

Stakeholder Analysis Report

Project: AI-Powered Predictive Maintenance for Industrial Equipment

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% Date: October 2025 % Confidential – Internal Use Only

Executive Summary

This report presents a comprehensive stakeholder analysis for the **AI-Powered Predictive Maintenance** project. The goal of the analysis is to identify and assess the individuals and groups who will influence – or be influenced by – the implementation of an AI-driven maintenance solution. By understanding their interests, power and concerns, the project team can develop tailored engagement strategies that accelerate adoption and maximise value for the organisation.

Predictive maintenance leverages real-time data collected from IoT sensors and employs machine-learning algorithms to anticipate equipment failures before they happen. By analysing vibration, temperature and pressure readings, the system identifies anomalies that could indicate impending faults, enabling maintenance to be scheduled proactively instead of waiting for breakdowns **【562221871104336†L139-L150】 【562221871104336†L162-L167】** . This proactive approach reduces unplanned downtime and extends asset life. Sustainable success, however, requires more than just technology – the organisation must develop internal expertise, select pilot assets strategically and build a culture that uses data to drive decisions **【912655020509175†L22-L39】** .

Project Description

The AI-Powered Predictive Maintenance system aims to improve industrial reliability by predicting equipment and product failures using deep neural networks (DNNs), recurrent networks (LSTMs) and computer vision. Sensors embedded in equipment continuously measure variables such as temperature, vibration and pressure. These streams are ingested into a data pipeline, where DNNs and long short-term memory networks model the future likelihood of failure. In parallel, a convolutional neural network analyses images of components to detect defects and classify damaged parts.

For the pilot phase, the project focuses on a compressor system. Historical sensor data will be paired with maintenance records to train models. An interactive dashboard built with Streamlit will present predictions and recommended actions to maintenance teams. Future phases will incorporate real-time IoT streaming, edge inference and an AI agent to deliver automated alerts and recommendations.

Implementing this solution as an organisational capability requires carefully sequencing work. The team must select suitable proof-of-concept assets, gather high-quality data, ensure secure

integration with existing systems and empower staff with the skills needed to interpret AI outputs. The following sections describe the stakeholders involved, their objectives and the strategies for engaging them.

Stakeholder Identification & Assessment

To understand the human dimension of the project, stakeholders were mapped according to their **interest**, **influence** and **impact** levels. A concise summary is provided in the table below, followed by narrative descriptions of each party's objectives and recommended engagement strategies. Breaking the information into two parts – a compact table and detailed bullet lists – makes the report easier to read and allows the tables to fit comfortably on a page.

Stakeholder	Role / Title	Interest	Influence	Impact
Project Sponsor	Senior executive / funding manager	High	High	High
Project Manager	Project delivery lead	High	High	High
AI Development Team	Data scientists & ML engineers	High	Medium	High
Dashboard Developer	Streamlit / software engineer	High	Medium	Medium
Maintenance Team	Technicians / field engineers	Very High	Low–Medium	Very High
Operations Manager	Production oversight	High	High	High
IT Department	Infrastructure & security	Medium	High	Medium
Quality Control	Product QA	Medium	Low	Medium
IoT Data Team	Sensor data management	High	Medium	High
Vendors	IoT hardware suppliers	Medium	Low	Medium
Regulatory Authority	Compliance & safety	Low	High	Medium
Future Clients	Potential system adopters	Medium	Low	High

Objectives and Engagement Strategies

- **Project Sponsor**
 - *Primary objectives / concerns:* Secure return on investment, ensure strategic alignment and approve resources.
 - *Engagement strategy:* Provide executive briefings and dashboards that link KPIs to business outcomes. Seek their guidance at major milestones and clarify how early wins support strategic goals.

