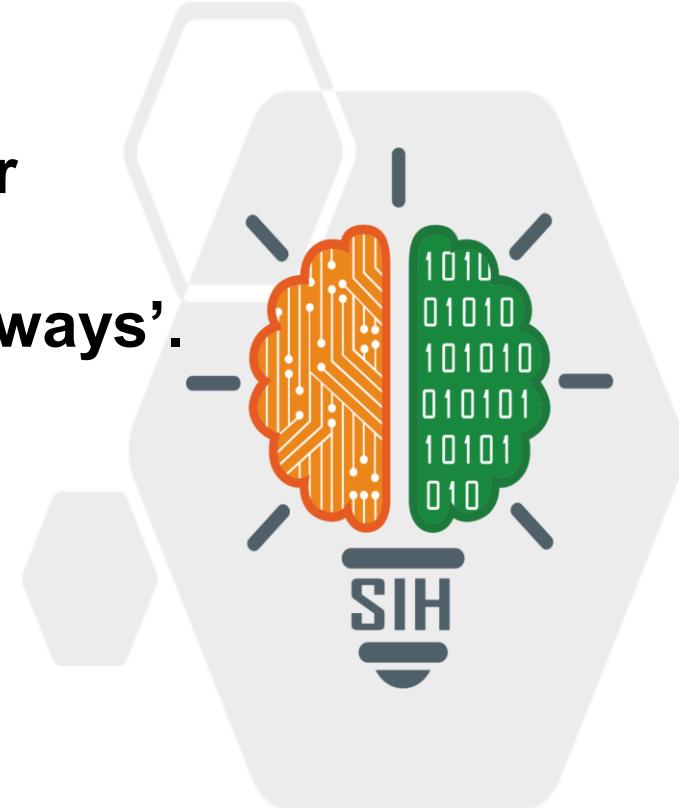


SMART INDIA HACKATHON 2025

TITLE PAGE



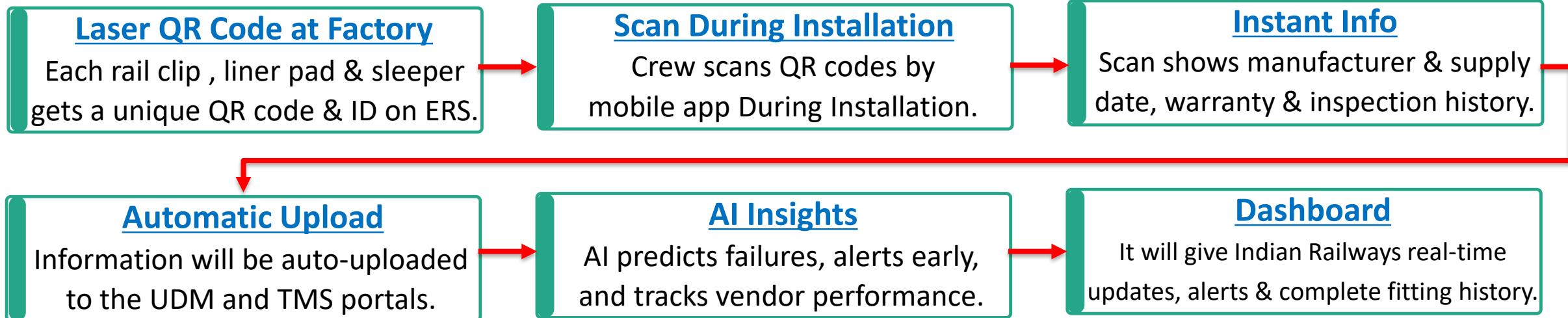
- **Problem Statement ID –SIH25021**
- **Problem Statement Title- AI based development of Laser based QR Code marking on ‘track fittings on Indian Railways’.**
- **Theme- Transportation & Logistics**
- **PS Category- Hardware**
- **Team ID-**
- **Team Name (Registered on portal) : YOLO**



Problem Statement:

- ❖ 10 crore rail clips, 5 crore liners, 8.5 crore pads bought yearly—**no tracking system.**
- ❖ No ID system for **clips, pads, liners, sleepers.**
- ❖ No **mobile scanning** for vendor, supply date, or warranty.
- ❖ Inspection history missing in **UDM/TMS.**
- ❖ Total approximate annual loss for fittings: **₹1122 crore.**

Proposed Solution:



Unique Value:

- | | |
|--|--|
| <ul style="list-style-type: none"> ✓ ₹1 Innovation → Savings ₹561 crore per year. ✓ AI powered → Intelligent Railways. ✓ Expandable → From clips to complete tracks & Monitoring. | <ul style="list-style-type: none"> ✓ Zero manual error & Easy to Implement. ✓ Full traceability of every fitting. ✓ Next-gen ready → Industry 4.0 standard. |
|--|--|

“₹1 Solution → Smarter, Safer, Stronger Railways.”



