

Phase 1: Problem Understanding & Industry Analysis

■ **Goal:** Understand the real-world problem and define the scope clearly.

Understanding the Industry

Hospitals and healthcare institutions are increasingly dependent on advanced medical devices such as MRI scanners, X-ray machines, ventilators, dialysis machines, and many others. These devices are critical for accurate diagnosis, continuous patient monitoring, and life-saving treatments. However, device failures can result in severe consequences: High risk to patient safety, as timely treatment or diagnosis may be delayed. Operational downtime that disrupts hospital workflows and reduces efficiency. Increased financial burden due to emergency repairs, replacements, and extended downtime. A proactive solution is essential to ensure uninterrupted functionality, reduce costs, and improve patient outcomes.

Problem Statement

“Predicting medical device failure is crucial for ensuring patient safety, minimizing downtime, and reducing maintenance costs.” Hospitals need a data-driven, predictive maintenance approach that allows them to anticipate failures before they occur. By doing so, they can minimize risks, extend device lifespan, and optimize operational costs while ensuring reliable healthcare delivery.

Define Stakeholders

- 1 **Hospital Admin:** Aims to control costs and reduce device downtimes, ensuring smooth hospital operations.
- 2 **Biomedical Engineer:** Responsible for regular maintenance, early detection of issues, and device repairs.
- 3 **Doctor/Staff:** Depend on reliable, well-functioning equipment for accurate diagnosis and patient care.
- 4 **Vendor/Manufacturer:** Provide maintenance contracts, technical support, and device servicing.

Define Success Criteria

- 1 ■ Achieve 30–40% reduction in device downtime through predictive insights.
- 2 ■ Enable automated preventive maintenance scheduling to reduce manual intervention.
- 3 ■ Maintain centralized equipment records for easy access and monitoring.
- 4 ■ Provide real-time dashboards for monitoring device health and performance trends.