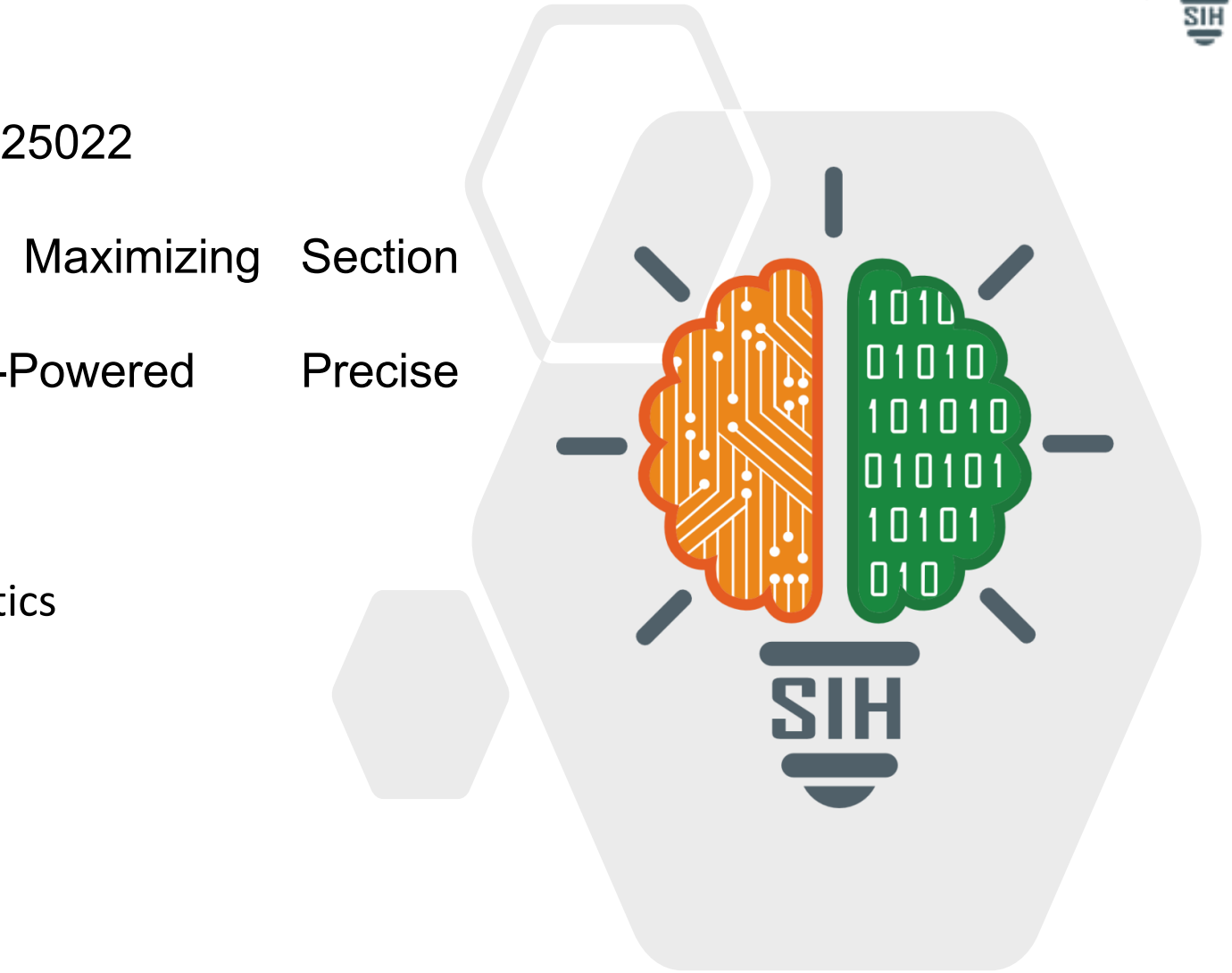
SMART INDIA HACKATHON 2025

- **Problem Statement ID –** SIH25022
- **Problem Statement Title-** Maximizing Section Throughput Using AI-Powered Precise Train Traffic Control
- **Theme-** Transportation & Logistics
- **PS Category-** Software
- **Team ID-**
- **Team Name-** KRITAGYA



