GENERAL PROJECT INFORMATION

PROJECT NAME	PROJECT MANAGER
Proactive Shield: Smart Maintenance Platform for Aero Engine Industrial Equipment	XUANHE YANG

EMAIL	PHONE	ORGANIZATIONAL UNIT
2252709@tongji.edu.cn	18937082731	School of Software Engineering, Tongji University

PROJECT INTERODUCTION

DATE OF AUTHORIZATION & PROJECT START DATE	March 9th	PROJECT FINISH DATE	June 15th
KEY SCHEDULE MILESTONES	Complete first version of the software by May 15th Complete produetion version of the software by June 10th		
BUDGET INFORMATION	The firm has allocated 2,000 yuan for this project, and more funds are available if needed, The majority of costs for this project will be internal labor. All hardware will be outsourced.		
GOALS / METRICS	Develop a smart maintenance web platform that enables real-time monitoring, predictive analytics, and automated diagnostics for aero engine industrial equipment to enhance operational efficiency, reduce downtime, and optimize maintenance schedules.		
EXPECTED DELIVERABLES	Deliverables include a centralized web dashboard with real-time monitoring capabilities, an AI analytics engine implementing multiple deep learning models, a comprehensive data management system, and a flexible notification system for alerts. Documentation will cover technical specifications, user guides, and implementation procedures. The project will also deliver two fully functional pilot deployments with validation reports and knowledge transfer to maintenance teams.		

PROJECT OVERVIEW

PROJECT OBJECTIVES	1.Design and build a responsive web-based platform using Vue.js frontend and Express backend that provides real-time monitoring capabilities and visualization tools. 2.Develop user-friendly dashboards for maintenance engineers to visualize prediction results and support data-driven decision-making processes. 3.Deploy and test the platform in at least two pilot implementation environments within the first year of development.
MAIN PROJECT SUCCESS CRITERIA	1.Engine component anomaly detection accuracy rate exceeds 95% within six months of deployment. 2.Unplanned maintenance events reduced by at least 25% in the first year after implementation. 3.Average equipment downtime per incident decreased from 72 hours to under 30 hours within 12 months. 4.Maintenance-related operational costs reduced by 25% within 18 months of full implementation.
APPROACH	1.Personnel Organization: Quickly assemble a core technical team to ensure the project has sufficient expertise. 2.Agile Development: Adopt an agile development methodology, breaking the project into 2-3 week sprint cycles to ensure frequent delivery of usable features. 3.Initial Planning: Within one month of project launch, complete a detailed work breakdown structure, scope statement, and schedule, clearly defining deliverables for each phase. 4.Equipment Procurement: Complete all necessary hardware purchases and software license acquisitions within two months of project initiation. 5.Regular Meetings: Establish weekly progress review mechanisms with the project team and key stakeholders to evaluate progress. 6.Testing Mechanisms: Develop comprehensive test plans to ensure AI model accuracy and system stability meet expected standards. 7.Pilot Deployment: Implement pilot projects at two key locations to collect actual usage data and user feedback in preparation for full-scale implementation.

