SLR Station Automation

Factors to Consider

Chris Moore, EOS Space Systems

Why do we talk about automation?

- Automated subsystems – reduce staffing

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- Fully automated system – eliminate staffing?

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- Realistic goal – minimize staffing, unmanned operations for useful periods.

Site

- Secure building
- Security Monitoring
- Reliable Power
- Reliable Communications
- Aircraft Safety

Hardware

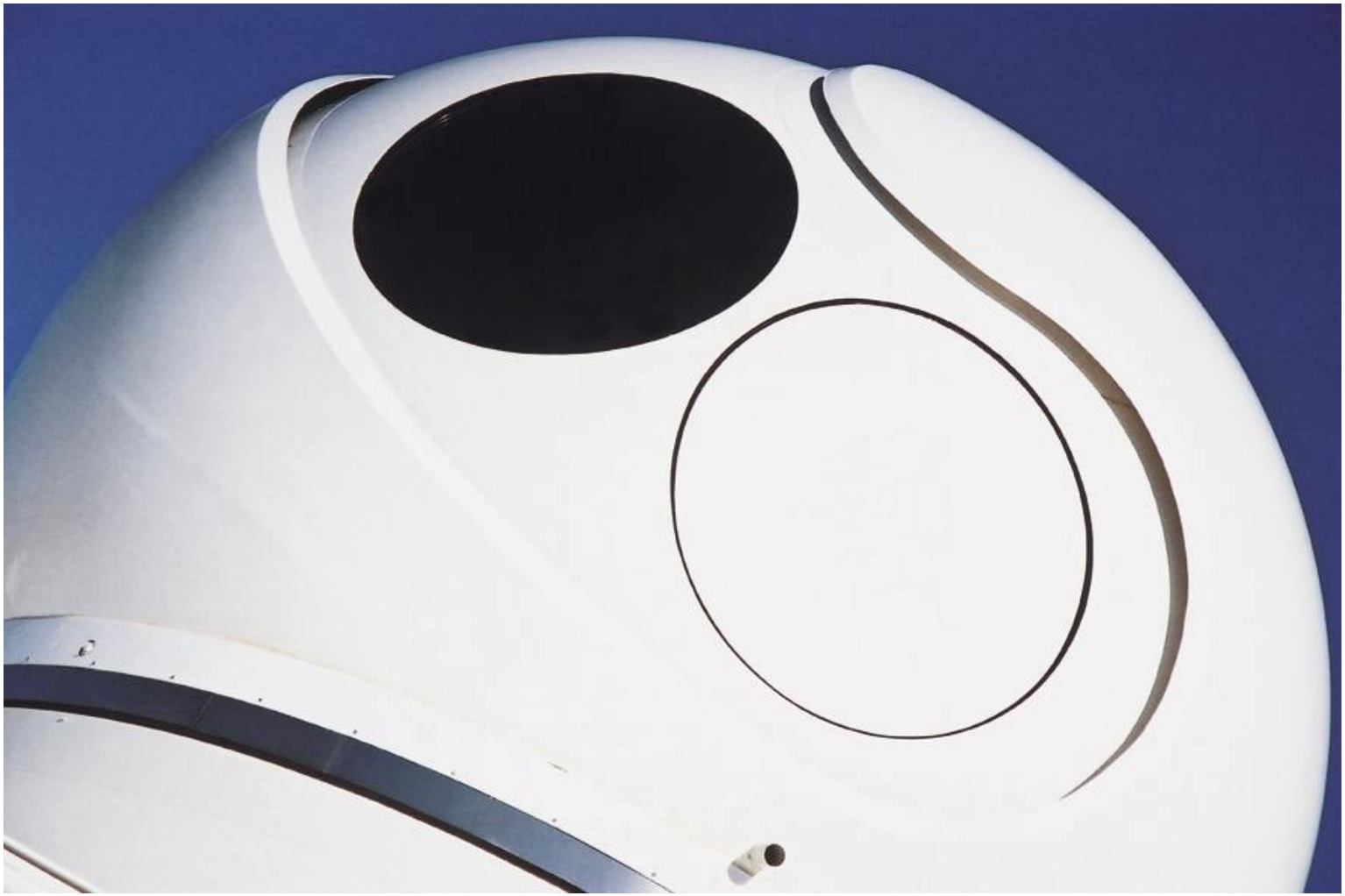
- Laser
- Telescope
- Enclosure
- Detector & T/R system
- Timing system
- Mets
- Calibration system
- Computing facilities/network
- Air conditioning plant

Stable, reliable and robust designs that requires minimal maintenance and no manual intervention for significant periods.