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Maximizing Section Throughput Using AI-Powered Precise Train Traffic Control

SMART INDIA HACKATHON 2025

UNIQUENESS & INNOVATION

01. Re-planning — Continuous Re-planning / Real-time Traffic Plan (STEG)

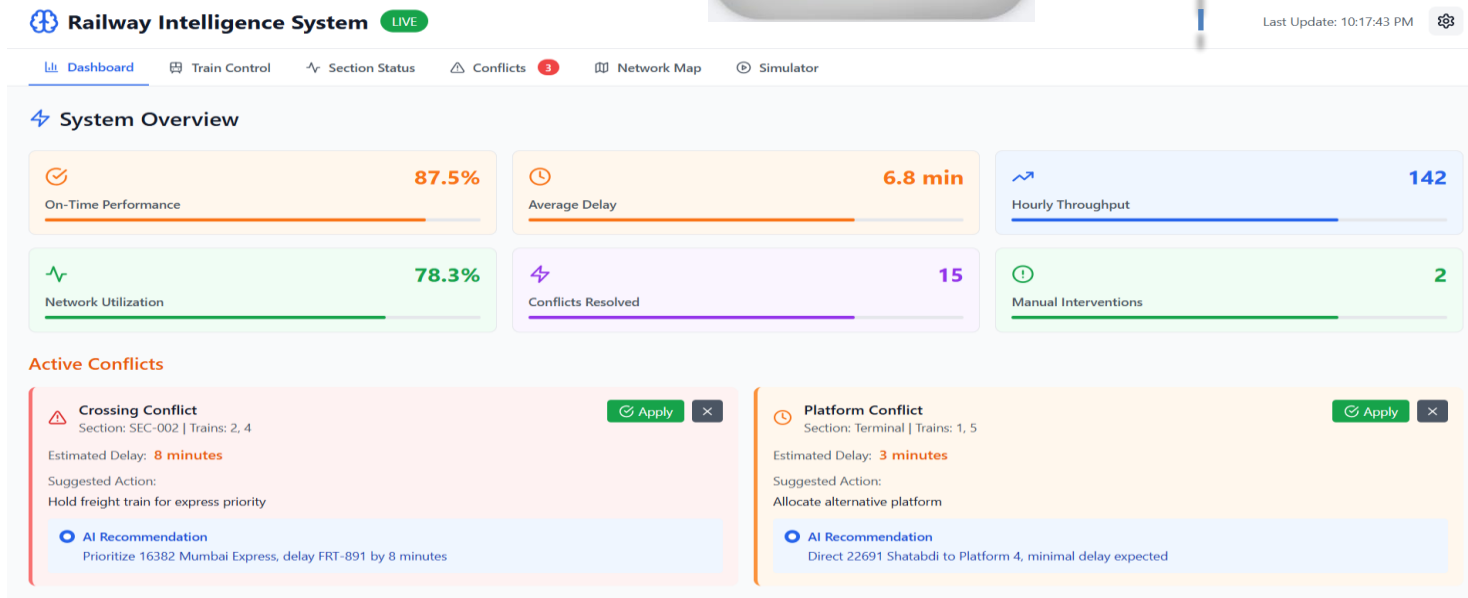
02. Sharing — Automatic Sharing of Updated Plans with Drivers

03. Advisory — Driver Advisory System (DAS)

04. Visualization — Visualization Tools & Decision Support for Controllers

SOLUTION EXPLANATION

- **AI-powered train traffic control system** that uses real-time data (GPS, speed, delays, weather) to optimize scheduling and train spacing.
- **Driver Advisory System (DAS)** guides optimal speed and eco-driving, while controllers get **visual dashboards** for better decision-making.
- Using **AI-driven analytics**, optimization, and real-time updates, **the system cuts delays, improves safety,** and increases throughput by **30–40%** without new infrastructure.