ROLES AND RESPONSIBILITIES

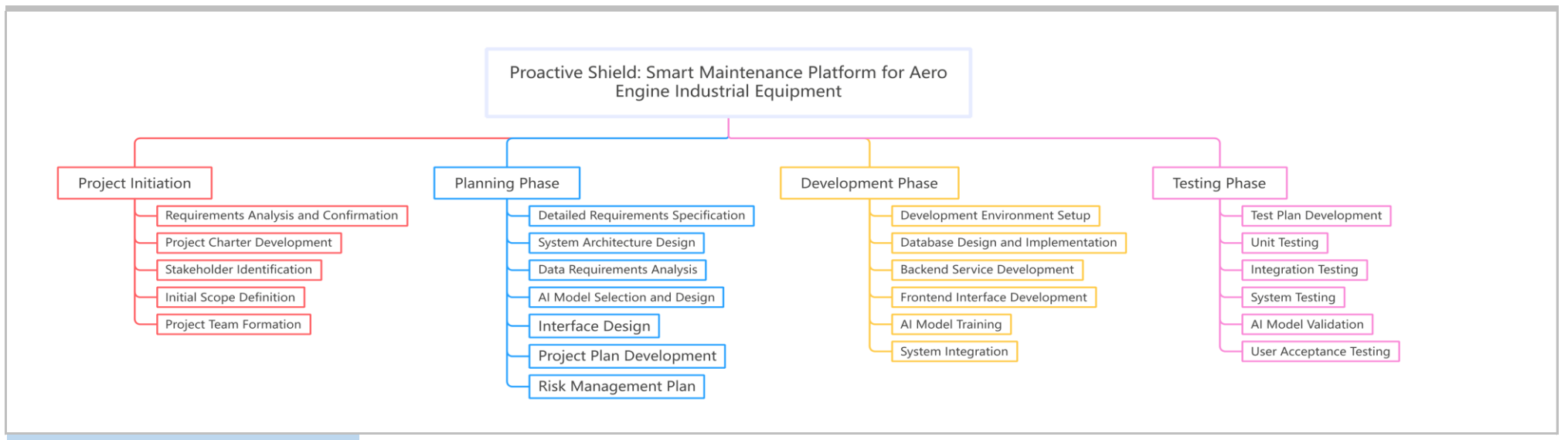
NAME	ROLE	POSITION	CONTACT INFORMATION
CHUNYAN DUAN	Sponsor	CEO	duanchunyan77@163. com
XUANHE YANG	Project Manager	Manager	2252709@tongji.edu. cn
JINGXIAO HAN	Team Member	Programmer	2251548@tongji.edu. cn
TONG LI	Team Member	Programmer	2251653@tongji.edu. cn

FUBIN CHEN	Team Member	Programmer	1958440015@qq.com

Sign-off: (Signatures of all the above stakeholders)

CHUNYAN DUAN TONGLI
XUANHE YANG FUBIN CHEN
JINGXIAO HAN

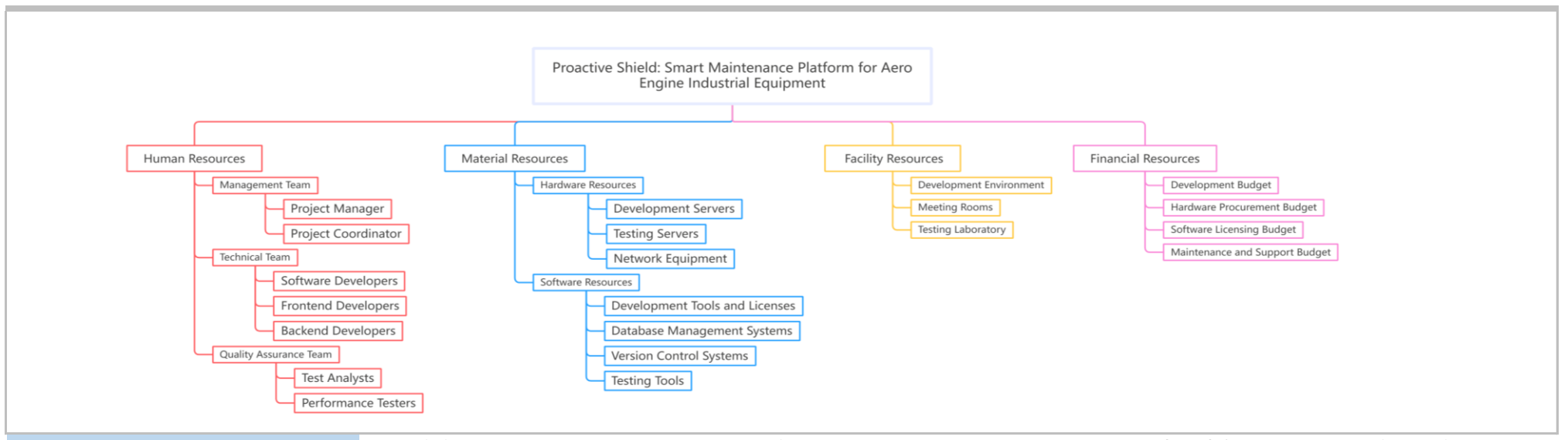
WBS



WBS INTRODUCTION

This image displays a Work Breakdown Structure (WBS) for "Proactive Shield: Smart Maintenance Platform for Aero Engine Industrial Equipment." The diagram is organized hierarchically, showing the key project phases including Project Initiation, Planning Phase, Development Phase, and Testing Phase. Each phase branches into specific tasks - Project Initiation covers requirements analysis, charter development, stakeholder identification, scope definition, and team formation. The Planning Phase includes detailed specifications, architecture design, data requirements, AI model selection, interface design, project planning, and risk management. The Development Phase encompasses environment setup, database implementation, backend and frontend development, AI model training, and system integration. The Testing Phase consists of test planning, unit testing, integration testing, system testing, AI model validation, and user acceptance testing. This structured approach ensures comprehensive coverage of all essential activities required for the development of this smart maintenance platform.

