ESO in a nutshell

- Inter-Governmental Organisation, founded in 1962.

- Mission: Build and operate world-class ground-based astronomical observatories and foster cooperation in astronomy

- ESO today: 16 Member States (AT, BE, CH, CZ, DE, DK, ES, FI, FR, IE, IT, NL, PL, PT, SE, UK) and AU strategic partner

- Long standing partnership with Chile since 1963, host of all ESO’s observatories

- Going global through partnerships, e.g., ALMA

- ESO HQ in Garching, observatories in the Atacama desert

- ESO staff complement: 750+

- Budget 2021 300+ MEUR

- ESO operates some of the most productive ground-based observatories

- Science output: 1000+ refereed papers/year

- ESO is building the largest and most powerful ground-based optical/infrared telescope (ELT)
ESO’s sites

- Garching bei München (Germany)
- Santiago (Chile)
- Chajnantor
- Paranal
- Armazones
- La Silla
La Silla Observatory site (2400 m, 150 km N of La Serena)

and many hosted telescope projects...
Paranal Observatory (2650 m, 130 km S of Antofagasta)

- Most powerful optical/infrared observatory in the world
- Very Large Telescope
  - 4 x 8.2m Unit Telescopes
- Very Large Telescope Interferometer
  - Also 4 x 1.8 m Aux Telescopes
- Survey Telescopes VST and VISTA

- A full suite of 15 scientific instruments that can be used with these telescopes

- On-site infrastructure facilities
Very Large Telescope (VLT) and VLT Interferometer (VLTI)
Largest sub/mm radio interferometer
In operations since 2011

**Global partnership: ESO, NSF (USA) and NINS (JP)**
In cooperation with the Republic of Chile

**Array Operations Site in Chajnantor (5050m)**
66 (movable) antennas, over a 16 km plateau
Back end and correlator

**Operations Support Facility at 3000m, near San Pedro de Atacama**
ALMA – Operations Support Facility (3000 m)
Extremely Large Telescope (ELT)

Largest optical/infrared telescope in the world, in construction
39.3 m segmented primary mirror & adaptive optics
Transformational science objectives
Construction 2015-2025+ (~1300 MEUR)
On Cerro Armazones (3050 m), to be operated as part of the Paranal Observatory
ELT construction progress

On-site construction work

Design & manufacturing in Europe

Cerro Armazones

Cerro Paranal
Most components manufactured in Europe (ESO or factories)

Sea or air freight, depending in requirements. Sea preferred to air (CO₂)

Import process in Chile as an IGO. Custom clearance, support by customs broker.

Transport to observatories by road. Long distances, special dimensions.
ESO: (Some) challenges of operating at remote places

Commuting of the staff and contractors

Power: use the grid and renewable as much as possible

Water: a scarce good in the Atacama desert

Data: Network with others and invest
Building and operating big science RIs in remote places – thoughts

✦ Programmatic (common to all RI)
  + Make sure all stakeholders are supportive
  + Secure multi-annual funding
  + Include a contingency fund in the budget (it will be needed)

✦ Local engagement
  + Gain “Social permission to operate”
  + Ensure that the RI is wanted by the hosts (national, regional and local) and that there are win-win opportunities
  + Secure supply chain, also in human capital. If not, invest on it.

✦ Secure basic infrastructure
  + You are far from home, nothing easily available
  + Develop sustainable solutions for provision of water, electricity, access roads, data etc

✦ Operations:
  + reduce as much as possible on-site human presence. It is expensive and environmentally unfriendly.
  + Use commercial support services, local when available.
  + Move into digital-based operation, using Industry 4.0 tools
Thank you