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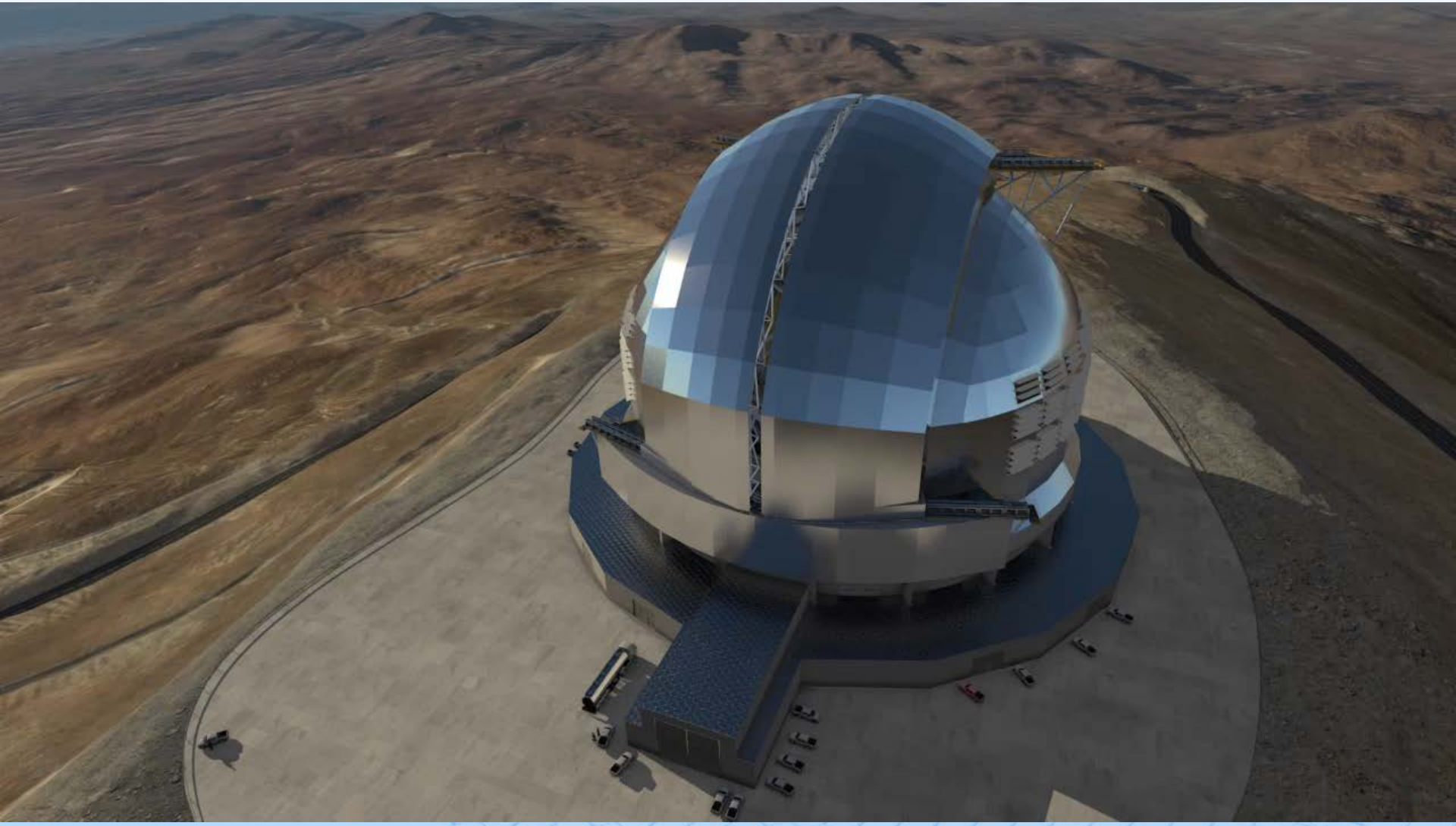
The Extremely Large Telescope



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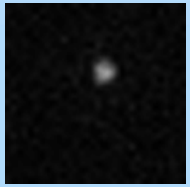
Why Chile?

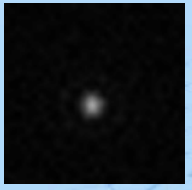
Excellent conditions in the Atacama Desert

