TSPM project

the state of affairs as of

29 April 2016

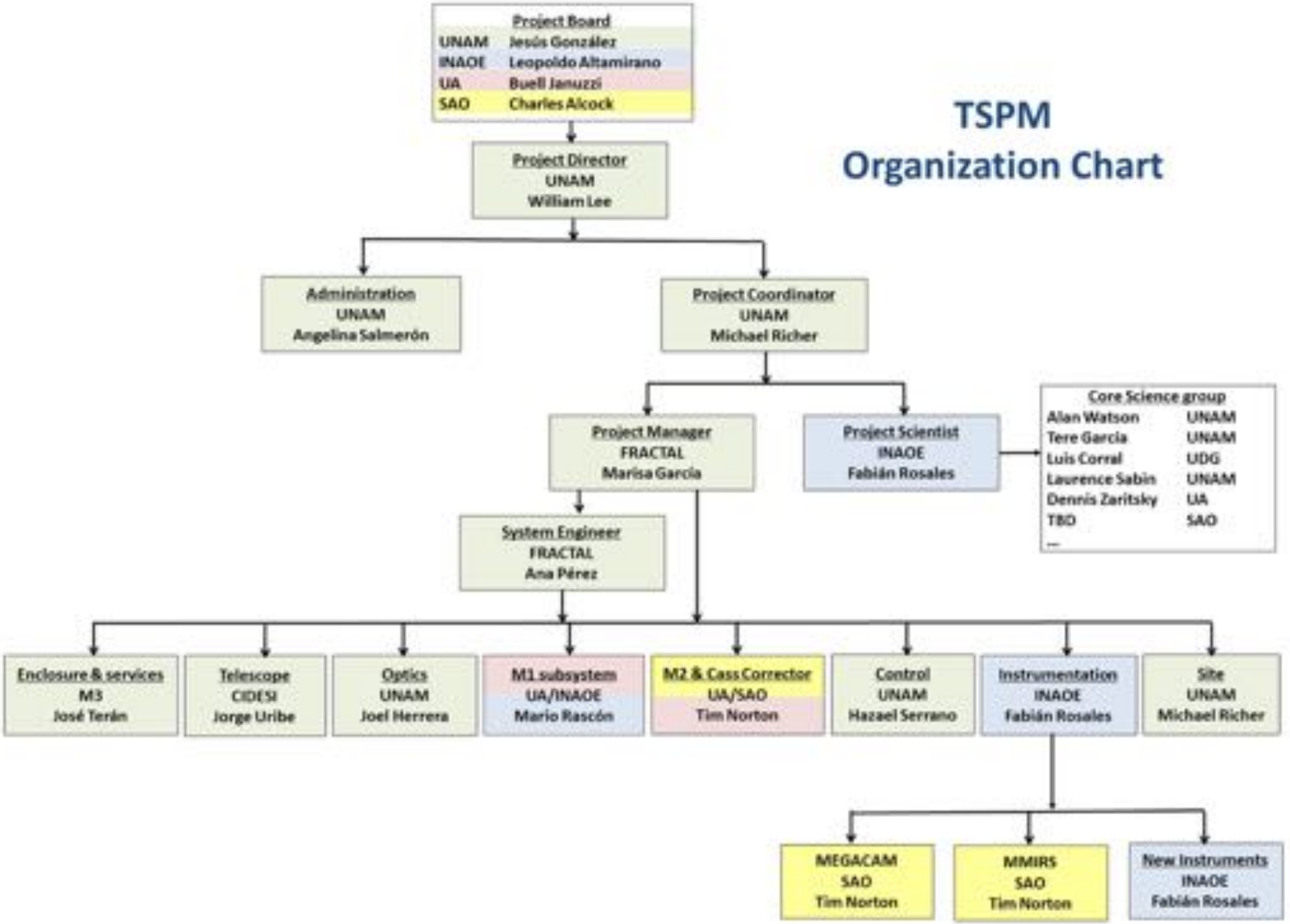
M. Richer, on behalf of all involved

Project organization

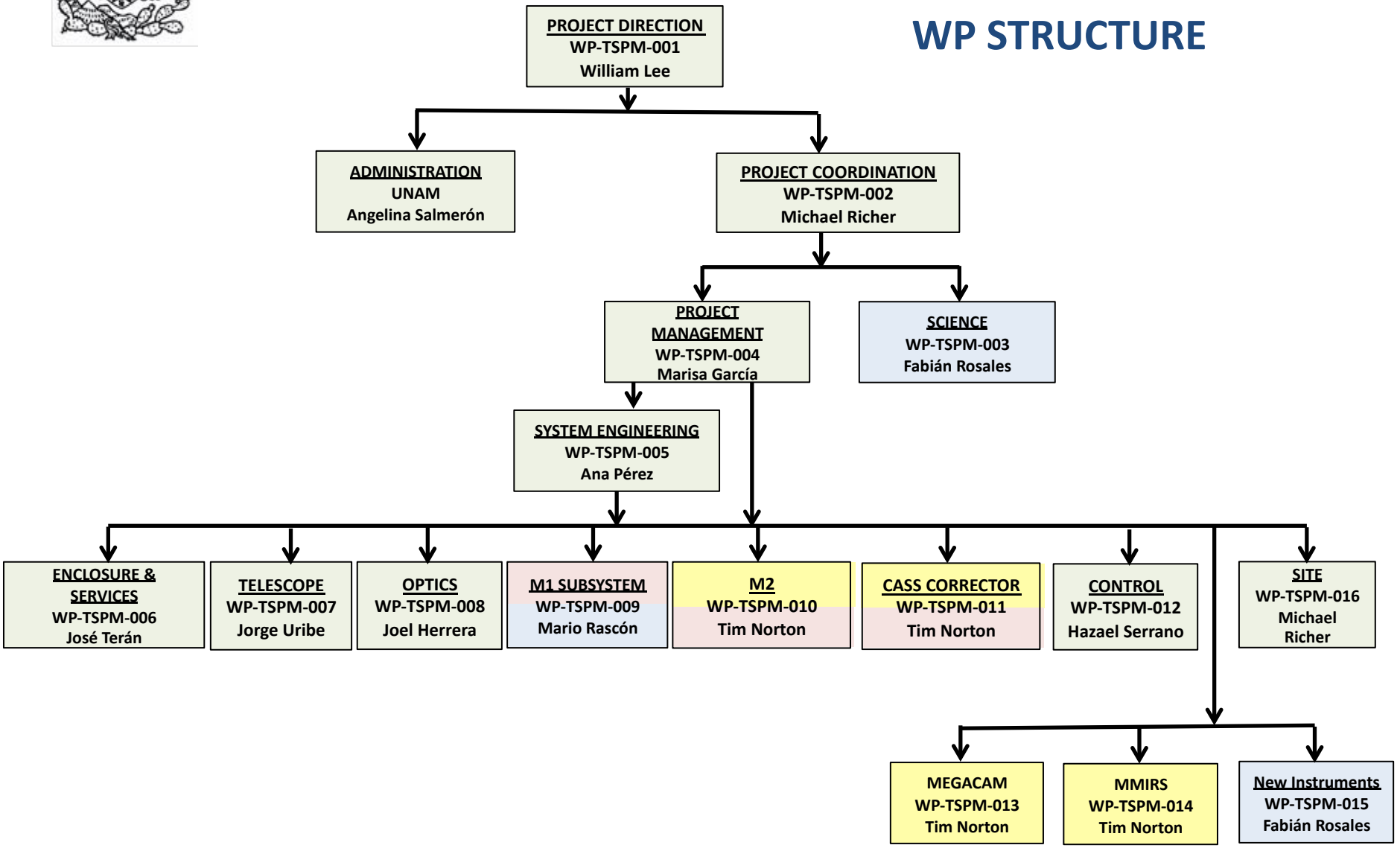
- A Letter of Intent (LoI) exists between
  - Steward Observatory, University of Arizona (UA)
  - Smithsonian Astrophysical Observatory (SAO)
  - Instituto Nacional de Astronomía, Óptica y Electrónica (INAOE)
  - Instituto de Astronomía, UNAM (IA-UNAM)

  that states their intention to collaborate to build the TSPM.
- The LoI stipulates that
  - IA-UNAM will contribute the telescope site and associated infrastructure at the OAN-SPM
  - UA+INAOE will contribute the M1 cell system
- Contingent upon funding for the telescope construction and without necessarily surrendering ownership
  - SAO+UA will contribute the f/5 M2 and Cass corrector