- **Project Manager**
 - *Primary objectives / concerns:* Deliver on time, control scope and coordinate the many stakeholders involved in the pilot.
 - *Engagement strategy:* Hold daily stand-ups, maintain a visible risk register and publish concise weekly reports summarising progress and blockers.
- **AI Development Team**
 - *Primary objectives / concerns:* Achieve high model accuracy, maintain data quality and secure adequate compute resources.
 - *Engagement strategy:* Organise technical workshops, offer access to labelled data sets and involve the team in decisions about modelling techniques and infrastructure.
- **Dashboard Developer**
 - *Primary objectives / concerns:* Deliver a simple, responsive user interface with low latency and clear UX.
 - *Engagement strategy:* Conduct sprint reviews and incorporate feedback from maintenance teams on usability; iterate quickly on UI/UX designs.
- **Maintenance Team**
 - *Primary objectives / concerns:* Obtain actionable alerts that reduce downtime and fit seamlessly into existing workflows.
 - *Engagement strategy:* Provide hands-on training, pilot trials and feedback loops. Use simplified interfaces and assign “power users” to champion adoption.
- **Operations Manager**
 - *Primary objectives / concerns:* Maintain production continuity, improve Overall Equipment Effectiveness (OEE) and reduce downtime.
 - *Engagement strategy:* Schedule KPI alignment meetings, share executive reports and align maintenance scheduling with production plans.
- **IT Department**
 - *Primary objectives / concerns:* Ensure data security, reliable integration and system availability.
 - *Engagement strategy:* Include IT in early planning, conduct security review sessions and agree on integration tests and API specifications.
- **Quality Control**
 - *Primary objectives / concerns:* Guarantee defect detection accuracy and minimise false positives/negatives.
 - *Engagement strategy:* Run sample validation tests, collaborate on labelled data review cycles and monitor precision metrics regularly.
- **IoT Data Team**
 - *Primary objectives / concerns:* Calibrate sensors, maintain data-ingest quality and optimise latency.
 - *Engagement strategy:* Define data quality SLAs, hold joint debugging sessions and improve preprocessing pipelines.
- **Vendors**
 - *Primary objectives / concerns:* Meet delivery timelines, honour warranties and ensure hardware compatibility.
 - *Engagement strategy:* Set clear contract milestones, specify acceptance criteria and

- monitor vendor performance.
- **Regulatory Authority**
 - *Primary objectives / concerns:* Achieve compliance with safety and environmental standards.
 - *Engagement strategy:* Provide documentation, schedule audits and participate in safety reviews.
- **Future Clients**
 - *Primary objectives / concerns:* Assess scalability, total cost of ownership and return on investment before adopting the solution.
 - *Engagement strategy:* Demonstrate proof-of-concept results, share case studies and invite prospective clients to pilot evaluations.

Power–Interest Grid (Mapping & Strategies)

The **power–interest grid** categorises stakeholders by their capacity to influence outcomes and their level of interest in the project. Each quadrant prescribes a distinct management approach [3628855678744†L168-L179] :

- **High Power, High Interest – Manage Closely:** Engage frequently, involve these decision-makers in key choices and address their concerns promptly. This group includes the Project Sponsor, Project Manager and Operations Manager.
- **High Power, Low Interest – Keep Satisfied:** Provide concise updates and high-level demonstrations to maintain support without overwhelming them with details. Regulatory authorities and other senior executives fall into this quadrant.
- **Low Power, High Interest – Keep Informed:** Share progress updates, offer opportunities for feedback and reassure them that their needs are being addressed. Maintenance teams and the AI development team typically belong here.
- **Low Power, Low Interest – Monitor:** Maintain minimal contact and monitor their needs. Vendors and other peripheral parties require occasional updates but do not need intensive engagement.

Stakeholder Engagement Assessment

The following table summarises how current engagement levels compare with desired levels and proposes actions to move each stakeholder to the target state.

Stakeholder	Current Engagement	Desired Engagement	Actions to Move to Desired State
Project Sponsor	Supportive	Leading	Hold executive demo sessions, share ROI projections and obtain milestone approvals
AI Team	Supportive	Leading	Allocate GPUs/compute resources, provide data access and involve

Stakeholder	Current Engagement	Desired Engagement	Actions to Move to Desired State
Maintenance Team	Neutral	Supportive	Conduct hands-on pilots, simplify UIs and incorporate direct feedback
IT Department	Neutral	Supportive	Offer security workshops, agree on an integration roadmap and define API specifications
Quality Control	Neutral	Supportive	Perform validation cycles and schedule labelled-image review sessions

Communication Plan (Summary)

A communication plan identifies who needs to be informed, what will be communicated, the delivery channel and how frequently communications occur **【864354382025979†L77-L83】** . This high-level summary should be supported by a more detailed schedule in the project repository.