Smarter Tracks, Smoother Trains – AI That Moves Railways Forward

PROTOTYPE LINK- https://indian-railways-inte-191

TECHNICAL APPROACH

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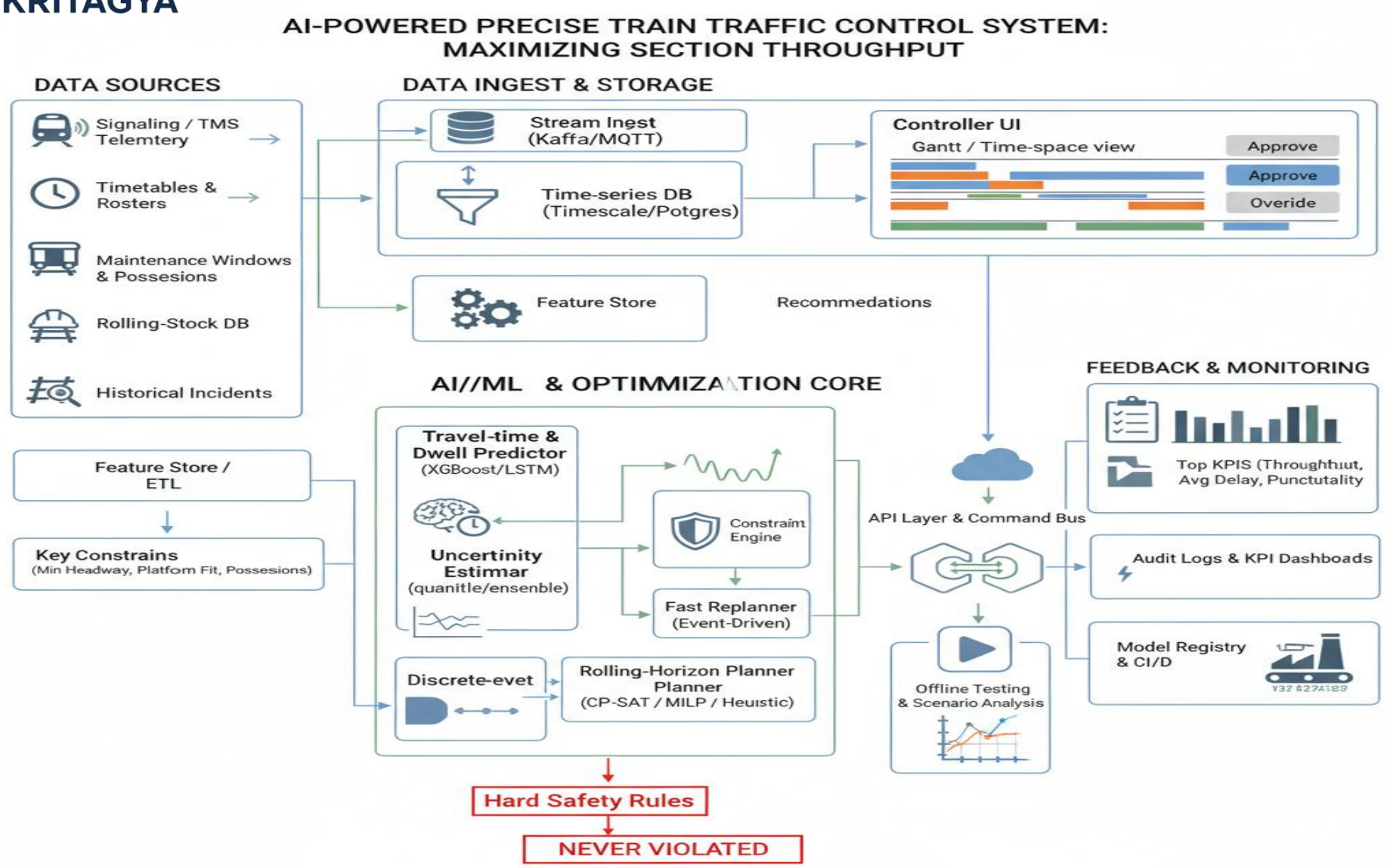