  - SAO+UA will contribute instruments, including Megacam and MMIRS
- Supposing that suitable conditions are met
  - SAO and UA may contribute additional instruments
- The LoI contemplates that the TSPM and MMT will be operated jointly as a bi-national observatory.

TSPM
Organization Chart



TSPM
WP STRUCTURE

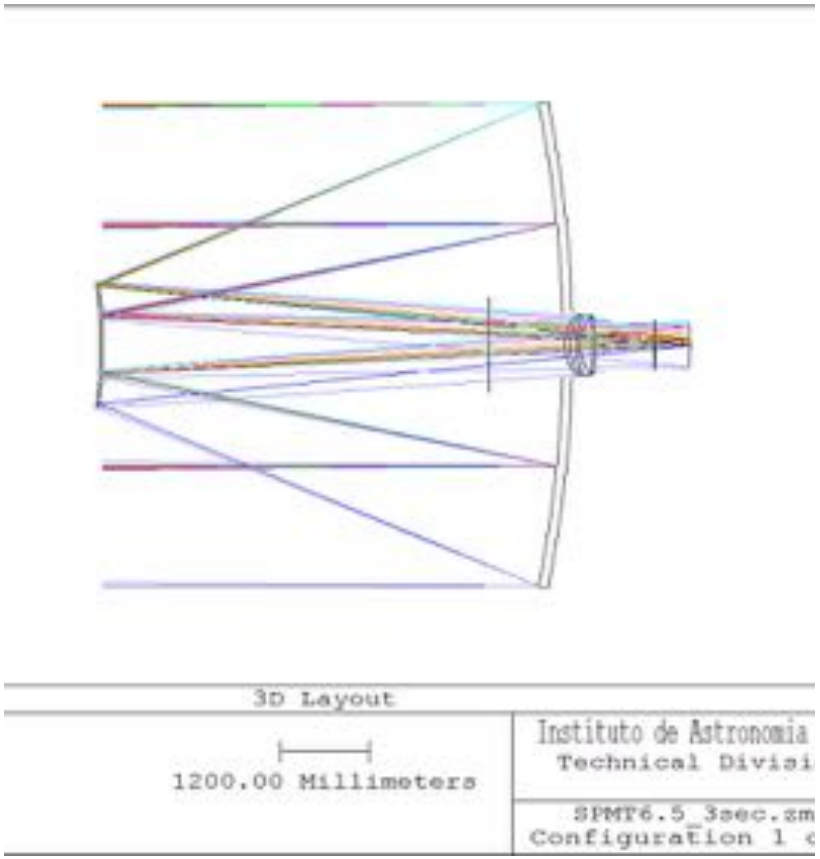


Project milestones

- Short-term milestones:
  - PDR preparation meeting 16-20 May 2016
  - Environmental Impact Study submitted to Secretary of the Environment in August-September 2016.
  - Hold a system-level PDR in 12-14 October 2016. Matt Johns at UA has accepted to chair the review panel.
  - Establish a legal entity in Mexico that can build and run the TSPM telescope facility (planned by the end of 2016).
- Longer-term milestones:
  - Hold a CDR for the enclosure and support building in early 2017.
  - Begin site work in 2017.