Stakeholder	Channel	Frequency	Format	Owner
Project Sponsor	Executive meetings & email	Monthly	Executive summary, KPI dashboard	Project Manager
AI & Dev Team	Slack, stand-ups & demos	Daily stand-ups, bi-weekly reports	Technical reports, code reviews	AI Lead
Maintenance Team	Workshops & dashboard training	Weekly during pilot	Hands-on training, quick reference guides	Product Owner
Operations Manager	Operational review meetings	Weekly	KPI reviews, change requests	Project Manager
IT Department	Technical meetings	Bi-weekly	Integration & security reports	Tech Lead

Key Stakeholder Risks & Mitigation

Successfully introducing predictive maintenance requires anticipating and mitigating stakeholder-related risks. The most significant threats and proposed mitigation measures are outlined below.

- **Poor Adoption by Maintenance Team:** Adoption can lag because technicians and operators often lack familiarity with advanced analytics, sensor systems and digital tools. **Mitigation:** Launch early pilots with simplified user interfaces, invest in structured training programmes and provide incentives for participation. Identify “power users” who can champion the system and mentor peers.
- **Data Quality & Documentation Issues:** Maintenance records, sensor data and manuals are often stored in disconnected systems, leading to inconsistent data and duplicated efforts [221609399385473†L48-L67] . **Mitigation:** Establish data quality agreements and sensor calibration schedules, develop preprocessing pipelines and centralise documentation (e.g., via digital twins) to provide a single source of truth.
- **Integration Delays with IT:** Legacy systems and siloed technologies can make it difficult to connect new IoT devices and analytics platforms [221609399385473†L121-L134] . **Mitigation:** Involve IT early, conduct security reviews, define an integration roadmap and allocate dedicated sprints to build APIs and middleware.
- **Sponsor Withdrawal / Budget Cuts:** High upfront costs and uncertain savings timelines can undermine commitment [221609399385473†L317-L323] . **Mitigation:** Deliver early wins through pilot projects, prepare clear ROI projections and phase funding based on milestones to build a strong business case.

Recommended Next Steps

1. **Pilot Validation:** Run a two-week pilot with the Maintenance Team and IoT sensors to validate data quality, model performance and user workflows.
2. **Executive Review:** Prepare an executive pilot review at the end of the trial, including demonstrations and preliminary ROI analysis, to obtain sponsor sign-off and funding for scaling.
3. **Integration Checklist:** Develop an integration checklist and security acceptance criteria with the IT Department to ensure systems are reliable, compliant and ready for expansion.
4. **Training & Power Users:** Schedule hands-on training sessions and designate *power users* within maintenance and operations teams to drive adoption and knowledge transfer [221609399385473†L283-L291] .
5. **Stakeholder Register:** Maintain a living stakeholder register, update engagement statuses weekly and adjust communication plans as the project evolves.

Appendix A: Contact Points & RACI (Suggested)

The Responsible–Accountable–Consulted–Informed (**RACI**) matrix defines roles for major activities in the pilot phase. Assignments may evolve as the project scales.

Activity	Responsible (R)	Accountable (A)	Consulted (C)	Informed (I)
Pilot planning	Project Manager	Project Sponsor	Operations	IT Dept,

Activity	Responsible (R)	Accountable (A)	Consulted (C) Manager	Informed (I) Maintenance Team
Model training & validation	AI Team	Project Manager	Quality Control	Maintenance Team
Dashboard deployment	Dashboard Developer	IT Department	AI Team	Maintenance Team

Sources

- Predictive maintenance uses real-time data and machine learning to anticipate failures and processes sensor data such as temperature, pressure and vibration
【562221871104336†L139-L150】 【562221871104336†L162-L167】 .
- Successful implementation requires strategic asset selection, comprehensive data and internal expertise 【912655020509175†L22-L39】 .
- The power-interest grid categorises stakeholders into four quadrants—Manage Closely, Keep Satisfied, Keep Informed and Monitor—providing management guidance
【3628855678744†L168-L179】 .
- High-power, high-interest stakeholders need close management
【494183382110889†L344-L349】 .
- A stakeholder communication plan identifies who needs to be informed, what is communicated and how often 【864354382025979†L77-L83】 , and its goals are to meet organisational objectives, maintain relationships and improve operations
【864354382025979†L86-L91】 .
- Workforce adoption of predictive maintenance tools is challenging due to skills gaps
【221609399385473†L283-L291】 .
- Fragmented documentation and data silos hinder effective maintenance
【221609399385473†L48-L67】 .
- Integration with legacy systems requires custom approaches and phased upgrades
【221609399385473†L121-L134】 .
- High initial costs make it difficult to justify investment in predictive maintenance
【221609399385473†L317-L323】 .