- Extremely dry
- 90% clean sky
- Low turbulence

Excellent vision to the Southern Hemisphere



Poor site



Chile

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Armazones and Paranal

25 km

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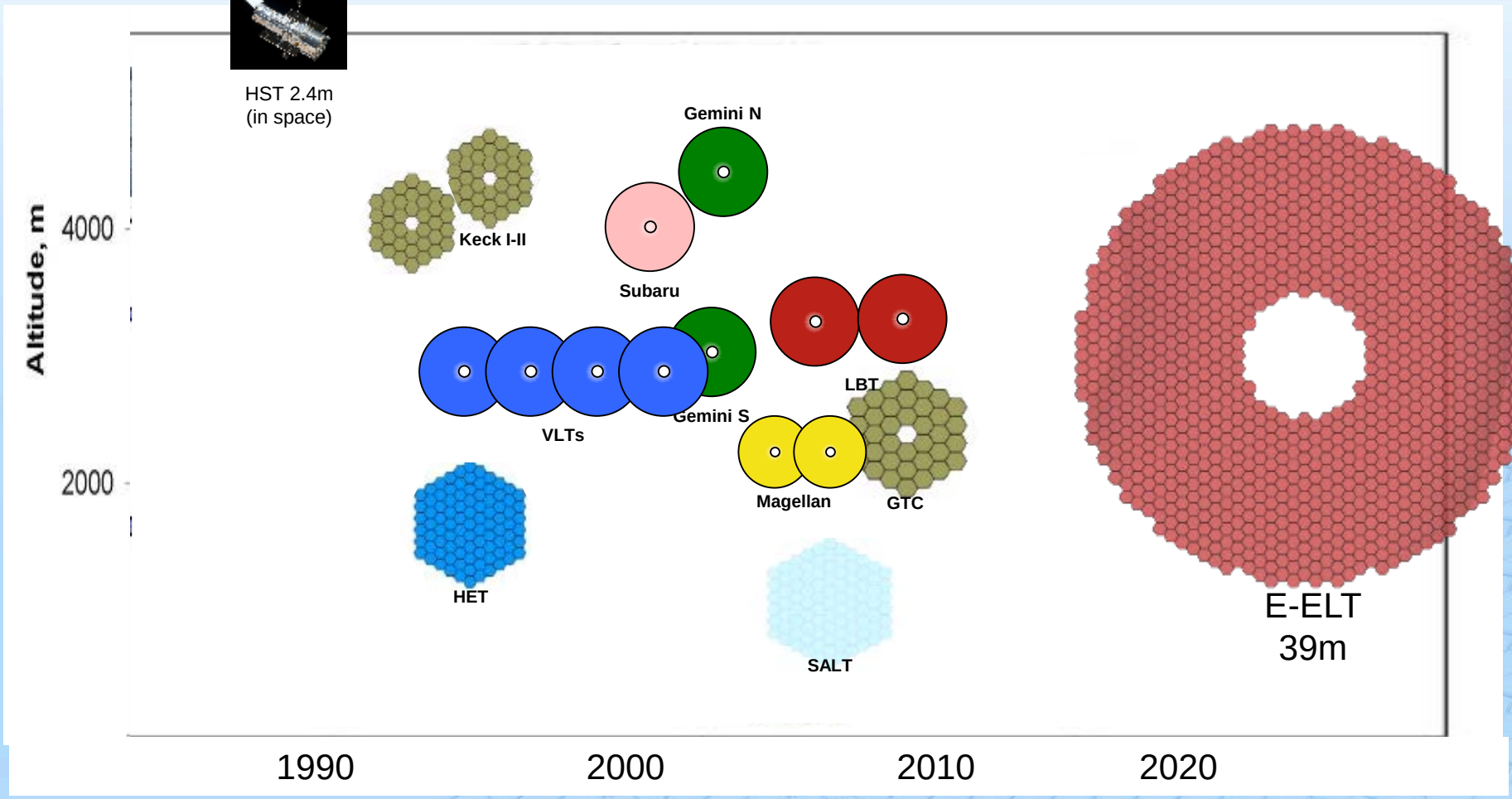
Huge Collecting Area



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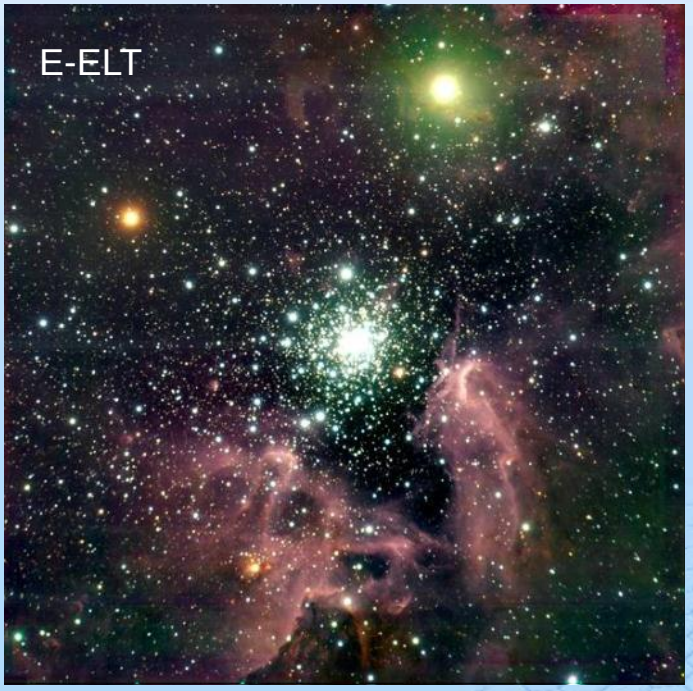
High quality images from the ground



E-ELT excels in **collecting power** *and* **angular resolution**

39.3m telescope with **Adaptive Optics** will deliver

4.9 x better angular resolution (1/D)

510 x faster exposure time ($1/D^4$)

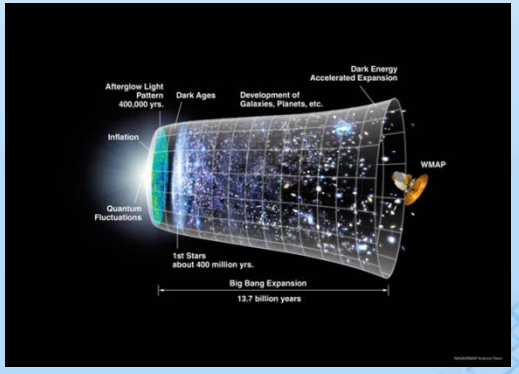
than existing 8m telescopes

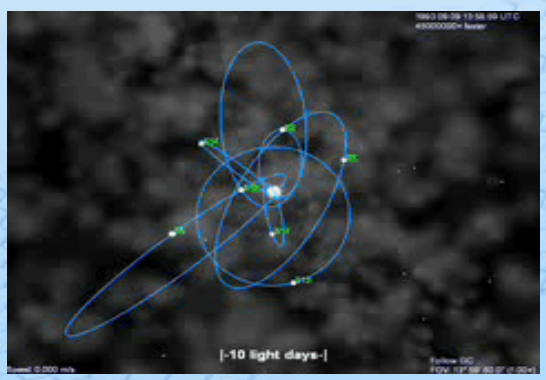
Unprecedented sensitivity and angular resolution

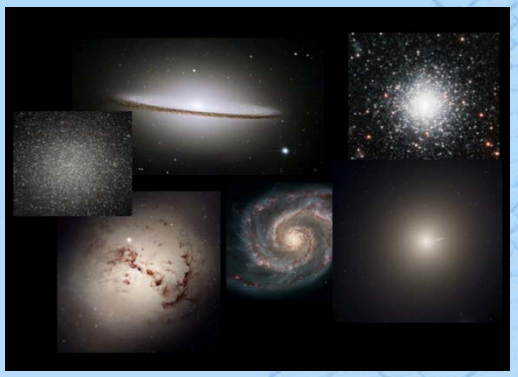
Prepare for the unexpected…!!