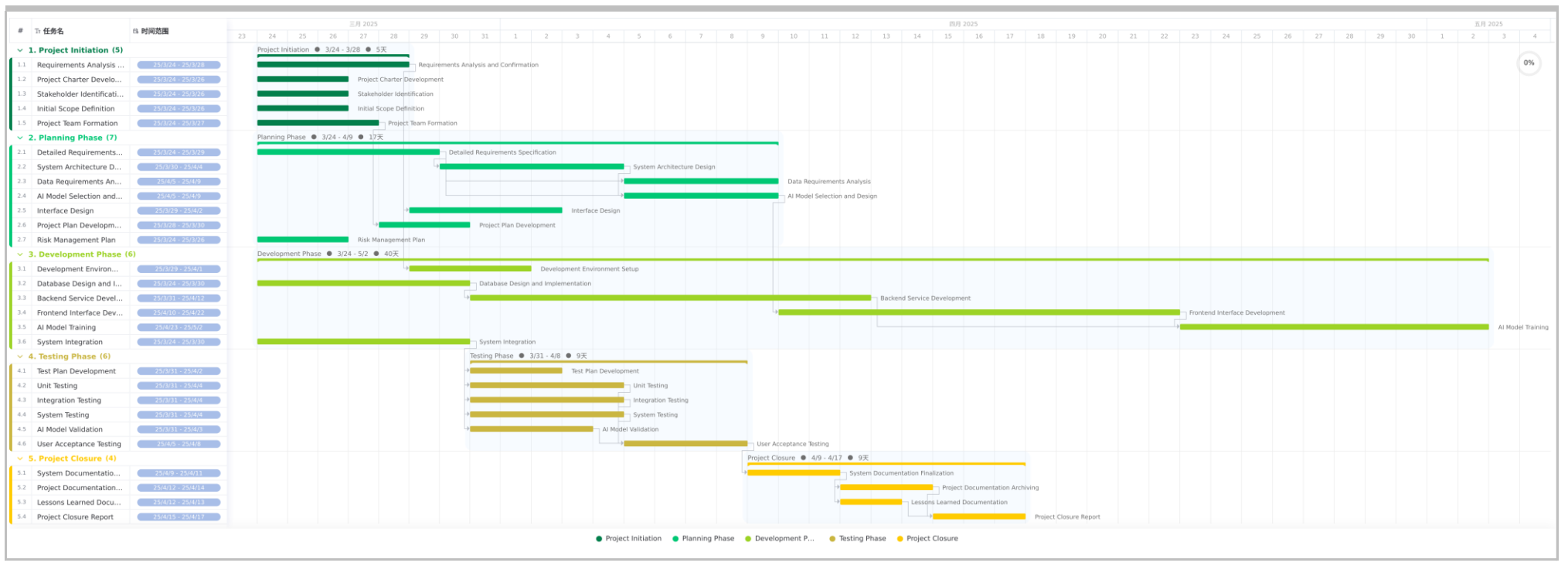
RBS



RBS INTRODUCTION

This image presents a comprehensive Resource Breakdown Structure (RBS) for the "Proactive Shield: Smart Maintenance Platform for Aero Engine Industrial Equipment" project. The diagram hierarchically organizes project resources into four main categories: Human Resources, Material Resources, Facility Resources, and Financial Resources. Human Resources include Management Team (Project Manager, Project Coordinator), Technical Team (Software, Frontend, and Backend Developers), and Quality Assurance Team (Test Analysts, Performance Testers). Material Resources comprise Hardware Resources (Development Servers, Testing Servers, Network Equipment) and Software Resources (Development Tools, Database Management Systems, Version Control Systems, Testing Tools). Facility Resources encompass Development Environment, Meeting Rooms, and Testing Laboratory. Financial Resources detail various budgets including Development Budget, Hardware Procurement Budget, Software Licensing Budget, and Maintenance and Support Budget. This structured approach ensures all necessary resources are identified and properly categorized for efficient project planning and execution.

