The European Solar Telescope (EST): Recent developments

Author: Carlos Quintero Noda, Manuel Collados, and the EST team
Affiliations: Instituto de Astrofísica de Canarias & Universidad de La Laguna

Abstract: We summarise in this presentation the recent developments regarding EST's design and science capabilities.

The optical design has been updated to include an Adaptive Secondary Mirror that becomes part of the Multi-Conjugated Adaptive Optics (MCAO) system. This new concept allows simplifying the optical design reducing the number of optical surfaces before the instrument suite. The project has also announced a call for tenders for the Preliminary Design of three EST main systems: the primary mirror assembly, the telescope structure, pier and enclosure, and the adaptive secondary mirror.

In terms of science capabilities, the Science Advisory Group (SAG) published an updated version of the Science Requirements Document in December 2019. The EST Project Office elaborated a database of instrument requirements based on that document. After discussing it with the newly formed EST Review Panel, we developed a tentative light distribution and instrument suite diagram. It was presented and approved by the SAG in June. We are now starting to create the instrument developers team to achieve the proposed performance. Our goal is to deliver the community the construction proposal of the telescope and the instruments by the end of 2022.

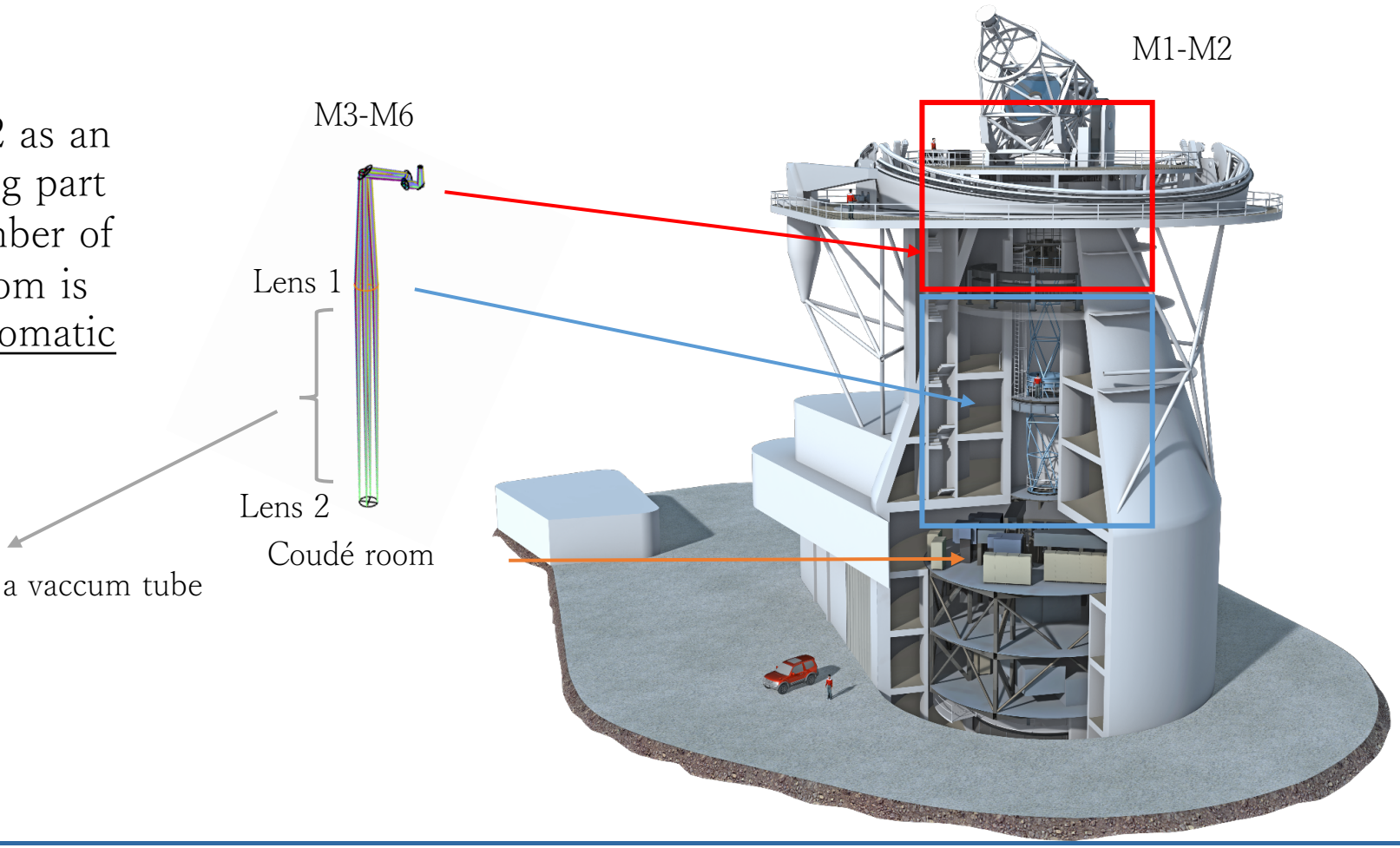
Content of the research

1. Updated optical design
2. EST team and working groups
3. Light distribution and instrument suite
4. Future perspectives

Updated optical design

The design from 2011 had 14 optical surfaces before the Coudé room. They consist of M1 and M2, plus the Multi-Conjugated Adaptive Optics (MCAO) system. After M2, each optical surface (mirrors) was duplicated with parallel mirrors to compensate the instrumental polarisation introduced by each optical surface.