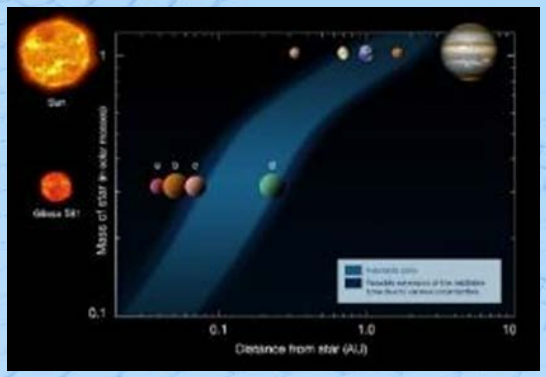
Science

- **The High-redshift Universe & Galaxy Formation**
- **Black Holes and Active Galactic Nuclei**
- **Resolved Stellar Populations and Star Formation**
- **Exoplanets and their Atmospheres**









The E-ELT Design

- 40-m class telescope: largest optical-infrared telescope in the world
- Segmented primary mirror
- Active optics to maintain collimation and mirror figure
- Adaptive optics assisted telescope
- Diffraction limited performance
- Wide field of view: 10 arcmin

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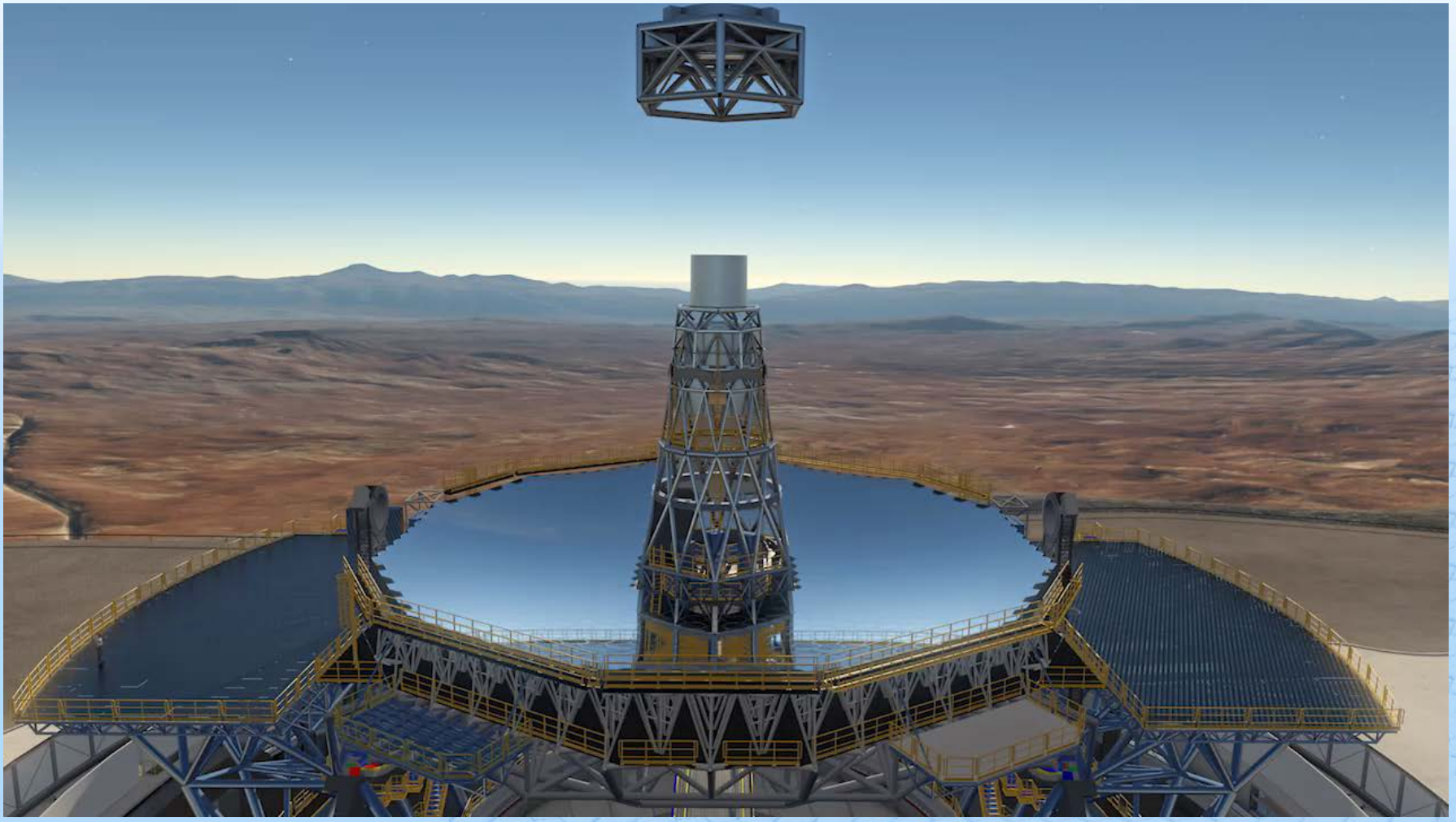
5-Mirror Design



