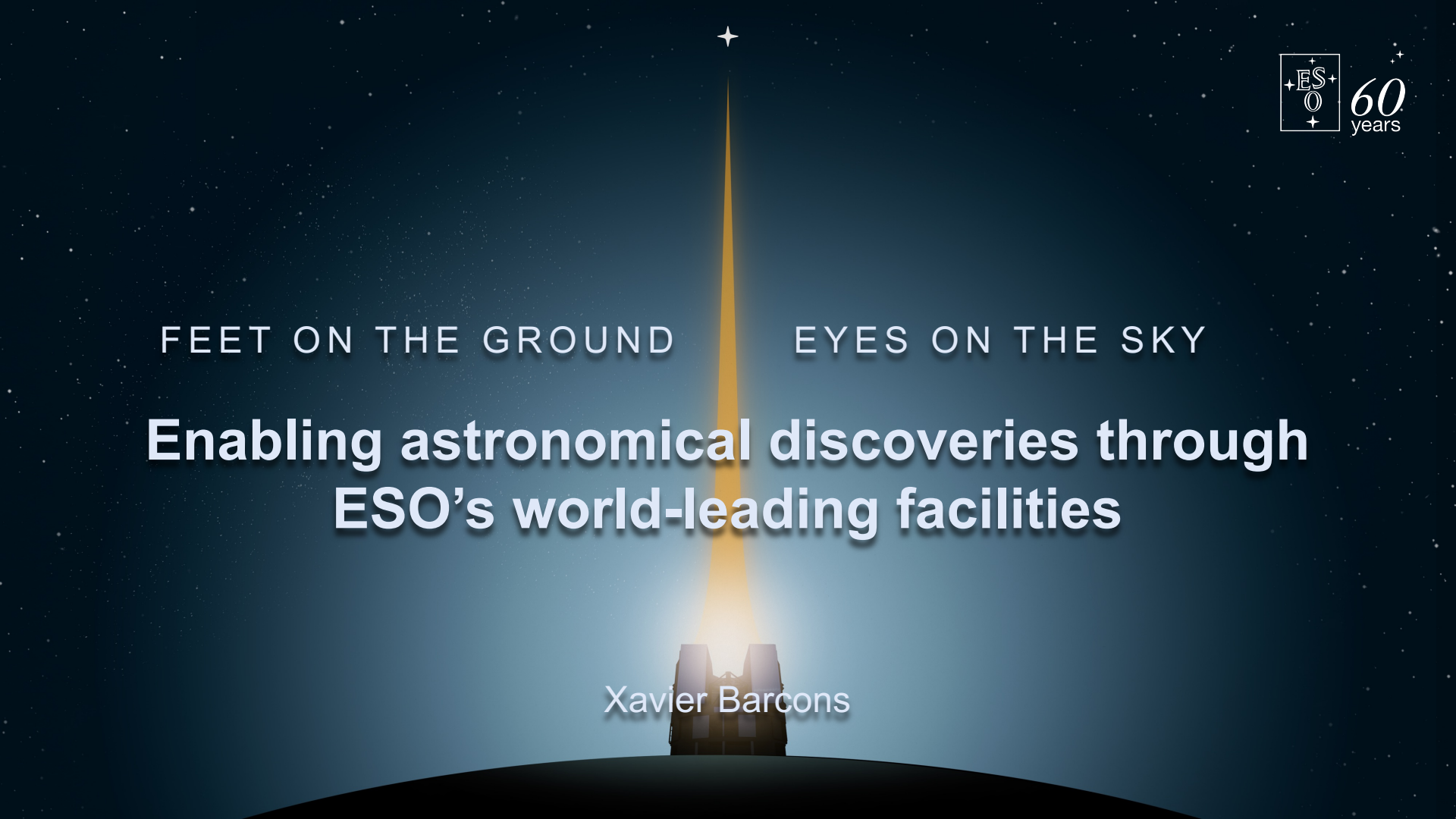

FEET ON THE GROUND
EYES ON THE SKY
Enabling astronomical discoveries through ESO's world-leading facilities
Xavier Barcons
ESO
60 years


ESO
60
years
For the past 60 years, the
European Southern Observatory (ESO)
has been enabling scientists worldwide
to discover the secrets of the Universe
for the benefit of all.