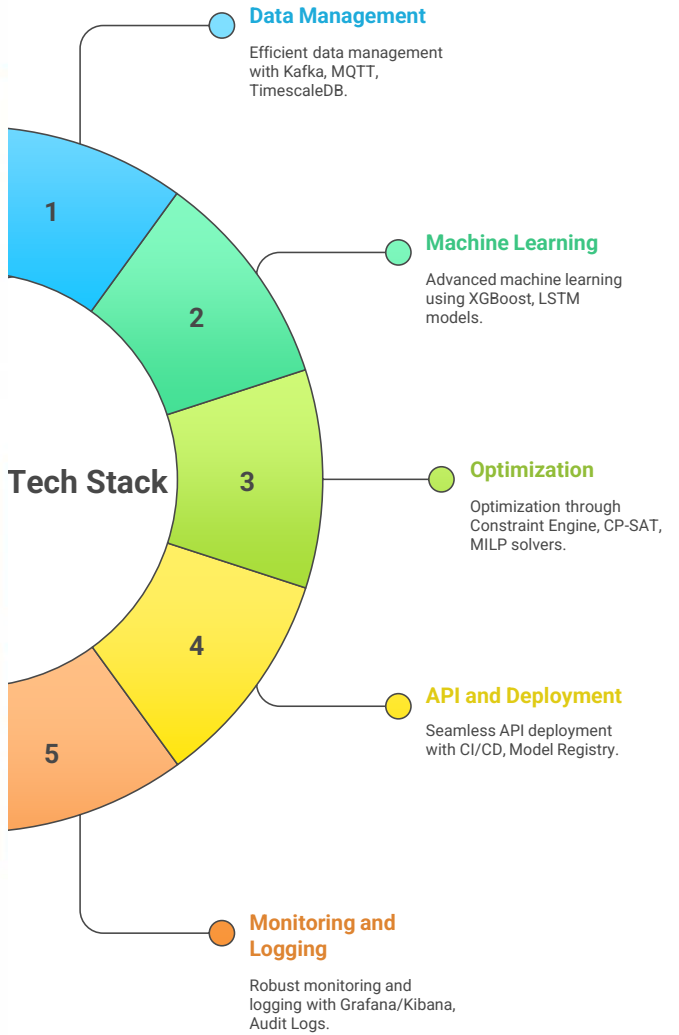
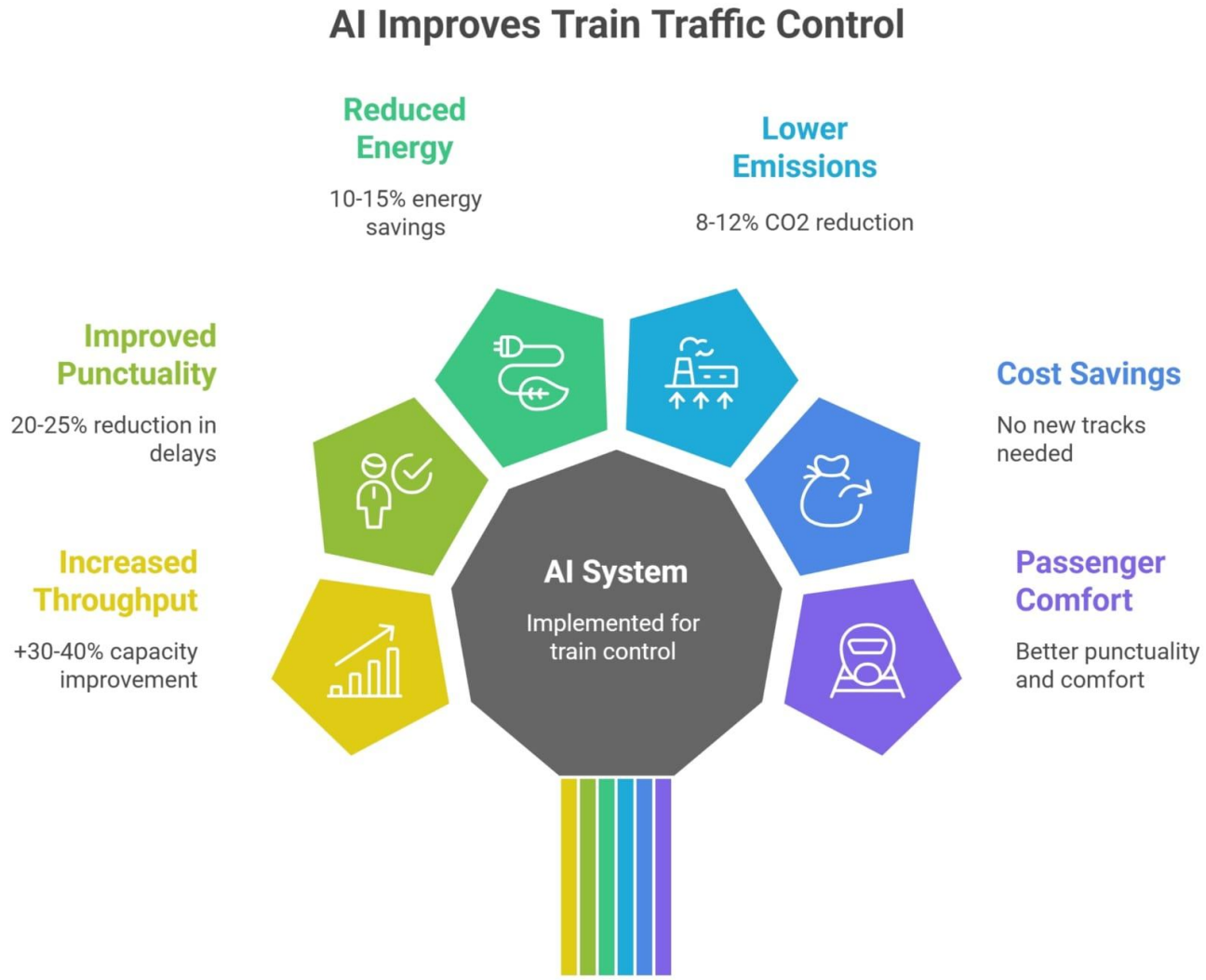




