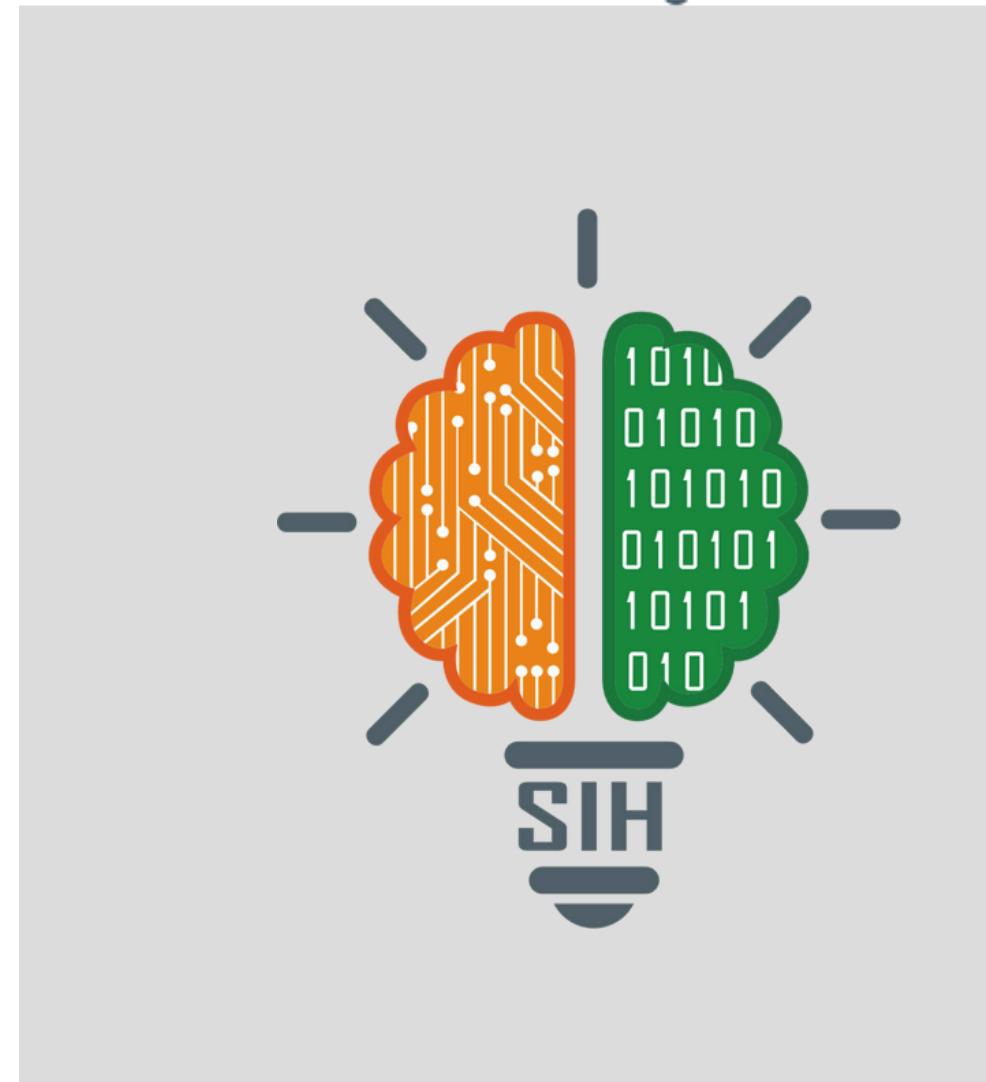


SMART INDIA HACKATHON 2025



TITLE PAGE

- Problem Statement ID – **SIH25192**
- Problem Statement Title- **Predicting Project Costs**
- and Timeline
- Theme-**Smart Automation**
- PS Category- **Software**
- Team ID- **65980**
- Team Name (Registered on portal)- **Coder Crew**



INFRALYTICS

Current Problem:

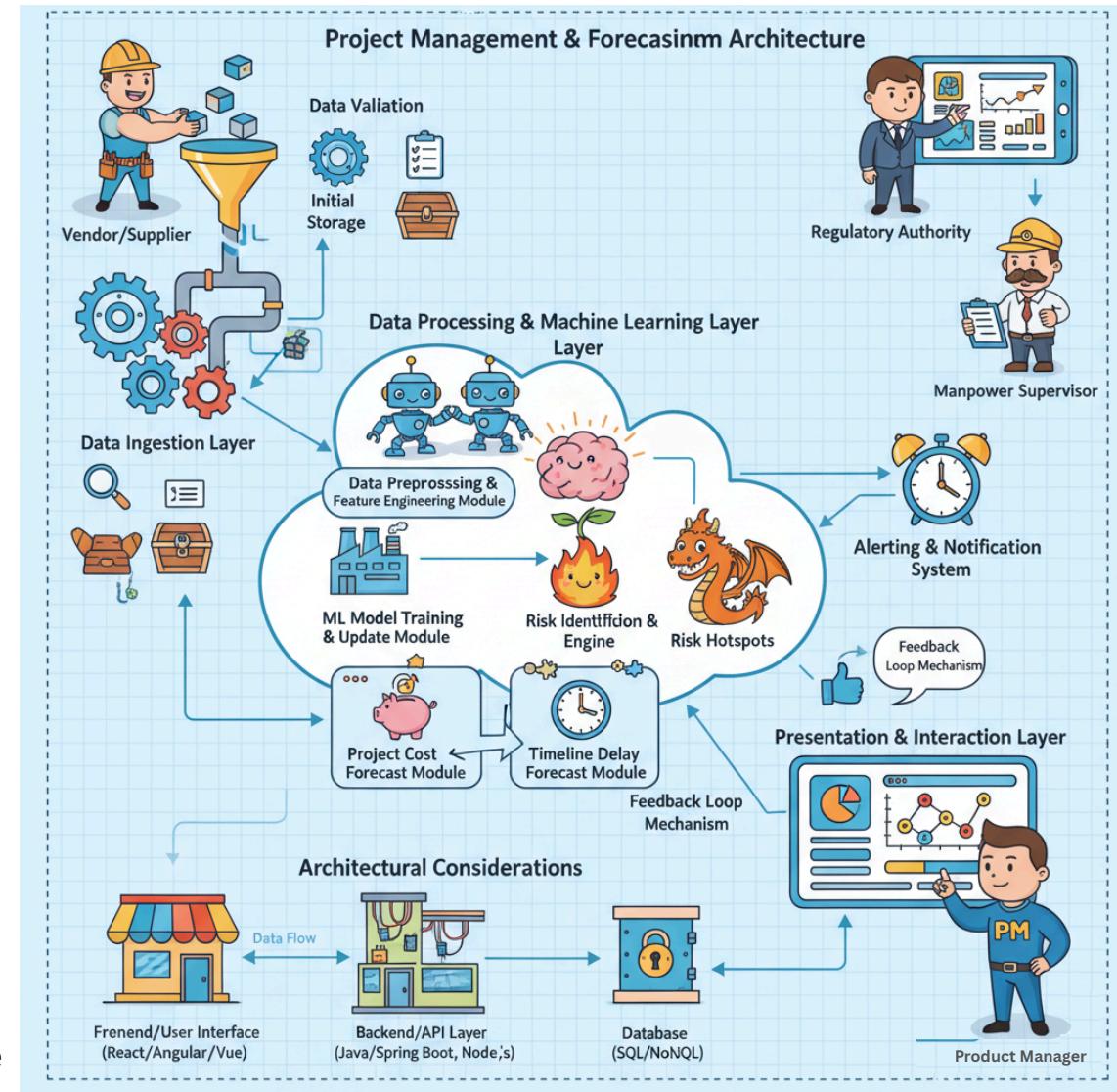
- Frequent delays and cost overruns in POWERGRID projects due to multiple dependencies and uncertainties.
- Complex factors such as terrain, regulatory approvals, vendor performance, weather, and manpower make prediction difficult.
- Lack of data-driven forecasting tools, leading to reactive management instead of proactive planning.

Proposed Solution:

- Develop a Machine Learning (ML) model to predict project cost and timeline overruns.
- Identify critical hotspots and risk factors that can lead to delays or cost variations.
- Enable proactive project management using data-driven insights instead of reactive measures.
- Leverage structured, semi-structured, and unstructured data for comprehensive forecasting.
- Provide visual dashboards and reports for easy monitoring and decision-making.

Our Unique Features:

- Integrated Data Processing: Leverages structured, semi-structured, and unstructured project data for comprehensive analysis.
- Predictive ML Model: Accurately forecasts cost and timeline overruns using advanced machine learning algorithms.
- Risk Hotspot Identification: Detects critical factors leading to delays and cost escalation for proactive mitigation.
- Decision Support & Visualization: Generates actionable insights via dashboards for effective project planning.
- Scalable & Reusable: Applicable across multiple POWERGRID projects and adaptable to other infrastructure domains.

