Phase 1: Problem Understanding & Industry Analysis

1. Requirement Gathering

- Talk to stakeholders (coal mine managers, environmental officers, sustainability consultants, government regulators).
- Example requirements:
    - Quantify and track carbon emissions from mining activities.
    - Provide real-time dashboards for monitoring emission levels.
    - Generate reports for compliance with Indian environmental policies.
    - Suggest pathways toward carbon neutrality (renewables, offsets, process optimization).

2. Stakeholder Analysis

- **Mine Manager** → Oversees mining operations, needs emissions reports.
- **Environmental Officer** → Tracks carbon footprint, ensures compliance.
- **Government/Regulators** → Require verified reports for audits.
- **Consultants/Researchers** → Use data for sustainability studies.

3. Business Process Mapping

- Mining activity data collected (fuel, machinery, electricity use).
- System calculates carbon footprint using emission factors.
- Dashboards and alerts generated for stakeholders.
- Reports submitted to regulators and management.

4. Industry-Specific Use Case Analysis

- Coal mines are **resource-intensive** and have **high emissions**.
- Industry challenge: balancing energy demand vs. environmental sustainability.
- Need for a **centralized system** to monitor emissions, identify reduction areas, and support India's net-zero commitments.

5. Existing Solutions Exploration

- Some global carbon accounting tools exist, but they are **generic** and not tailored for **Indian coal mines**.
- Custom web application ensures localized compliance, affordability, and relevance.