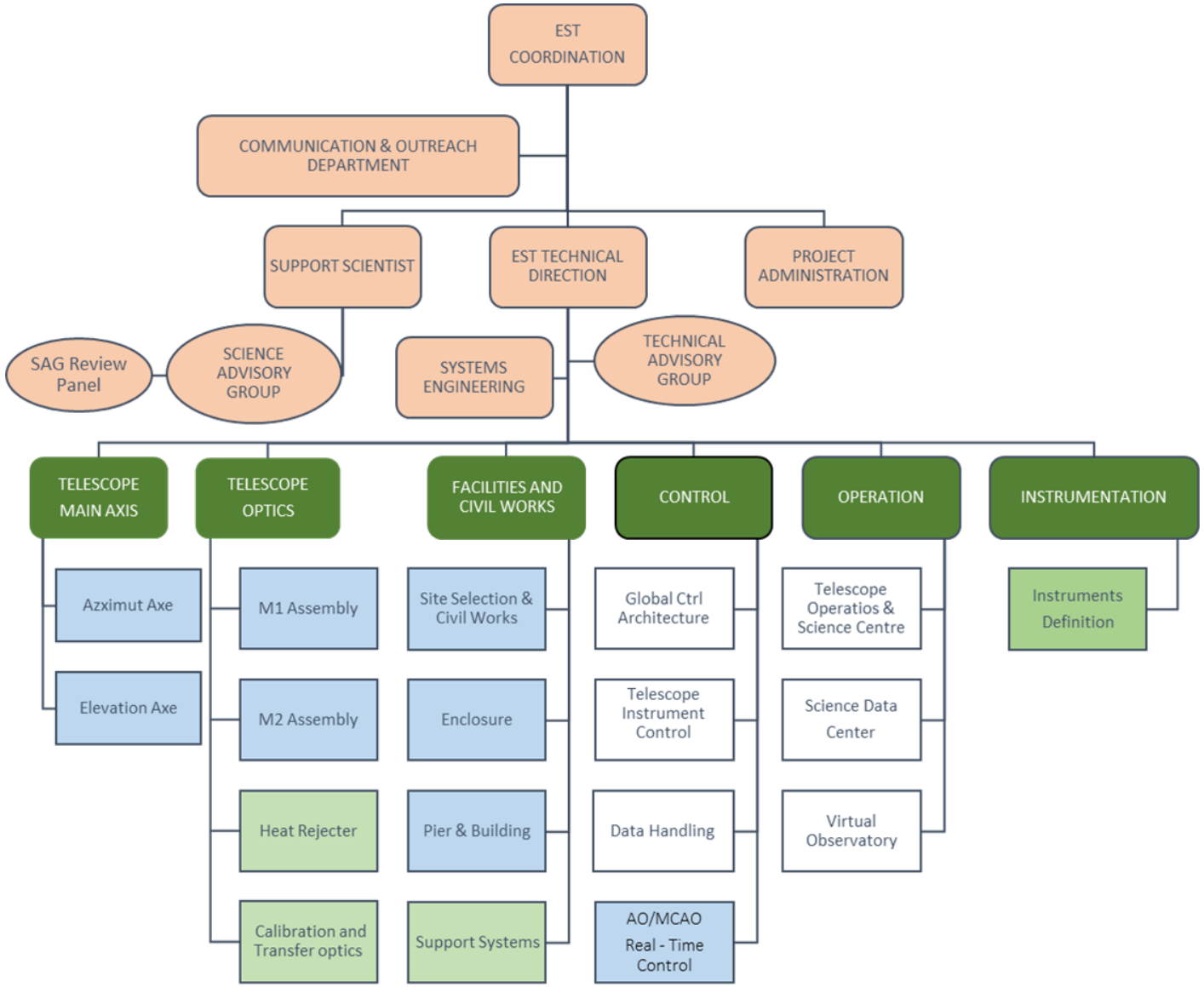
The updated design incorporates M2 as an Adaptive Secondary Mirror, becoming part of the MCAO system. The total number of optical surfaces before the Coudé room is only 6 mirrors and (probably) 2 achromatic lens doublets (see rightmost figure).