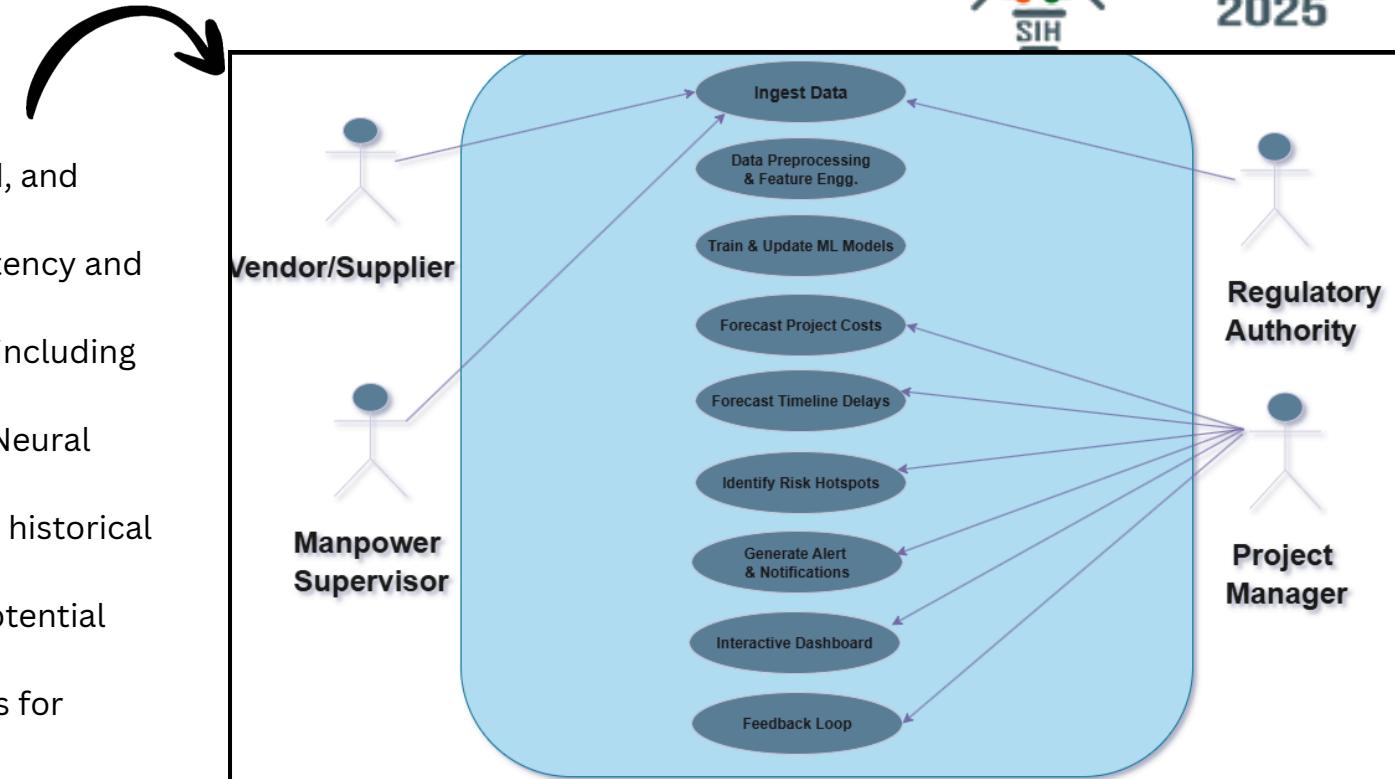


TECHNICAL APPROACH



Technical Process:

- Data Collection & Integration:** Aggregate structured, semi-structured, and unstructured project data from multiple sources.
- Data Preprocessing:** Clean, normalize, and transform data for consistency and model readiness.
- Feature Engineering:** Extract key factors affecting cost and timeline, including terrain, manpower, vendor performance, and weather patterns.
- Predictive Modeling:** Train **ML models** (Random Forest, XGBoost, or Neural Networks) to forecast cost overruns and project delays.
- Model Validation & Optimization:** Evaluate model performance using historical data; fine-tune for accuracy and reliability.
- Hotspot Detection & Insights Generation:** Identify risk factors and potential bottlenecks for proactive intervention.
- Visualization & Decision Support:** Present predictions via dashboards for project managers to enable data-driven planning.



