

IDENTIFICATION & JUSTIFICATION OF PROCESS MODEL

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Group 2

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Problem Statement:

Predictive Maintenance System for Industrial Machinery: Build an intelligent system using machine learning algorithms to predict equipment failures and schedule maintenance proactively. The system should analyze historical data, sensor readings, and operational parameters to identify patterns and anomalies indicative of impending malfunctions. By implementing this solution, industries can minimize downtime, optimize maintenance costs, and prolong the lifespan of critical machinery.

Identification of Process Model: Agile Methodology (Scrum)

For this type of project, the Agile methodology, particularly Scrum, is highly recommended. Scrum is a subset of Agile that is iterative and incremental, ideal for managing complex software and product development.



Features of Scrum:

- Sprints: Development is done in short cycles (typically 2-4 weeks), allowing for frequent reassessment and realignment based on project needs and results.
- Product Backlog: A list of tasks to be completed, which is continually prioritized based on business needs.
- Scrum Meetings: Daily meetings to discuss current progress, upcoming tasks, and potential blockers.
- Review and Retrospective: At the end of each sprint, the team reviews the work completed and discusses improvements for the next sprint.

Justification for Choosing Scrum

1) Flexibility and Adaptability:

Predictive maintenance systems involve complex data and require continual adaptation as new data comes in and machine learning models are refined. Scrum allows for frequent reassessment of the project scope and direction, which is essential given the experimental nature of machine learning model development and feature engineering.

2) Iterative Development:

Developing a predictive maintenance system requires iterative testing and tuning of machine learning models. Scrum's sprint-based approach allows for incremental improvements to the system, making it possible to refine algorithms, adjust features, and improve data processing techniques progressively.

3) Collaboration and Cross-functional Teams:

These projects benefit greatly from close collaboration between data scientists, data engineers, machine maintenance experts, and IT staff. Scrum facilitates this by involving all stakeholders in the planning process, sprint reviews, and daily scrum meetings, ensuring that all perspectives are considered in decision-making.

4) Continuous Feedback and Improvement:

Continuous testing and integration are vital in predictive maintenance systems to ensure models perform accurately under changing conditions. Scrum's emphasis on regular feedback, both from within the team and from external stakeholders (e.g., maintenance personnel), ensures the system evolves effectively according to real-world feedback and usage.

5) Risk Management:

Developing predictive models carries significant risks due to uncertainties in data quality, model accuracy, and operational integration. Scrum addresses these risks by allowing them to be identified and addressed early through sprint retrospectives and continuous stakeholder feedback.

6) Product Quality and Reliability:

Quality is critical in a system that aims to predict equipment failures. Poor predictions can result in unanticipated downtimes and high costs. The iterative nature of Scrum ensures that quality is built incrementally and maintained throughout the development process, with regular testing and adjustments based on real operational data.

Conclusion:

Using Scrum for the development of a predictive maintenance system is advantageous due to its flexibility, iterative nature, and strong emphasis on collaboration and feedback. These characteristics make it particularly well-suited to the dynamic and complex nature of machine learning projects, where

requirements and solutions may evolve as the project progresses. This approach not only helps in managing the technical complexities of the project but also in aligning the development process with the operational realities and strategic objectives of the industry it serves.