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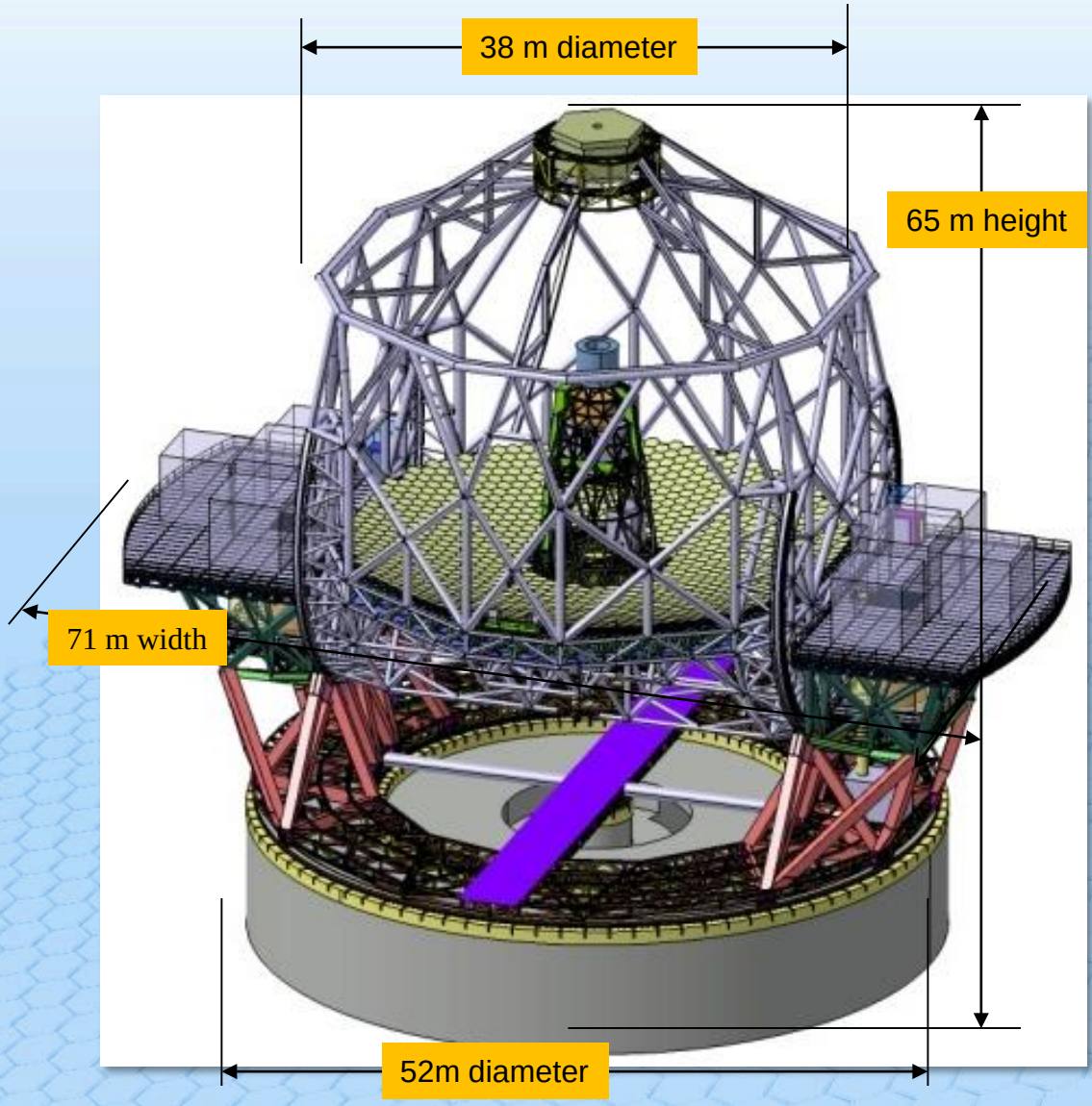
The Main Structure

*The Main Structure is about **2500 tonnes** of steel moving 700 tonnes of opto-mechanics and electronics around two perpendicular axes (azimuth and altitude) supported on hydrostatic bearings and driven by electrical direct drive motors with a precision of 0.3 arcsec under the maximum wind disturbance.*



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M1 Unit

Segment Assembly

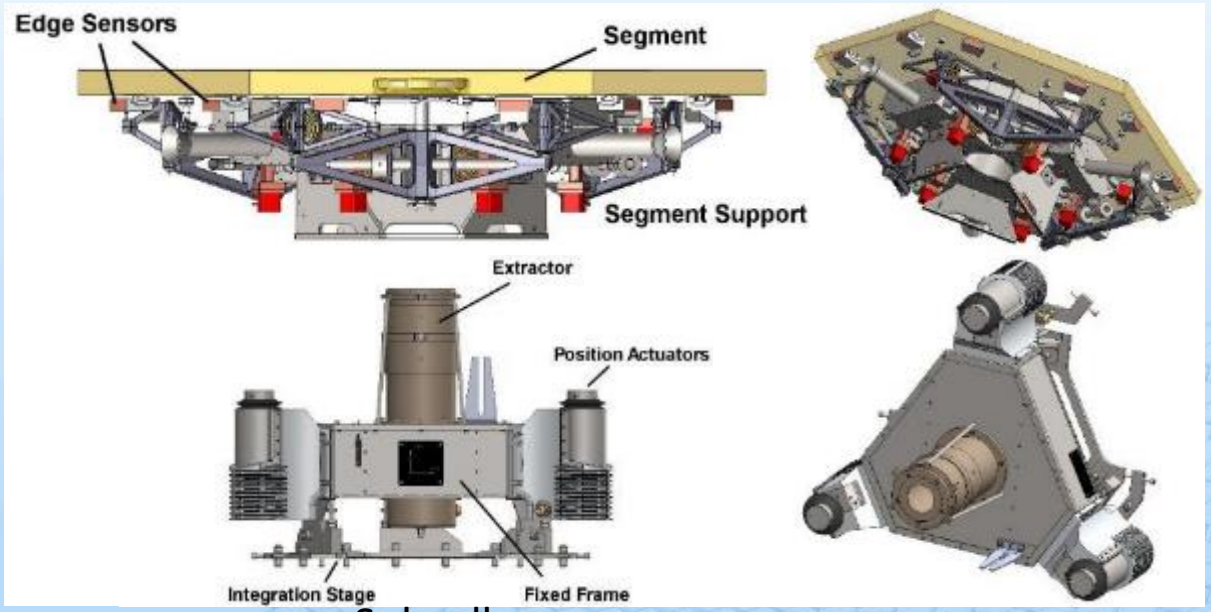
931 x M1 Segments
931 x Blanks + 19 x Spare Blanks
931 x Segments Polishing

4530 x M1 Edge Sensors
4530 x Sensors +813 x Electronics + Spares
(100 sensors – 15 x controllers)