Laser QR Marking Machine



Mobile Scanner/Android App



Indian Railways UDM & TMS

Hardware:

- **Laser QR code printer** for clips, pads, liners, sleepers.
- **Mobile devices** for scanning and data entry.

Software:

- **Mobile app:** Java, Swift(iOS), Flutter
- **Backend & AI :** Python , java
- **Database:** MongoDB
- **Core Integration:** UDM & TMS Portals

Methodology (Step-by-Step Flow)**QR Code at Factory**

Laser-mark unique QR codes on all clips, pads, liners, and sleepers.

Scan During Installation

Crew scans each QR code with a mobile app.

Data Upload

Information(vendor, supply date, warranty, inspection)automatically goes to UDM & TMS.

AI Analysis

Predicts failures, plans maintenance, and tracks vendor performance.

Real time Dashboard

Shows real-time updates, alerts, and full history

Continuous Improvement

AI learns from past data to improve maintenance, vendor quality & track safety.



FEASIBILITY AND VIABILITY



Feasibility

Technical

Laser QR codes & mobile scanning already used in other industries – 100% adaptable to Railways.

Financial

₹1 Innovation → Big Savings it Can cut fitting losses by 50% (₹561+ crore/year).

Operational

Easy Adoption Mobile app & dashboard – minimal training needed for staff.

Scalability

System can cover all fittings across Indian Railways and expand to other assets.

Challenges / Risks

QR damage in field

Network issues → delayed sync

Data accuracy

Staff training gap

Solutions

Durable QR + backup ID

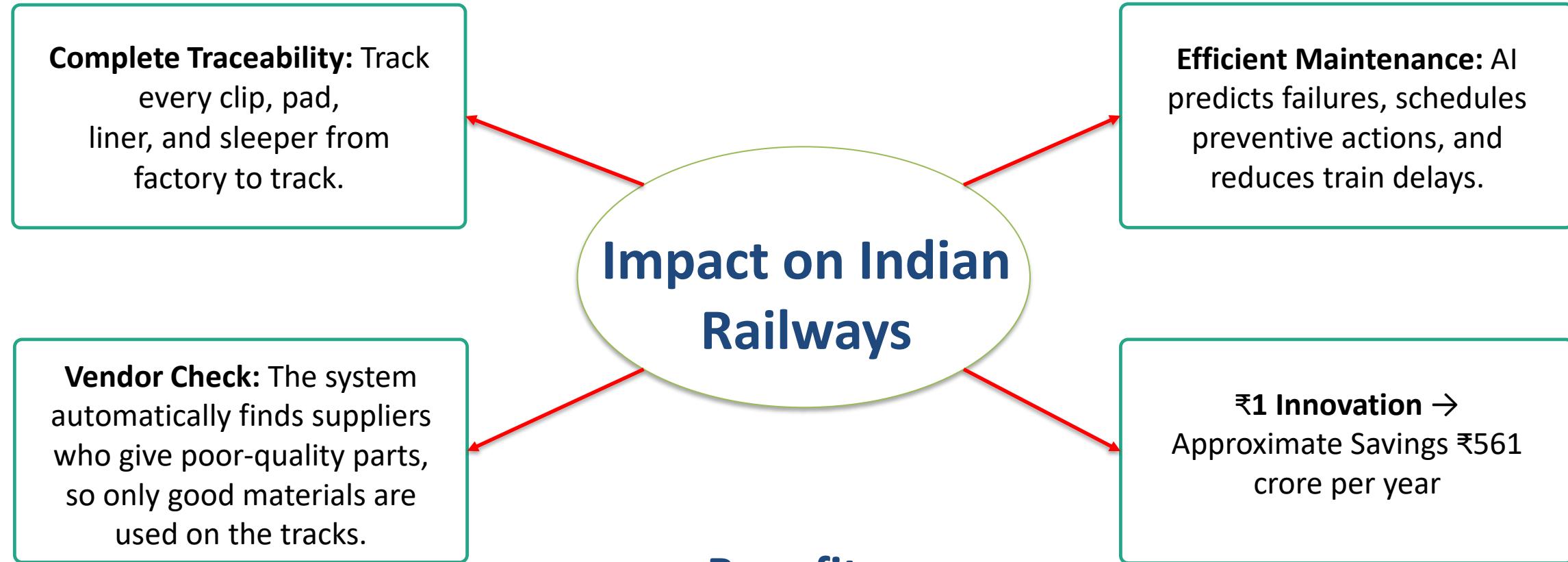
Offline mobile mode → auto-sync

Auto-validation & AI cross-checking.

Quick on-site training



IMPACT AND BENEFITS



Benefits

- ✓ Complete traceability of all clips, pads, liners, and sleepers.
- ✓ Predictive maintenance using AI reduces failures and downtime.
- ✓ Safer rail operations for passengers and staff.
- ✓ Reduces losses by up to ₹561 crore/year.
- ✓ Reduces waste from damaged or poor-quality fittings.
- ✓ Longer-lasting components reduce waste and energy use, supporting sustainable and greener railway operations.



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