, and message routing.

- Binary Multi-Agent System (BMAS): Development framework enabling new agents to inherit proven architectures from existing ones.
- Specialised Tooling: Standards & Policies Rules (SPR) Module, Acoustic Signal Simulation Engine, Memory Bank for cross-project component reuse (allowing patterns learned in one domain to accelerate others), and 1500+ lines of optimised prompt libraries*.
- Test Suite: Comprehensive automation framework with 1000s of test files and agent automation scripts.

Modifiability & Engineering Pedigree

All core components are fully modifiable. This capability is uniquely informed by our founder, Chinedu Achara, an inventor of two manufacturing patents and lead for manufacturing of Earth observation satellites, subsea high-pressure/high-temperature monitoring systems, and laser micro-machining systems demanding sub-micron accuracy.

- Mission-Critical Reliability: This background drives our focus on "manufacturing-grade" agents. Unlike generic AI wrappers, our agents are architected to handle precision data and operate in harsh edge environments (validated in Sentry 5G) where latency and accuracy are non-negotiable. For example, Sentry Rail uses deterministic Fourier transforms for signal processing, avoiding probabilistic hallucinations common in standard LLMs.
- Rapid Innovation: BMAS allows us to build robust, specialised agents at below 30% of the initial effort by extending these proven, high-reliability patterns.

Solution Maturity & Packaging

- TRL 8 (Live): ProAgentic.AI (Project Manager), Luna Listens (EdTech).
- TRL 7 (Enterprise): DocIntel deployed in Azure.
- TRL 5-6 (Field Validated): Sentry Rail (94% accuracy), Lighthouse (\>95% detection), Sentry Cabin (Singapore trial).
- Integration: Edge-to-cloud architecture (reducing raw data \>99% at the edge) packaged as containerised services with RESTful APIs enabling plug-and-play interoperability.

Responsible AI & UK Standards

Our governance aligns with BS ISO/IEC 42001 and the UK's 5 Pro-Innovation AI Principles:

- Safety & Robustness: We use Test-Driven Development (TDD) and parallel agent swarms (3-5 agents) to debug code pre-deployment.
- Transparency: The SPR Module explicitly cites regulations (ISO 9001, OSHA) used for agent outputs, ensuring human-readable reasoning and adherence to data minimization.

- Fairness: Pricing models use standardised logic to prevent algorithmic bias.
- Accountability: Version control provides immutable audit trails of logic changes.
- Redress: High-stakes alerts use multi-modal validation (e.g., drone verifying acoustic alerts) to ensure human operators can contest machine decisions before action.

11. Mentorship support

Mentorship support

Optimising your use of compute resources

Terms and conditions

Award terms and conditions

Partner	Funding rules	Terms and conditions
PROAPTUS LTD (Lead)	Subsidy control	Innovate UK - Subsidy control (/application/10181048/form/terms-and-conditions/organisation/24713/question/50448)