931 x M1 Segment Supports
& SA Auxiliary Equipment
[SA Handling Tools, SA Transport Containers, SA AIV Tools]

2394 x M1 Position Actuators
2394 x Actuators + 798 x Electronics + Spares (16 x PACT – 6 x Controllers)

M1 Auxiliary Equipment
Aux. Sensors, Mass Dummies. Carts, Stands, Manipulator, Phasing Gun, Alignment Tools



Subcell

Including glass, mechanics, electronics:
⇒ more than 10,000 components

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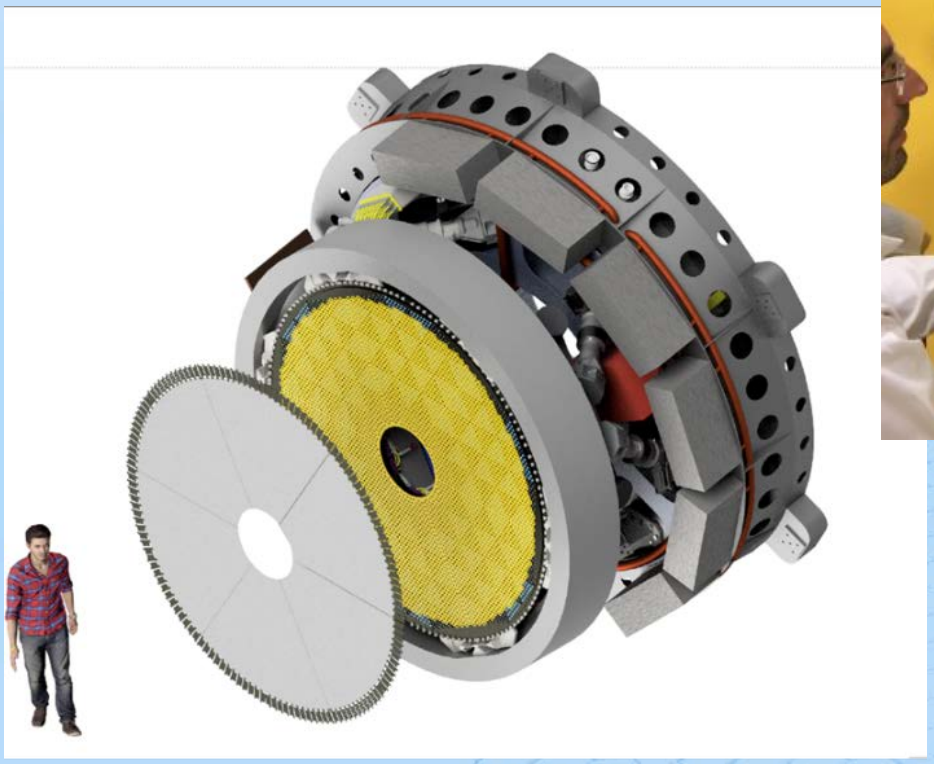
M4 Unit

- 2.4-m flat adaptive mirror – 6 thin-shell petals only 1.95mm thick!
- ~5300 contactless actuators driving the mirror shape at 1 kHz



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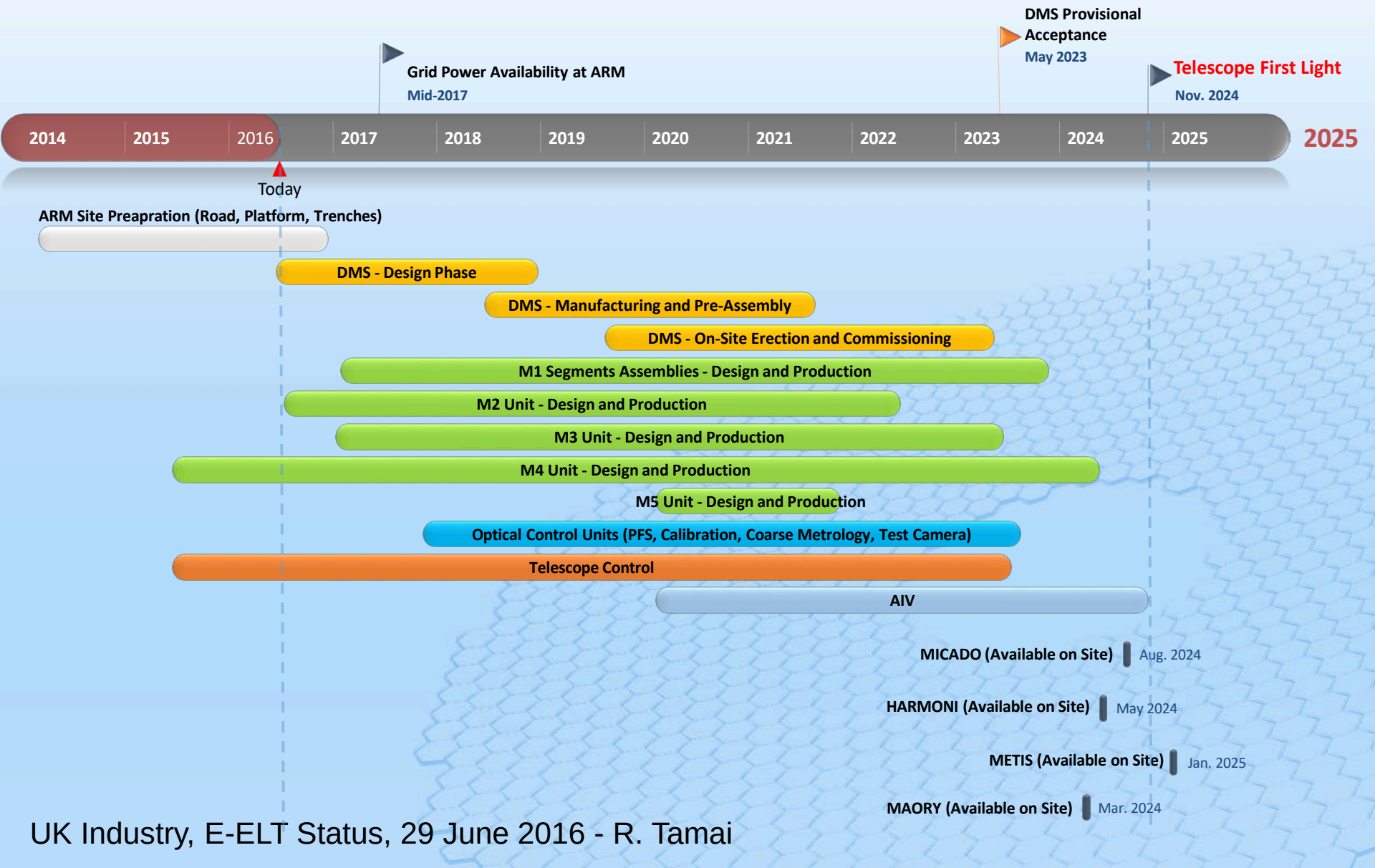
E-ELT Full Programme Schedule