FEASIBILITY AND VIABILITY

FEASIBILITY

- Energy Efficiency
- Conflict Reduction
- Safety Assurance
- Scalability



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IMPACT AND BENEFITS

SMART INDIA HACKATHON 2025

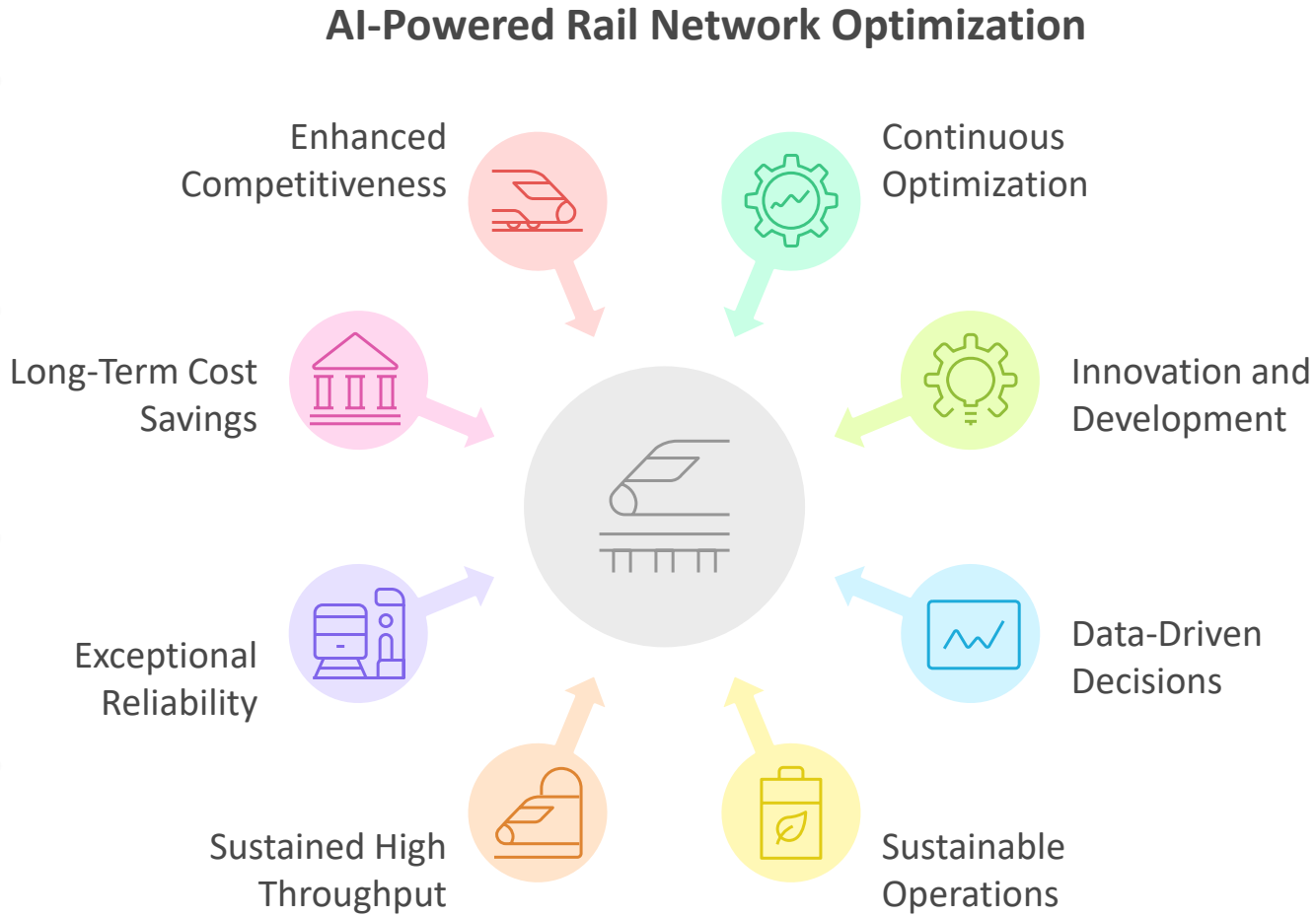
1. **Increased Section Throughput**
   AI-driven rescheduling + optimal headways
   → up to 30–40% more trains per section

2. **Reduced Delays & Improved Punctuality**
   Real-time adaptive planning cuts average delays by 20–30%

3. **Energy & Environmental Gains**
   Eco-driving + DAS lowers energy consumption by 12–18%

4. **Operational Efficiency**
   Controller workload reduced by 40% with visualization & decision-support tools

5. **Scalability**
   Uses open datasets (Indian Railways, GTFS, ONTIME) for nationwide rollout



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RESEARCH AND REFERENCES

SMART INDIA HACKATHON 2025

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Authors: Helmi, W.; Bridgall, R.; Askarzadeh, T.

Published in: Applied Sciences, 2024, 14(9):3573

DOI: 10.3390/app14093573

Title: Towards a Safe MLOps Process for the Continuous Development and Safety Assurance of ML-based Systems in the Railway Domain

Authors: Marc Zeller, Thomas Waschulzik, Reiner Schmid, Claus Bahlmann

Published: arXiv preprint, 2023

Title: *Improving Theoretic Train Driving Time with AI and TensorFlow*

Authors: Emil Krsak, Tomas Kello

Conference: 2020 4th International Symposium on Informatics and its Applications (ISIA), IEEE

Title: *Artificial Intelligence in Railway Transport: Taxonomy, Regulations, and Applications*

Authors: Nikola Bešinović, Lorenzo De Donato, Francesco Flammini, Rob M. P. Goverde, Zhiyuan Lin, Ronghui Liu

Published in: *IEEE Transactions on Intelligent Transportation Systems.*