GANTT CHARTS



GANTT CHARTS INTRODUCTION	This image displays a detailed Gantt chart for the ProactiveShield Smart Maintenance Platform project, spanning from March to June 2025. The chart visually represents the project timeline with five main phases: Project Initiation (green, March 24-April 4), Planning Phase (light green, April 5-21), Development Phase (bright green, April 22-May 22), Testing Phase (yellow-green, May 23-June 5), and Project Closure (yellow, June 6-10). Each phase contains multiple tasks with specific durations and dependencies clearly marked by horizontal bars. The chart shows parallel activities and critical path tasks, with the development of backend and frontend services representing the longest tasks at 13 days each. The timeline includes calendar dates across the top, task names on the left, and color-coded phase indicators at the bottom, providing a comprehensive visual project management tool that demonstrates how the 80-day project progresses sequentially through its lifecycle stages.

RISKS, CONSTRAINTS, AND ASSUMPTIONS

RISKS	The project faces significant technical challenges, particularly with the AI model implementation. We anticipate potential issues in achieving the desired prediction accuracy for equipment failures, which could undermine the platform's core value proposition. Integration complexities with existing maintenance systems and IoT sensors may cause delays during the development phase. Additionally, stakeholder expectations management presents a risk, as overpromising capabilities could lead to disappointment upon delivery. Resource constraints, especially regarding specialized AI expertise, might impact our ability to deliver on schedule. The project timeline is aggressive, creating vulnerability to unforeseen technical obstacles or scope expansion requests from stakeholders.
CONSTRAINTS	The project operates under strict budgetary limitations that restrict the technology stack selection and the extent of customization possible. Time constraints are particularly challenging, with a fixed delivery date of June 10, 2025, allowing minimal flexibility for contingencies. Technical constraints include the need to integrate with legacy systems that have limited documentation and outdated interfaces. The project team size is capped at current headcount, with no additional resources available despite the aggressive timeline. Regulatory requirements for data privacy and security compliance create additional implementation constraints that cannot be compromised. The solution must operate within the existing IT infrastructure environment, limiting some technical design options.
ASSUMPTIONS	We assume that stakeholders will be available for timely input during the requirements gathering and validation phases. The existing data quality from maintenance systems is presumed adequate for AI model training without extensive cleansing efforts. We expect the allocated resources to remain dedicated to this project throughout its duration without being reassigned. The current technology stack selection is assumed to be compatible with all required integrations. User adoption is expected to be high based on preliminary stakeholder feedback, with minimal resistance to the new platform. We assume that third-party API dependencies will remain stable during the development period. Finally, we anticipate no major organizational changes that would impact project priorities or resources.

PROJECT SCOPE

WITHIN SCOPE	The project scope encompasses the development of a comprehensive predictive maintenance platform with AI-powered analytics capabilities for industrial equipment monitoring. Within scope is the creation of a secure, scalable cloud-based solution with a responsive web interface accessible across devices. The system will include real-time equipment monitoring dashboards, automated alert notifications for potential failures, comprehensive maintenance scheduling functionality, and detailed reporting modules. Development of machine learning models to analyze sensor data and predict maintenance needs based on historical patterns is included. The project covers full integration with existing equipment sensors and IoT devices, implementation of a centralized database for maintenance records, creation of role-based access control systems, and comprehensive user documentation and training materials. The delivery will include thorough testing phases to ensure system reliability and performance under expected operational conditions.
OUTSIDE OF SCOPE	This project explicitly excludes hardware procurement or installation of new sensors or monitoring devices on physical equipment. The platform will not provide direct control functionality for equipment operations or process control systems. Integration with ERP or financial systems beyond basic API connections for maintenance cost tracking is outside scope. Custom mobile applications are not included, though the web interface will be mobile-responsive. The system will not incorporate video monitoring capabilities or video analytics. On-premises deployment options will not be developed, as the solution is designed specifically for cloud deployment. Legacy system replacement or data migration from obsolete systems not identified in requirements is excluded. The project does not include continuous post-implementation support beyond the standard 30-day warranty period. Extensive customization for individual client workflows beyond the core functionality is outside the project boundaries, as are regulatory compliance certifications beyond those specifically identified in requirements.