Optical design

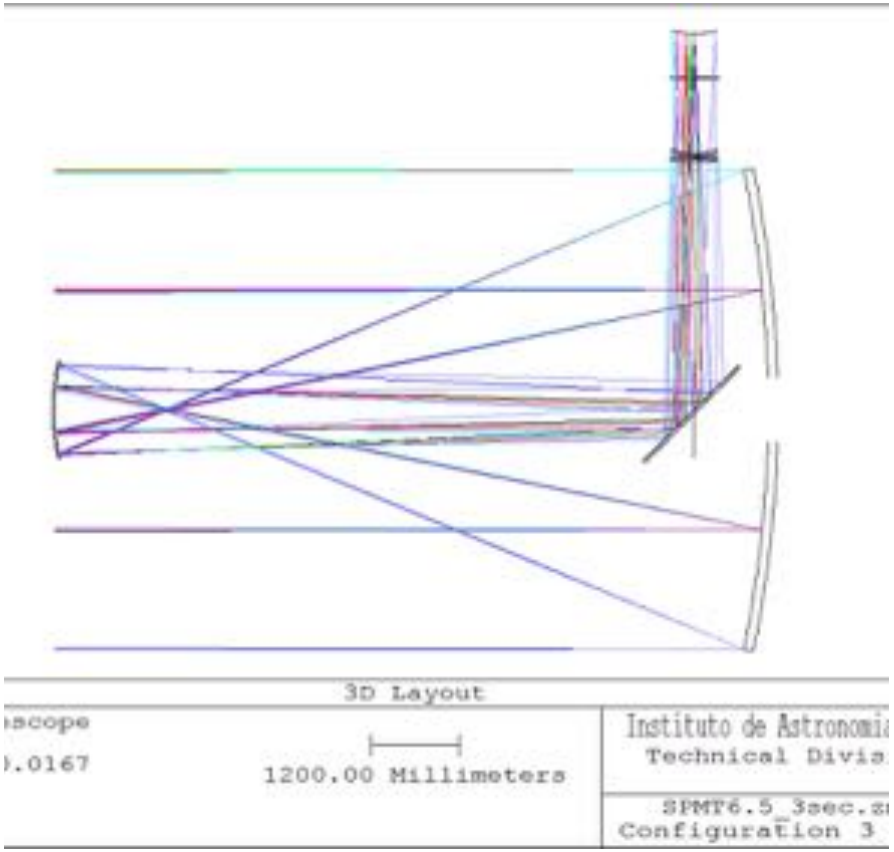
- The Day 1 configuration is f/5 Cassegrain, nominally identical to the MMT and Magellan.
- In principle, the f/5 Cass secondary and Cass corrector from Magellan II (Clay) will be used.



f/5 Cassegrain configuration

Optical design

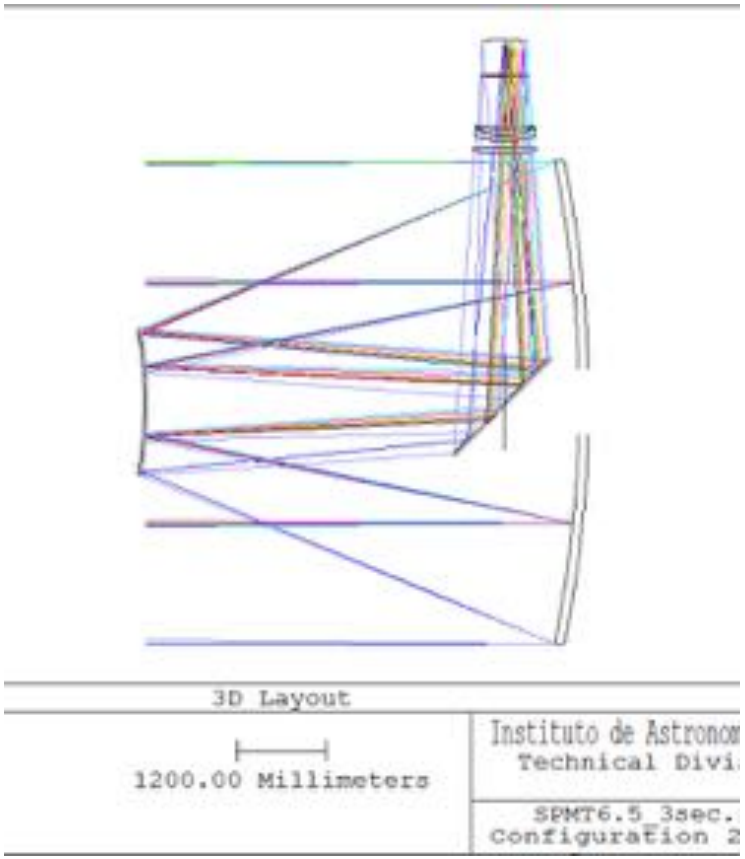
- Two extreme optical configurations affect the designs of the enclosure and telescope.
- The dome is sized to accommodate an f/11 Gregorian configuration at the Nasmyth focal stations (as at Magellan).



f/11 Nasmyth configuration

Optical design

- The telescope design is required to accommodate an f/5 Nasmyth configuration with a 1˚ FOV.
- This requires that the elevation axis be further from the M1 vertex than in the Magellan design.
- The objective is to allow the use of MMT instruments at the Nasmyth foci using an appropriate WFC.



