



Requirements (functional and non-functional) of the Gemini project

Functional Requirements :

1. Observing & Data Collection
 - The system must support **three operational levels**: Observing, Maintenance, and Test.
 - The system must allow **astronomers to create, validate, and submit science plans**.
 - The system must provide a **full telescope simulator** for planning observations.
 - The system must support **remote operations**, including observing, monitoring, and diagnostics.
 - The system must allow users to **queue observations** and optimize scheduling based on conditions.
 - The system must automatically **archive collected data** for later retrieval.
 - The system must support **multipoint monitoring**, where multiple users can view live telescope operations without interfering.
 - The system must allow **different access levels for users** (e.g., astronomers, telescope operators, support staff).
2. System Control & Operation
 - The system must allow **telescope operators to indirectly control the telescope** through a scheduler.
 - The system must ensure **instrument compatibility**, allowing different instruments to be selected and configured.
 - The system must allow **remote access** to subsystems for testing and maintenance.
 - The system must support **automated startup and shutdown procedures** for telescopes and instruments.

Non-Functional Requirements :

1. Performance & Reliability
 - The system must support **high availability** to minimize downtime.
 - The system must provide **real-time monitoring and logging** of telescope activities.
 - The system must provide **timeout support** to handle delayed command responses.

- The system must ensure **fast and reliable communication** between subsystems.
- The system must support **scalability**, allowing future upgrades without significant redesign.

2. Security & Access Control

- The system must **restrict access based on user roles** (e.g., astronomers cannot directly control the telescope).
- The system must log **all user actions and system changes** for security auditing.
- The system must **encrypt sensitive data** to protect observation details and user access credentials.

3. Usability & Maintainability

- The system should provide a **graphical user interface (GUI)** that is intuitive for non-technical users.
- The system must allow **easy integration of new instruments** with minimal manual setup.
- The system must support **remote troubleshooting** and diagnostics for maintenance teams.

4. Alternative Flow

- The system must **operate on existing hardware** without major modifications.
- The system must be designed to **accommodate poor documentation** of legacy software.
- The system must support **offshore development teams**, ensuring clear documentation and communication.