Telescope/Enclosure

- Sun avoidance
- Rain (hail, snow, dust, etc) avoidance
- Wind loading
- Temperature stability
- Sealed enclosure?

EOS Typhoon Enclosure



Computing System

- Operating System/Network
- Software architecture
- Data management
- Alerts and alarms
- Remote monitoring/control

Software Architecture

- Support evolutionary development
- Hardware independent
- Minimize coupling
- Reuseable and shareable.
- Distributed/redundancy
- Use of appropriate technologies
- Client – server ?

Client Server Architecture

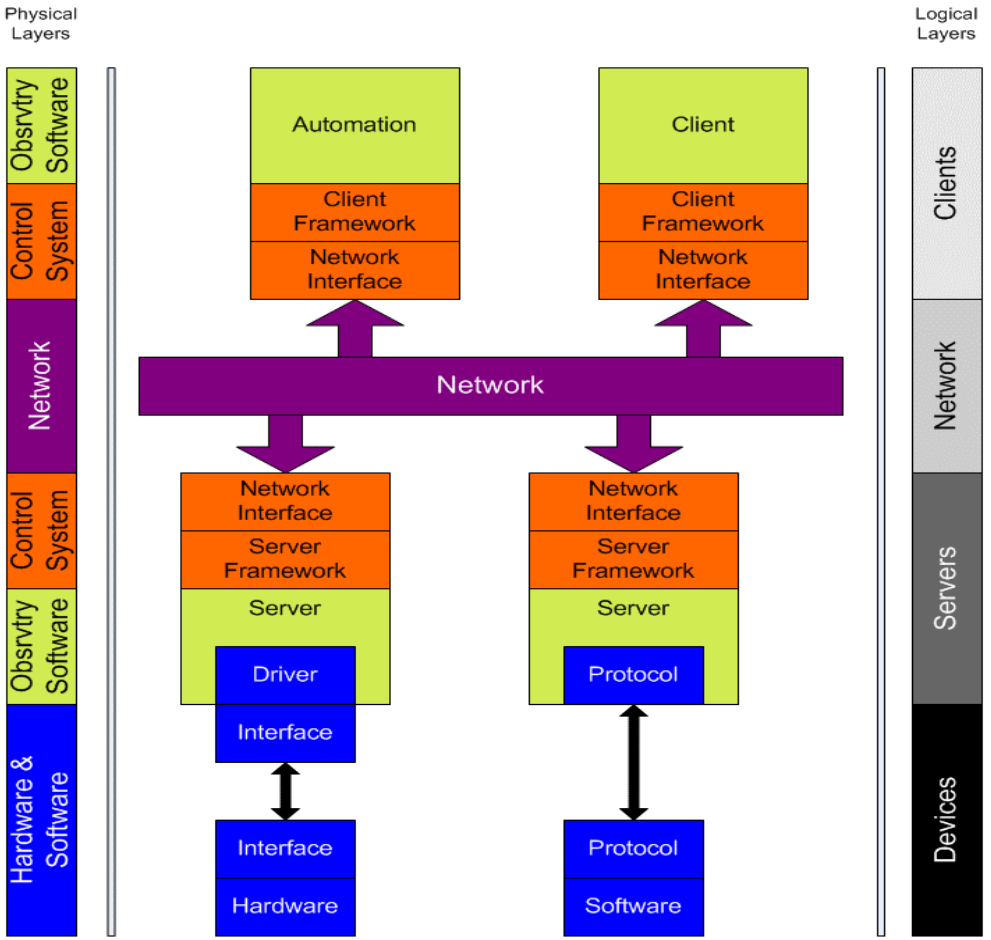


Figure 2. Software architecture employed at Mt Stromlo (from M Pearson, Proc. of 15th International Workshop on Laser ranging, 2006)

Functionality

- Hardware level management
- Network messaging
- High level functions (manual and automated)
  - Scheduling and task management
  - Auto tracking and target acquisition
  - RT signal processing and optimization
  - Post processing and report generation
  - Quality control
  - Alerts, alarms, logging
  - Data and configuration management

Scheduling

- Static scheduling
  - Target prioritization
  - Multiple GNSS targets
- Dynamic scheduling
  - Automatically?

Data management

- Prediction selection and download
- Management of
  - Tracking data from multiple segments
  - Real time or delayed cals
  - Timely transmissions to data centers
- Manual reprocessing and retransmissions
- Archival and storage

Discussion Points

- Satellite signatures
  - parameter normalization & QC
  - can/should ILRS publish nominal values?
- Standardization of algorithms?
  - Leverage off existing stations
  - Code sharing?