f/5 Nasmyth configuration

Optical design

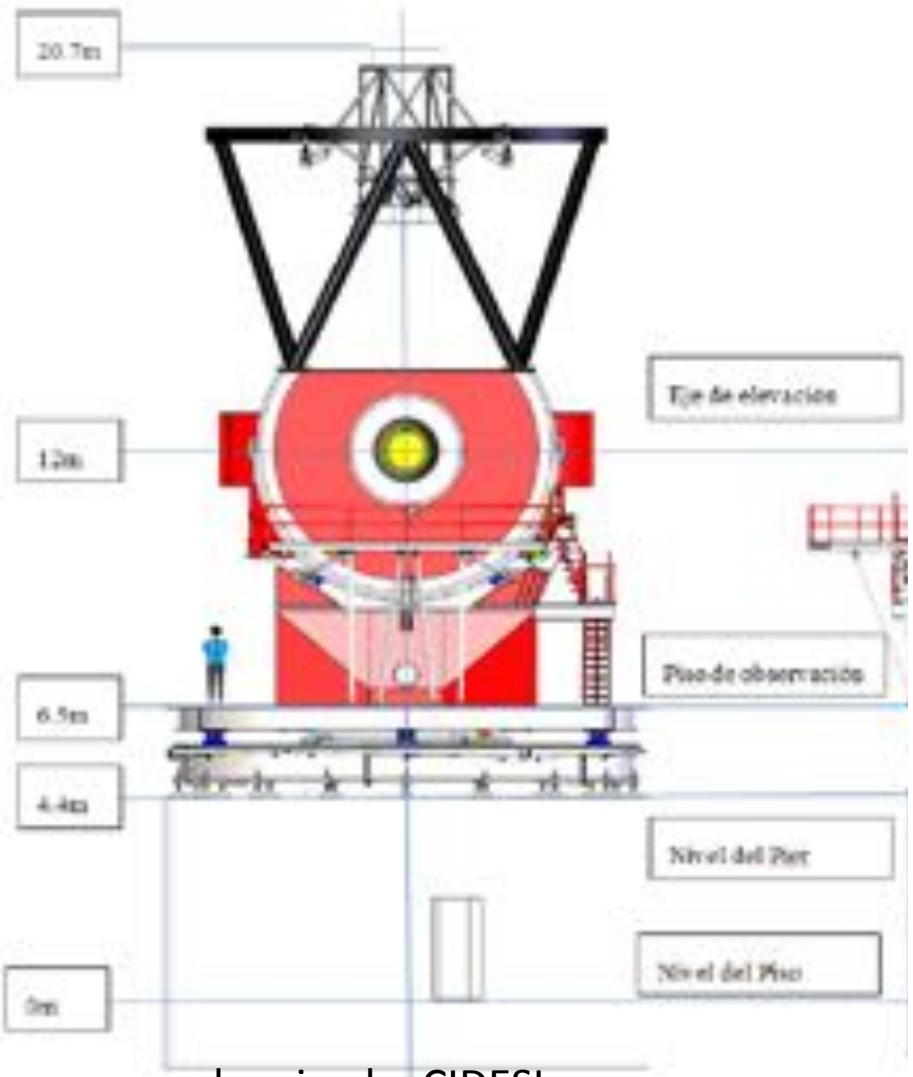
- The design includes four folded Cassegrain focal stations.
- Currently, an end-to-end simulation, using the as-built descriptions for the existing components is underway: error budget and stray light analysis.

Telescope design

- The telescope design is being done by the Centro de Ingeniería y Desarrollo Industrial (CIDESI) in Querétaro, Mexico.
- CIDESI is a federally-funded research institute dedicated to engineering, industrial development, and the transfer of technology to private and public entities.
- CIDESI has worked with the IA-UNAM on three GTC instrumentation projects:
  - Verification camera
  - OSIRIS spectrograph (specifically, components of its camera)
  - FRIDA (AO NIR diffraction-limited imager and spectrograph), see http://www.astroscu.unam.mx/~ckeiman/FRIDA/frida.php (in Spanish)

Telescope design

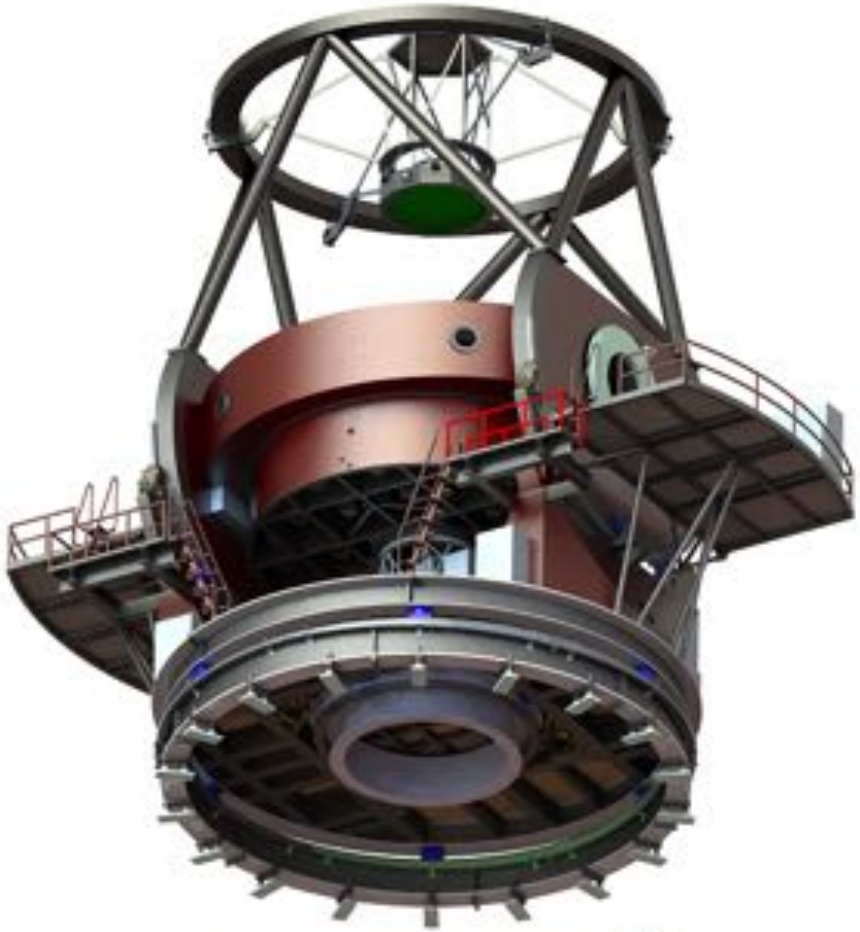
- Generally, the Magellan design is followed, except:
  - The elevation axis is farther from the M1 vertex, allowing an f/5 Nasmyth focal station with a 1˚ FOV.
  - The backside of the M1 cell (including rotator) will be identical to that of the MMT (with cone).
  - The interface to the Cass corrector will necessarily differ from that at the MMT.



drawing by CIDESI

Telescope design

- Currently, CIDESI is progressing towards completing the preliminary design (delivery July 2016).