Tech Stack Used:

- Frontend:** Streamlit, Dash, Plotly
- App Development:** React Native (optional for mobile dashboards)
- Backend:** Python, Flask / FastAPI (for serving models and APIs)
- AI / Machine Learning:** Python, NumPy, Pandas, Scikit-learn, XGBoost, LightGBM, PyTorch (optional)
- Database:** PostgreSQL, MongoDB, AWS S3 (for unstructured/semi-structured data)
- UI/UX Design:** Figma (for dashboard design)
- Version Control:** Git, GitHub
- Deployment / Hosting:** Vercel, Docker, AWS / Azure / GCP



FEASIBILITY AND VIABILITY



From Overload to Opportunity

- Multiple dependencies and uncertainties cause delays and cost overruns.
- Manual planning limits efficiency and proactive decision-making.
- **ML and predictive analytics** provide accurate **forecasts** and risk detection.
- **Data-driven insights** optimize scheduling, resource allocation, and vendor management.
- **Scalable dashboards** enable real-time monitoring and proactive mitigation.
- **Continuous model validation** ensures **reliability** and improved project outcomes.



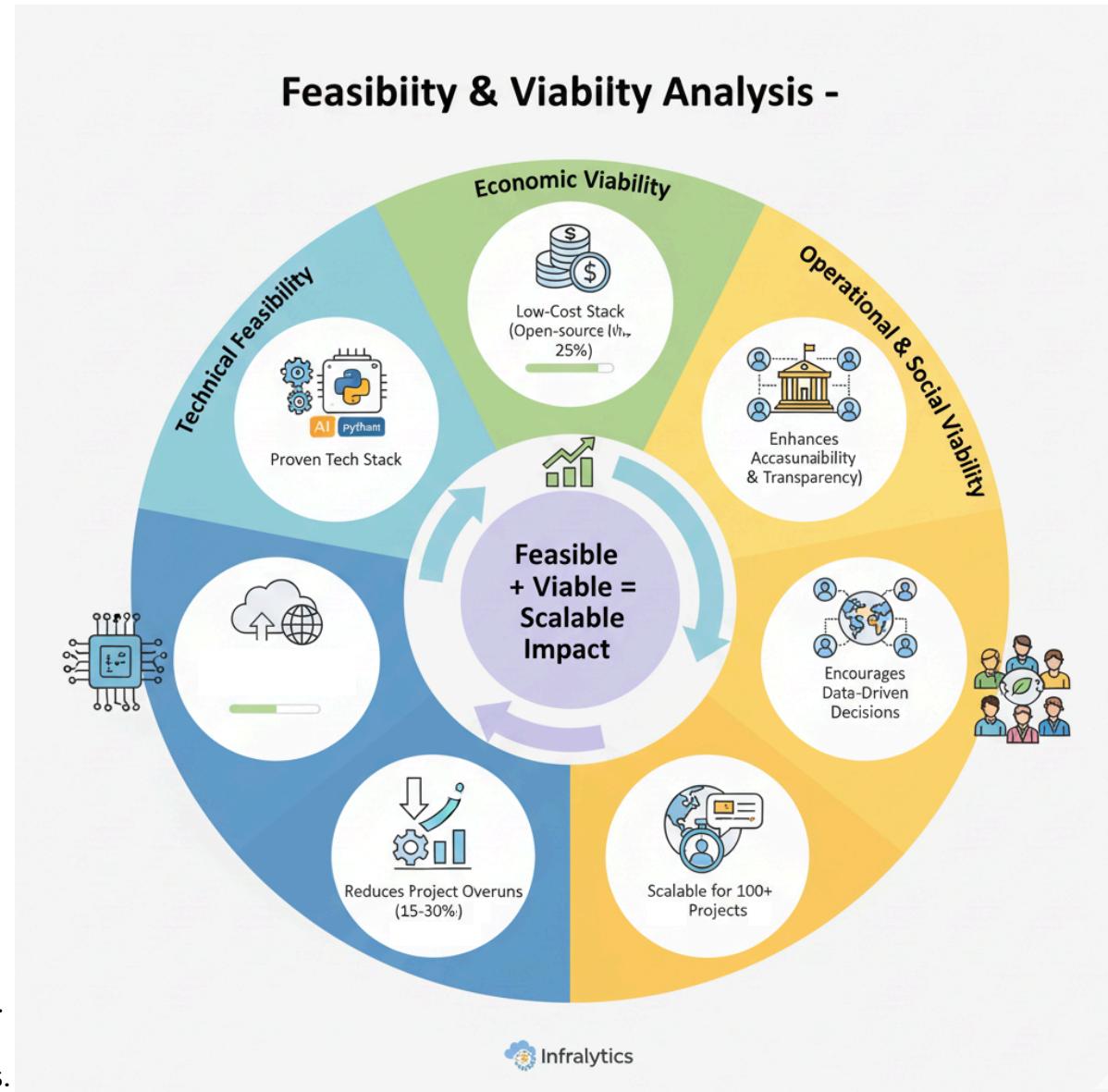
Future Scope:

- Integrate IoT and real-time project data for **continuous forecasting**.
- Extend **ML models** for **predictive maintenance** and **risk mitigation**.
- Scale the solution across multiple POWERGRID projects and other infrastructure sectors.
- Use **AI/GenAI tools** for **automated insights**, reports, and decision support.
- **Continuously update models** to improve accuracy and **operational efficiency**.