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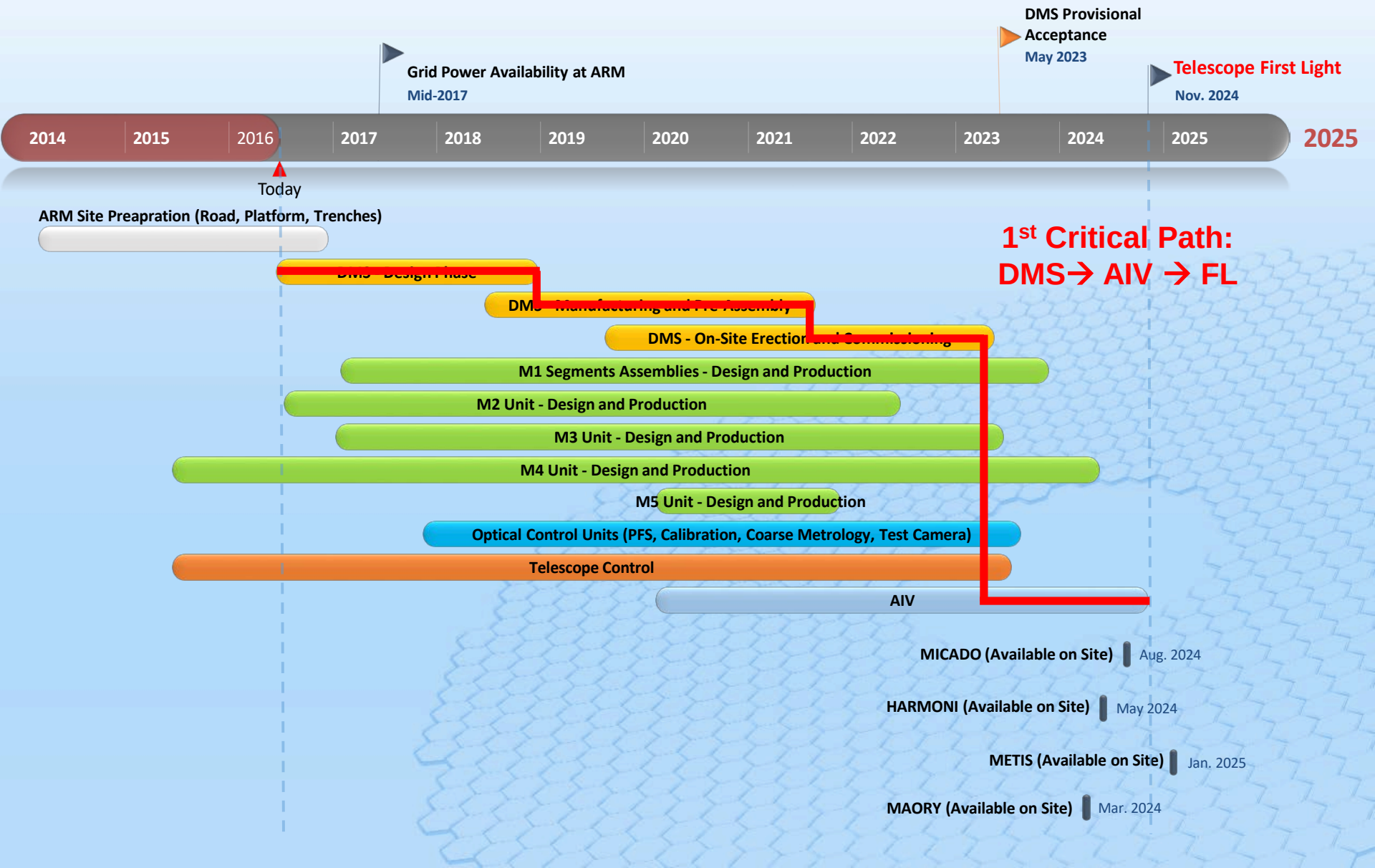
E-ELT Full Programme Schedule