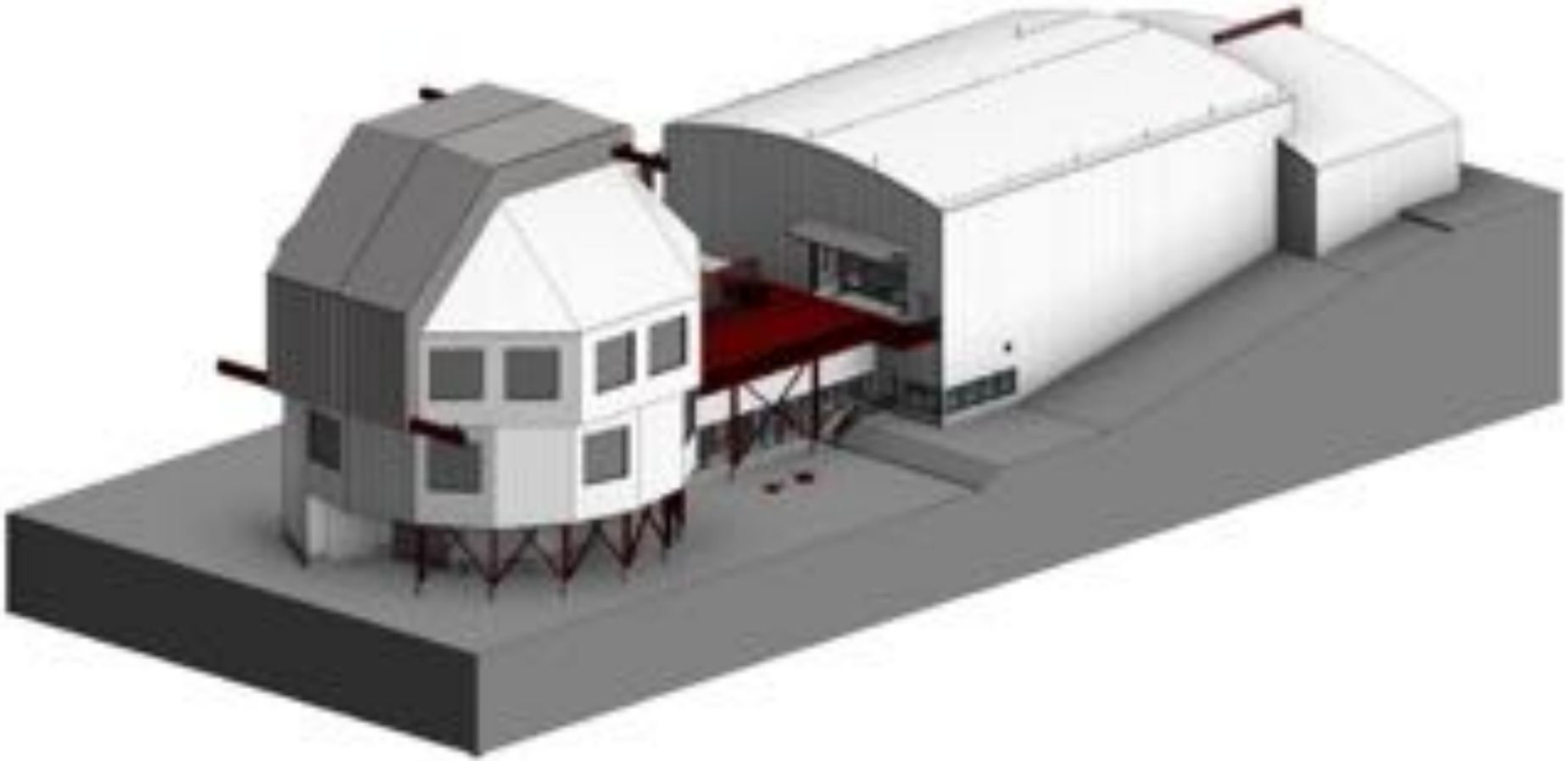


Enclosure design

- M3 (Tucson/Hermosillo) are designing the enclosure and support building.
- The preliminary design (30%) was delivered in Nov. 2014.
- The critical design (60%) is contracted and to be delivered in summer 2016.
- The design of the telescope enclosure is similar to that of Magellan.