Turning Insights into Revenue:

- Minimize **delays** and **cost overruns** to generate direct savings.
- Optimize resources, manpower, and vendor management for **efficiency**.
- Scale **ML-powered forecasting** across multiple projects nationwide.
- Offer **predictive analytics** solutions to other infrastructure or energy companies.
- Monetize insights through **strategic planning and reporting** services.
- Convert predictive insights into **cost savings** and **scalable revenue** opportunities.



IMPACT AND BENEFITS



Benefits of Solution :



- Enhanced Accuracy:** Provides data-driven, statistically robust forecasts, moving beyond subjective estimation and reducing planning errors.
- Proactive Risk Management:** Identifies potential cost overruns or timeline delays early, enabling immediate corrective action to mitigate project failure.
- Optimized Resource Use:** Offers clearer insights into future demands, preventing resource shortages or expensive under-utilization.
- Improved Decision Making:** Supplies actionable intelligence to stakeholders, supporting informed choices on scope, budget, and strategic priorities.
- Increased Success Rates:** Directly contributes to a higher percentage of projects being completed on time and within the original budget.
- Continuous Learning:** Creates a feedback loop that uses completed project data to continuously refine and improve the predictive models.

Impact on Target Audience :

• Students (The End-User/Beneficiary) 🎓

The system provides clarity and fairness in processes like grant or project applications. It **reduces** waiting times by accelerating reviews and automates workflows to eliminate manual bias. This leads to a smoother, more transparent experience, giving students **clear and fast communication** on their progress.

• Government and Administration Impact 🏛️

The system delivers fiscal responsibility to government and drives operational efficiency for administration through **automation and real-time risk visibility**.

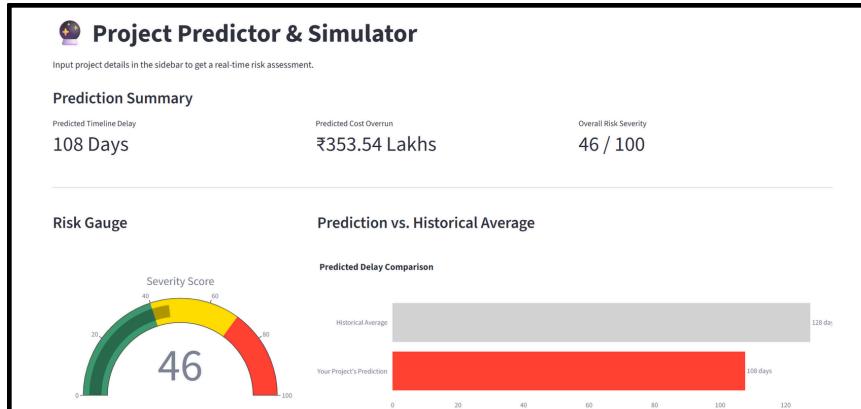


RESEARCH AND REFERENCES



BEYOND THE COMPETITION:

| <u>Functionality</u> | Competitor App 1 | Competitor App 2 | Infralytics (Proposed System) |
|---|------------------|------------------|-------------------------------|
| • AI-Based Forecasting & Delay Prediction | ✗ | ⚠ Partial | ✓ |
| • Risk Hotspot Identification | ✗ | ✗ | ✓ |
| • Interactive Real-Time Dashboard | ⚠ Basic | ✗ | ✓ |
| • Automated Alerts & Notifications | ✗ | ⚠ Limited | ✓ |
| • Transparency & Data-Driven Decisions | ⚠ Limited | ✗ | ✓ |



• Experience the App
[Click Here](#)



Research & Data Sources:

- <https://www.researchgate.net/publication/389593705>
- <https://www.scirp.org/journal/paperinfo?paperid=137197>
- <https://www.researchgate.net/publication/313091576>
- https://planisware.com/resources/portfolio-reporting-analysis/data-driven-decision-making-project-management-what-it-and?utm_source=chatgpt.com
- <https://www.journalimcms.org/journal/smart-delay-prediction-supervised-machine-learning-solutions-for-construction-projects>