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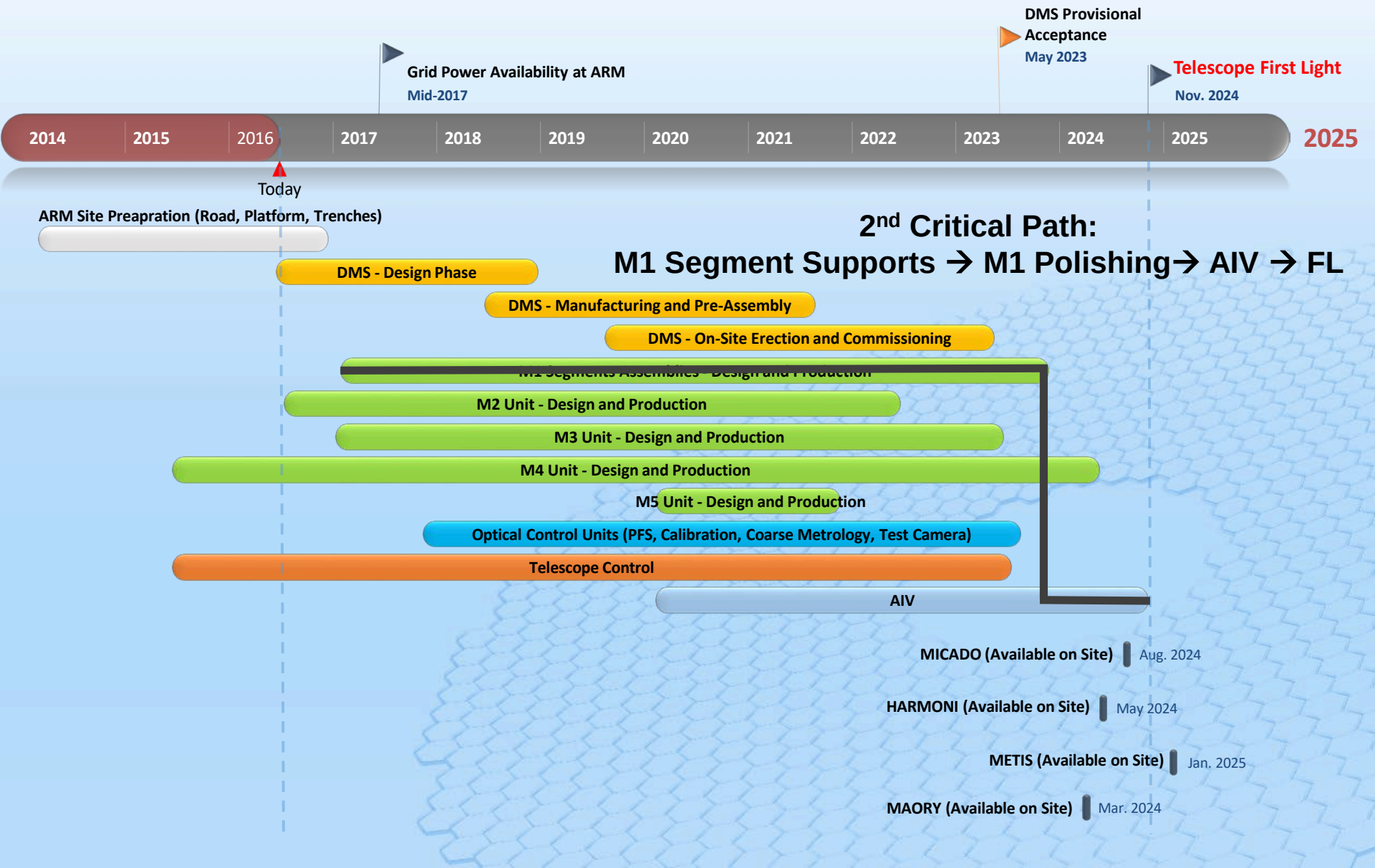
E-ELT Full Programme Schedule



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University of Oxford

Science & Technology Facilities Council
Rutherford Appleton Laboratory

Durham University

University of Cambridge

Heriot Watt University

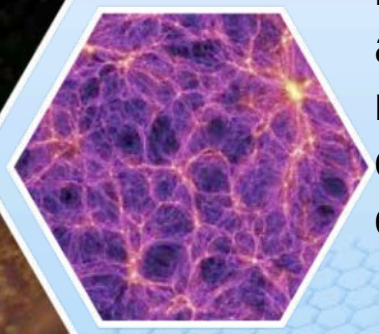
UK Programme for the European Extremely Large Telescope

UK ELT strategy

Science

Lead a First Light Instrument with major science impact

Take significant roles in a range of first generation instruments where the UK adds value and will obtain high priority science return



Technology

Develop technology in instrumentation and adaptive optics to mitigate risk and enhance UK partnership opportunities

Inspiration

Use the E-ELT project to engage the public from the science and engineering viewpoints