PROJECT ADMINISTRATION

COMMUNICATIONS PLAN	The Communications Plan establishes a structured framework for information exchange among all project stakeholders. Weekly status reports will be distributed to the steering committee every Friday, with comprehensive monthly reviews scheduled on the last business day of each month. Daily stand-up meetings (15 minutes) will occur for the development team, while bi-weekly progress meetings will include all key stakeholders. A centralized project portal will serve as the primary repository for all documentation. Critical issues will be communicated within 24 hours of identification via both email and direct notification to the appropriate decision-makers. The plan designates specific communication channels for different types of information, with the Project Manager serving as the central coordination point for all formal communications. Regular feedback loops are incorporated to ensure communication effectiveness throughout the project lifecycle.
SCOPE MANAGEMENT PLAN	The Scope Management Plan outlines procedures for defining, documenting, verifying, managing, and controlling the project scope. All scope definitions will be documented in the requirements specification and subject to formal approval by key stakeholders. A structured change control process will evaluate all scope modification requests, with clear evaluation criteria including impact assessment on timeline, budget, and resources. The approval authority for scope changes is tiered based on impact magnitude, with minor changes (under 5% impact) managed by the Project Manager and major changes requiring steering committee approval. A comprehensive Work Breakdown Structure will define the full project scope boundary, and regular scope verification checkpoints are scheduled at the conclusion of each project phase to ensure alignment with stakeholder expectations and business requirements.

QUALITY MANAGEMENT PLAN	The Quality Management Plan establishes standards, processes, and metrics to ensure the ProactiveShield platform meets all functional and performance requirements. Quality objectives include 99.5% system uptime, AI prediction accuracy exceeding 85%, and user interface response times under 2 seconds. Comprehensive code reviews will be conducted for all development deliverables, with automated testing achieving minimum 85% code coverage. Quality control checkpoints are established at key milestones, with formal acceptance criteria defined for each deliverable. Periodic quality audits will be performed by an independent quality assurance team. The plan incorporates continuous improvement mechanisms based on metrics analysis and stakeholder feedback. Defect tracking will follow a standardized severity classification system, with resolution timeframes tied to impact levels. All testing processes and outcomes will be thoroughly documented to ensure traceability.
CHANGE MANAGEMENT PLAN	The Change Management Plan defines the process for identifying, evaluating, authorizing, and implementing changes to the project scope, schedule, or resources. A formal Change Request form will document all proposed modifications, with impact analysis required for each request. The Change Control Board, consisting of key stakeholders and technical leads, will meet weekly to review pending requests. Emergency changes follow an expedited approval path while maintaining documentation requirements. All approved changes will be integrated into project documentation, with updates to the project plan, WBS, and schedule as needed. Change implementation will include verification steps to confirm proper execution. The project team will maintain a comprehensive change log tracking all requests, decisions, and implementation status. This structured approach ensures that all changes are properly evaluated, authorized, and communicated to maintain project integrity.
HUMAN RESOURCES PLAN	The Human Resources Plan details the organizational structure, roles, responsibilities, and resource allocation for the project. The team consists of a Project Manager, Business Analyst, System Architect, Database Administrator, Backend Developers (3), Frontend Developers (2), AI/ML Specialists (2), QA Engineers (2), and Technical Documentation Specialist. Role descriptions define specific responsibilities, required skills, and reporting relationships. The resource loading chart schedules personnel allocation across project phases, identifying peak resource periods. The plan addresses team acquisition, including internal assignments and contractor engagements where needed. Skills development initiatives will address identified competency gaps, particularly in specialized AI technologies. Team performance evaluations will occur monthly, with a recognition program to acknowledge outstanding contributions. Conflict resolution procedures and escalation paths are clearly defined to maintain team cohesion.
IMPLEMENTATION AND PROJECT CLOSURE PLAN	The Implementation and Project Closure Plan outlines the methodology for system deployment and formal project conclusion. Implementation will follow a phased approach, beginning with controlled user group testing before broader rollout. Deployment includes database configuration, backend services installation, frontend deployment, and comprehensive system testing in the production environment. Rollback procedures are defined for addressing critical deployment issues. User training will be conducted in the two weeks preceding full implementation. The formal closure process includes final deliverable verification against acceptance criteria, documentation handover, and a comprehensive lessons learned session. Administrative closure activities include returning allocated resources, archiving project records, and formal stakeholder sign-off. A post-implementation review will be conducted 30 days after deployment to evaluate system performance and user adoption. The final closure report will document project performance against original objectives, highlighting successes, challenges, and recommendations for future initiatives.

PREPARED BY	TITLE	DATE
XUANHE YANG JINGXIAO HAN TONG LI FUBIN CHEN	The project chapter of Proactive Shield: Smart Maintenance Platform for Aero Engine Industrial Equipment	March 22th