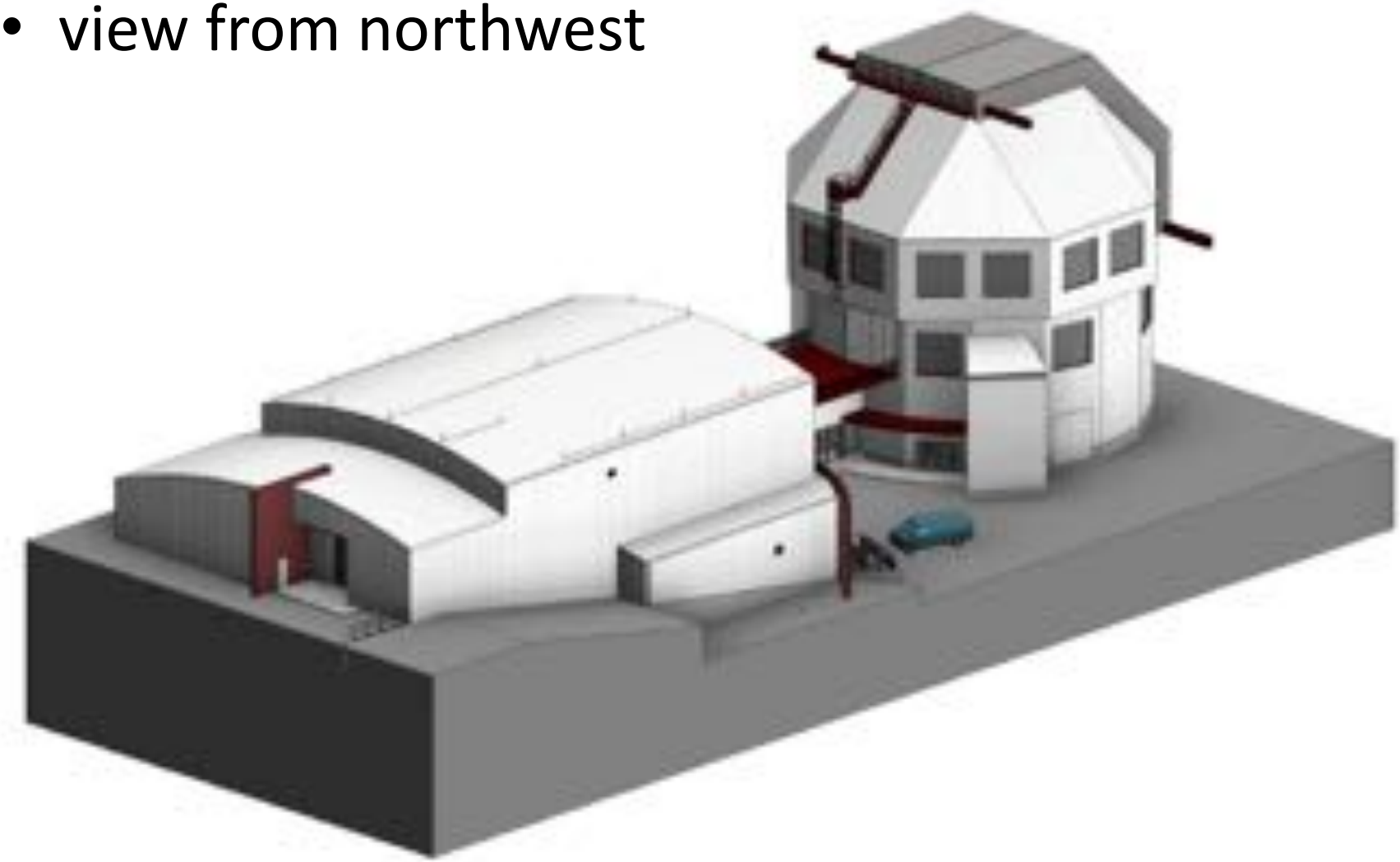
Enclosure design

- view from southeast



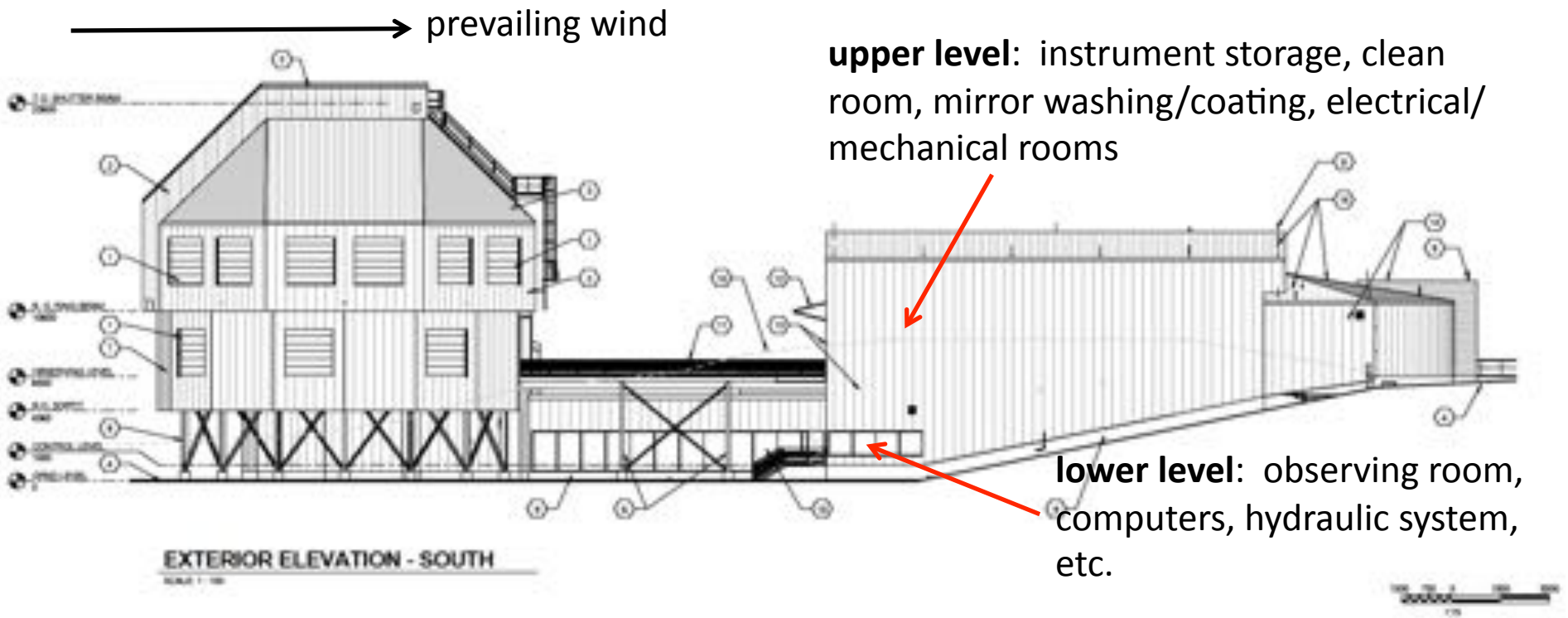
Enclosure design

- view from northwest