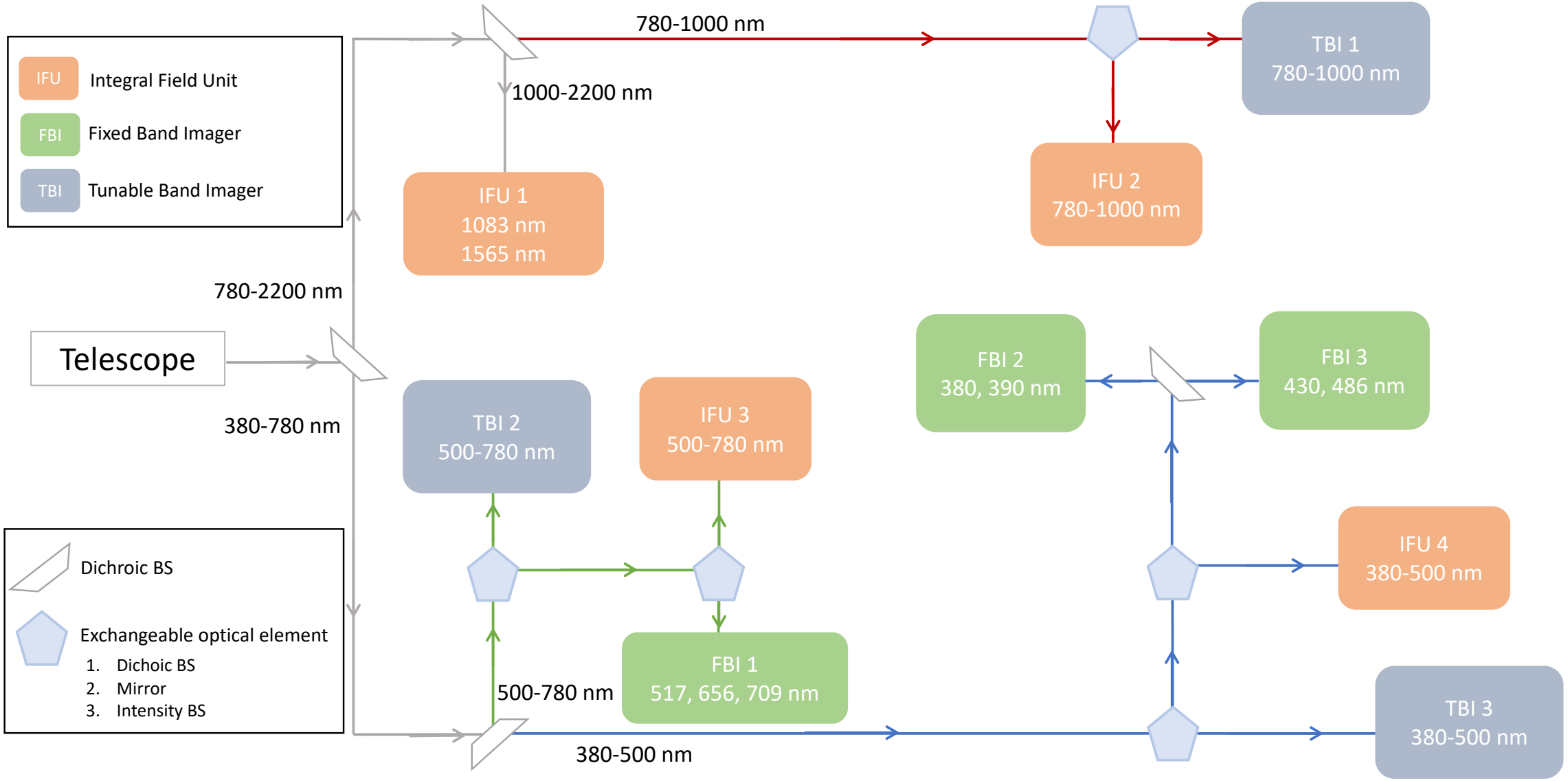
Reimaging system: Probably 2 lenses and a vaccum tube

EST team and working groups

1. The EST Project Office has grown considerably in the last 2 years up to a total of 26 staff. We now cover most of the essential areas (see blue and green in the diagram) to deliver the construction proposal by 2022.
2. We have created different working groups to help the Project Office define technical elements
    1. An EST review panel
    2. Instrument developers teams (a total of three, one per instrument type)
    3. An EST local SAG, integrated by IAC researchers, has been created for a more fluent interaction with the science team.



Light distribution and instrument suite



Future perspectives

1. The main goal is to have the full construction proposal by the end of 2022, so the construction phase can start just after that

2. Multiple recent advances have taken place
    1. Updated optical design, light distribution and instrument suite
    2. Various specific working groups have been created

3. Also very important: A new board of directors started in June 2020 (see the EST's June newsletter).
    1. Prominent researchers and institutions leaders that will mediate between the authorities of each country and the EST Project

4. We are in a critical time where we will define the future of the infrastructure
    1. We are surrounded by competent and motivated staff
    2. The Science community is also more committed than ever
    3. So we expect to fulfil the dream of having the European Solar Telescope built by multiple institutions from multiple countries working together.