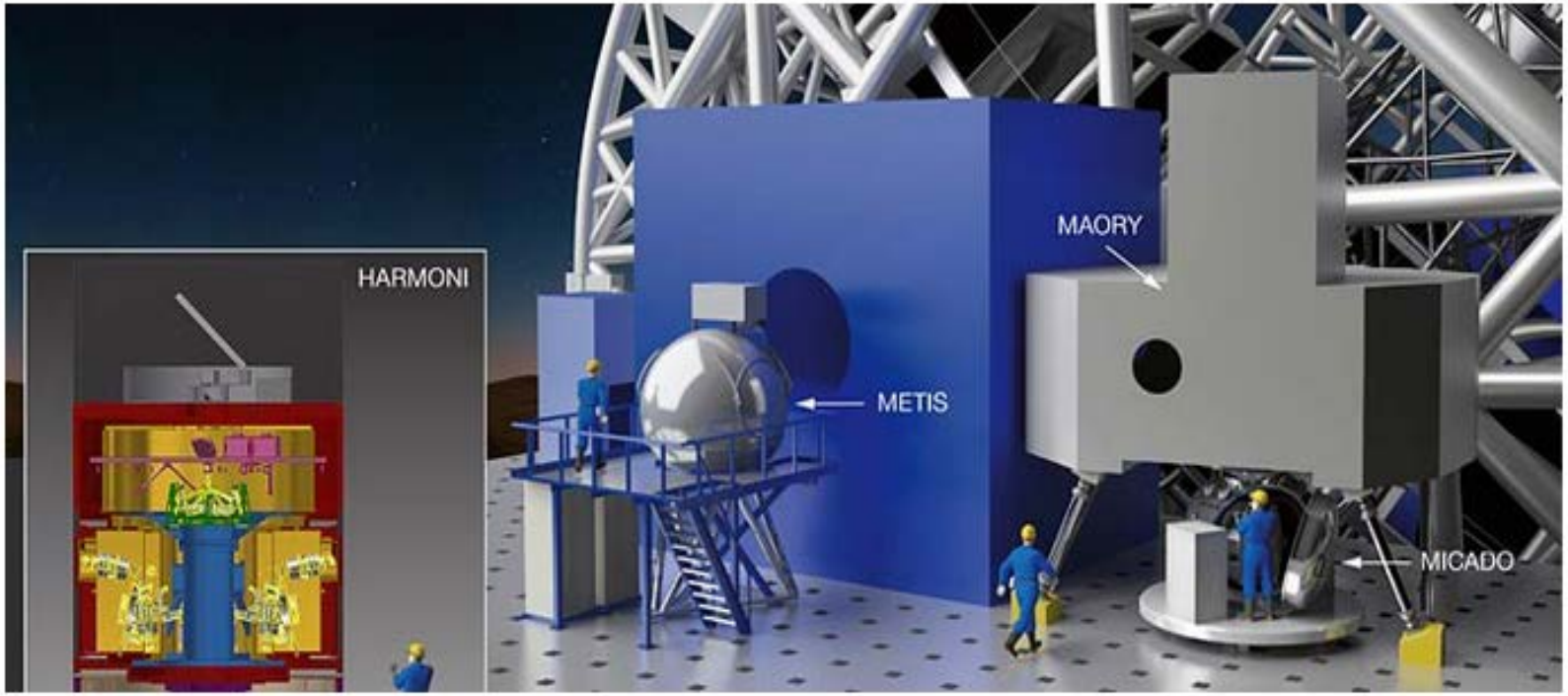
Economic Return

Maximise the economic return to the UK from both the instrumentation and telescope programmes

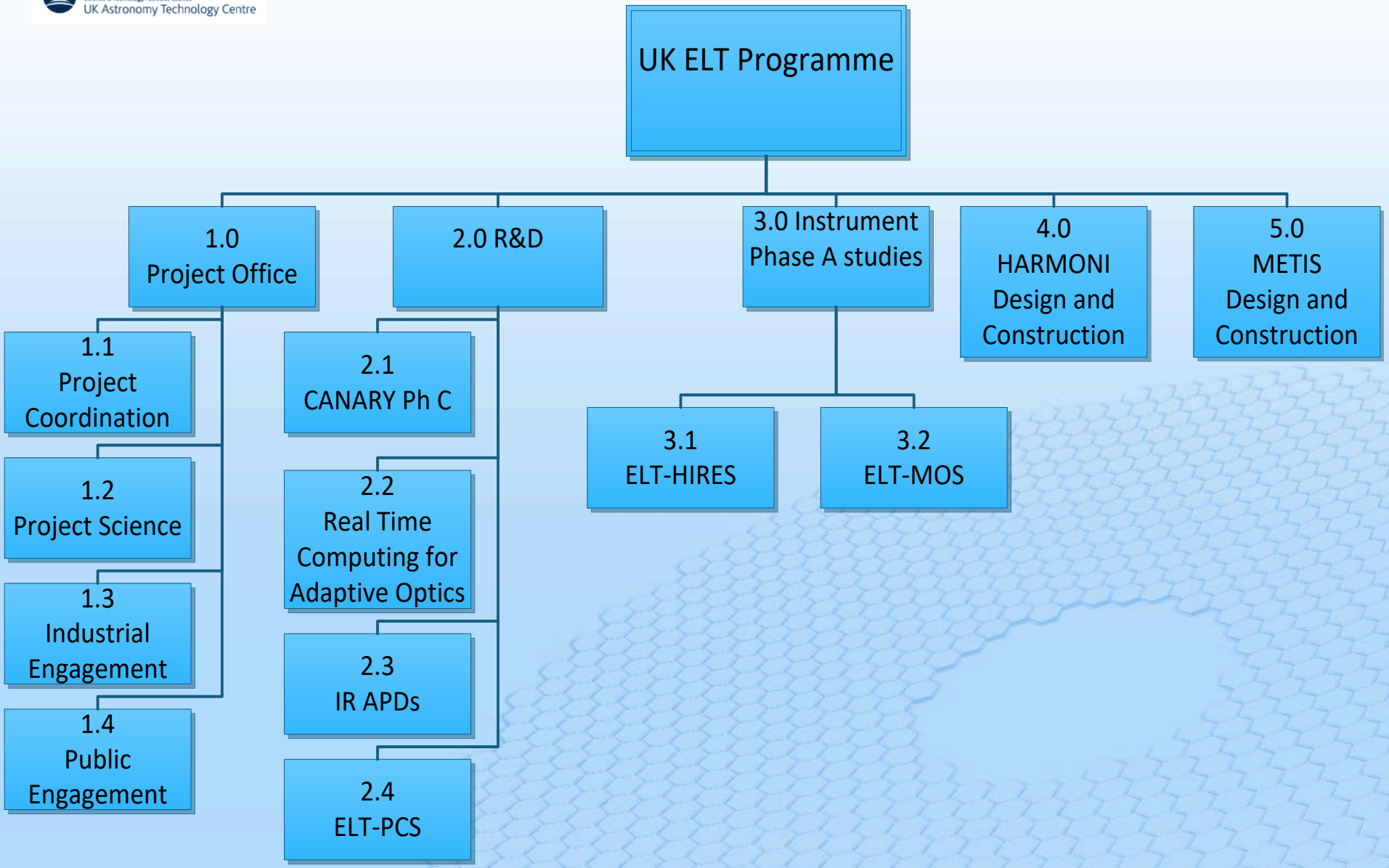
European Southern Observatory

First Instruments for E-ELT Approved

10 July 2015



Following the recommendations of the ESO Finance Committee (FC) and Scientific Technical Committee (STC), Council authorised the Director General to sign the contracts for the first set of instruments for the E-ELT. These huge and innovative tools to analyse the light collected by the giant telescope will allow the E-ELT to address a wide range of astronomical questions soon after its completion. The choices are based on extensive input from the astronomical communities in ESO's Member States.


UK ELT Programme
1.0 Project Office
2.0 R&D
3.0 Instrument Phase A studies
4.0 HARMONI Design and Construction
5.0 METIS Design and Construction
1.1 Project Coordination
1.2 Project Science
1.3 Industrial Engagement
1.4 Public Engagement
2.1 CANARY Ph C
2.2 Real Time Computing for Adaptive Optics
2.3 IR APDs
2.4 ELT-PCS
3.1 ELT-HIRES
3.2 ELT-MOS

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E-ELT Full Programme Schedule