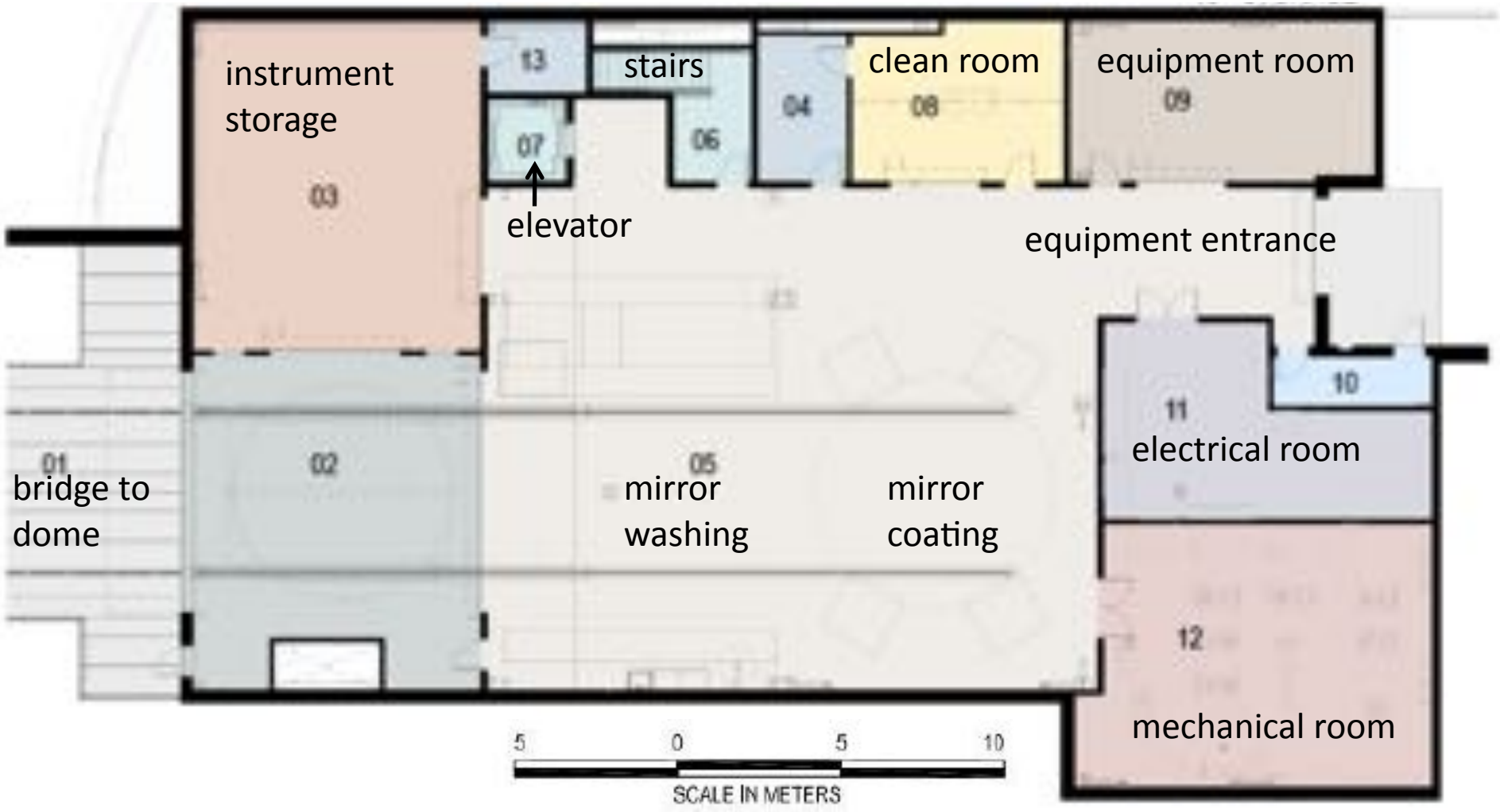
Enclosure design

- The building is oriented SW (telescope) to NE (support building), so the telescope faces into the prevailing wind.



