Project Design Phase-I

Proposed Solution Template

Date	20 September 2022
Team ID	PNT2022MID46747
Project Name	Smart Solution for Railways
Maximum Marks	2 Marks

Proposed Solution Template:

Project team shall fill the following information in proposed solution template.

S.no	Parameter	Description
1.	Problem Statement (Problem to be solved)	Smart Maintenance in the railway industry means to leverage the potential of digitalization. Possible solutions include the optimization of existing maintenance processes, reducing life cycle costs by efficient use of existing assets and implementing new business models and services. Sense and connect is an important topic, availability and utilization of data from different sources are deciding factors for success. Infrastructure to create and handle a large amount of data is needed. Technologies for data analytics, knowledge discovery and artificial intelligence developed rapidly in the last years and are core competencies for the next decade. Deployment and application of new knowledge is just as important and a great challenge when implementing Smart Maintenance.
2.	Idea / Solution description	FRMCS (Future Railway Mobile Communication System) is the future worldwide telecommunication system designed by UIC, in close cooperation with the different stakeholders from the rail sector. The new system is a successor of GSM-R that lacks the capacity to transmit the volumes of data needed today Although the railway supply industry has guaranteed continued support for GSM-R until 2030, a new one has to be prepared and rolled out in a test mode before the end of GSM-R sufficiency. A new system should empower the railway industry to better leverage the potential given by modern communication technology.

		Unlike ERTMS, FRMCS will decouple applications, services and transport to allow independence and transport bearer flexibility.
3.	Novelty / Uniqueness	**Reactive:** Reduced maintenance costs. High repair costs. Safety issues. Longer downtimes. The train operates until complete failure, even if anomalies occur during trips (as long as they do not prevent the train from operating). **Preventive:** Lower maintenance and repair costs than reactive maintenance. Does no fully minimize risk of critical problems **Proactive:** Reduced failure probability. Higher cost of components and materials is compensated by higher reliability and longer times between maintenance. **Reliability-Centered:** Prevents unnecessary costs. Makes use of RCA methods to study the problem, such as Ishikawa diagram or Five Whys, to increase reliability and vehicle's uptimes. **Predictive:** Reduced repair costs. Higher upfront costs. Minimizes risks of critical problems.
4.	Social Impact / Customer Satisfaction	In light of the presented state-of-the-art, several open issues and research directions can be identified. These are addressed in the current section
5.	Business Model (Revenue Model)	Speed acceleration (a must have for high speeds), safety improvement 

6	Scalability of the Solution	Smart Maintenance is one of the core innovative topics for rail and a direct result of the ongoing digitalization in the railway industry. Costs can be reduced, and availability of rolling stock and infrastructure can be increased significantly. Maintenance systems are developing from reactive behavior after component failure or strict time-based cycles towards proactive maintenance. Railway systems vary and Smart Maintenance can be addressed in different ways, but first results can be achieved fast, without a huge amount of effort. A structured approach can help to save resources and avoid mistakes, which have a long-term business impact. As this is an innovative topic there are still challenge, and new ones will occur as new systems get implemented for more use cases