Enclosure design

upper level of services building



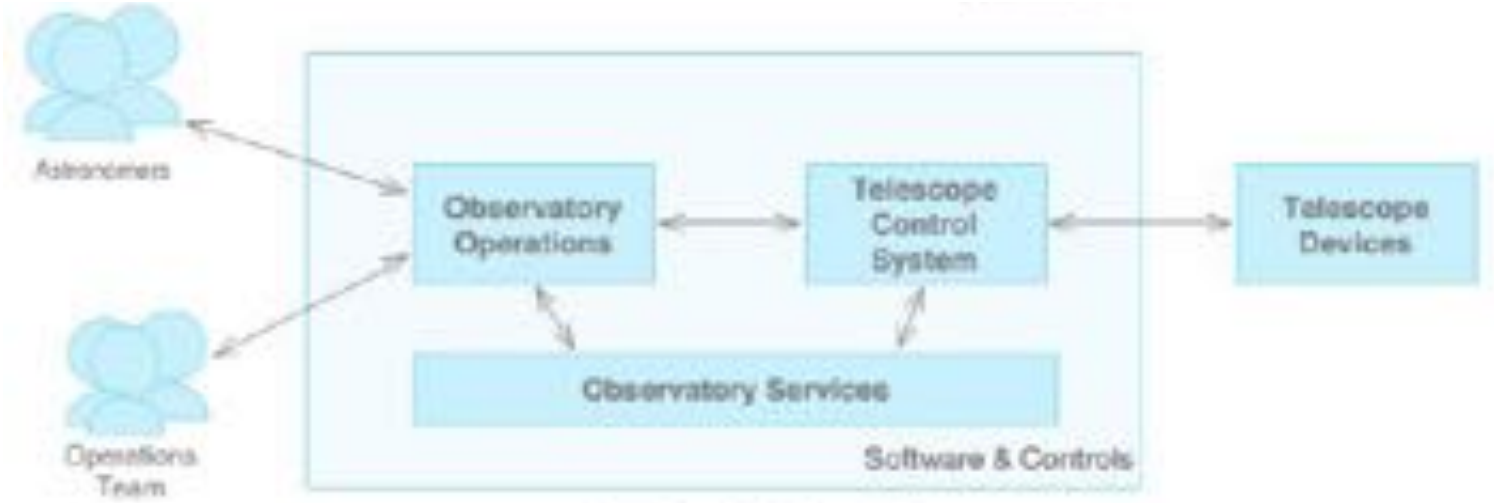
Optics, instruments

- M1 exists, thanks to an agreement between the UA and INAOE, which includes the cell, supports, and controls.
- The schedule for M1 polishing is being developed (more news next week):
  - finish polishing in late 2018
  - integration in cell, ready for shipping by mid 2019
- M2 and the f/5 Cassegrain corrector already exist and deployed at Magellan II (Clay).
- The “Day 1” instruments already exist, in service (Megacam @ Magellan, MMIRS @ MMT).

Control system

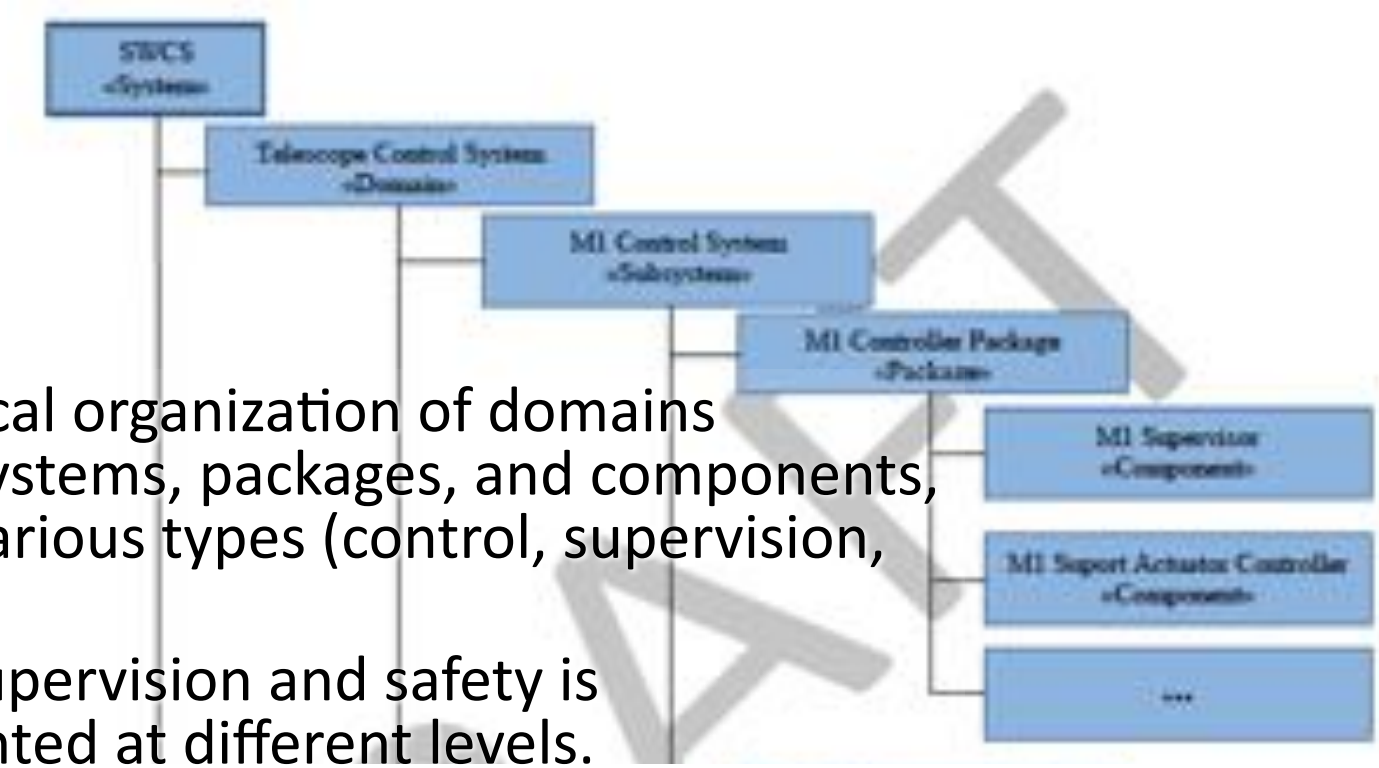
- The development of the control system is headed by personnel from IA-UNAM (Hazael Serrano and Leonel Gutiérrez @ Ensenada).
- The architecture is modelled very closely upon the control system for the GMT.
- A first draft of the document has been released internally, with copies sent to those in charge of science, telescope, enclosure, and instruments.

Control System: high level domains



- There are three top-level domains:
  - Observatory Operations: management and execution of observations, data management
  - Observatory Services: infrastructure, network, time, data storage
  - Telescope Control System: telescope operation and safety

Control system: domain hierarchy



- Hierarchical organization of domains into subsystems, packages, and components, each of various types (control, supervision, etc.).
- System supervision and safety is implemented at different levels.
- The interlock and safety system is responsible for overall system supervision