# Our Mission

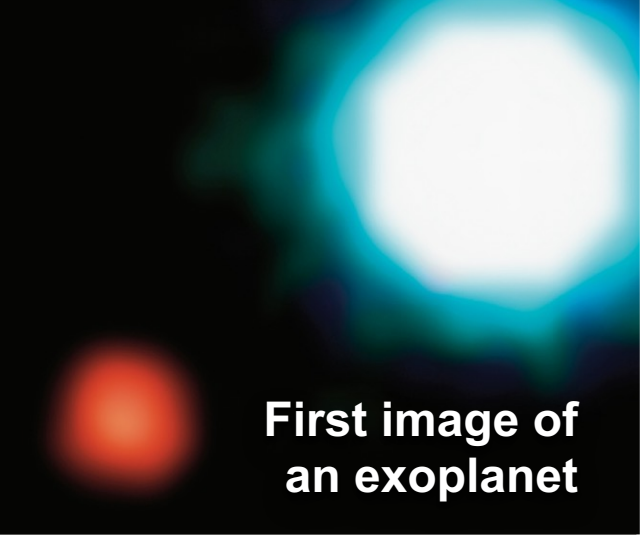
To design, build and operate the most advanced observatories on the ground,

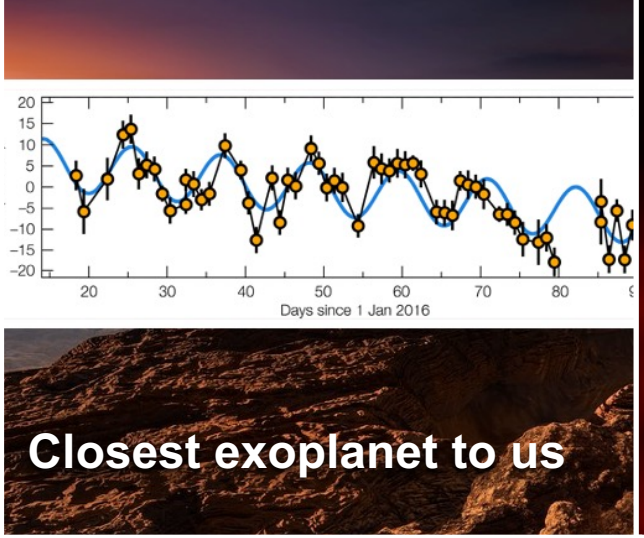
and

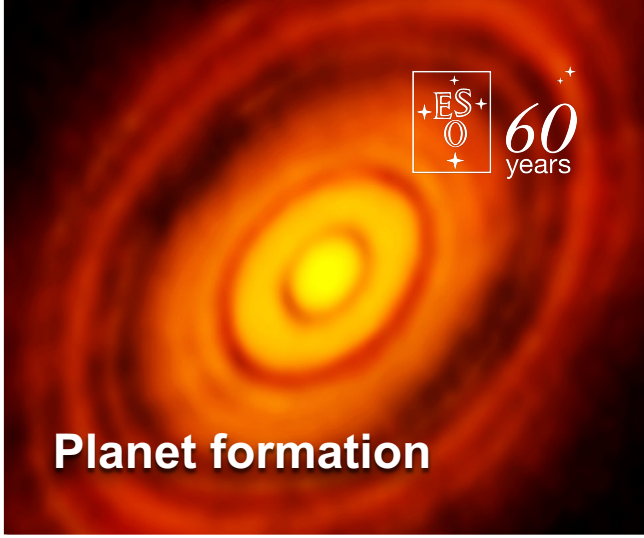
to foster international collaboration for astronomy.

# Our Vision

is to advance humanity's understanding of the Universe by working with and for the astronomy community, providing it with world-leading facilities


First image of
an exoplanet


20
15
10
5
0
−5
−10
−15
−20
20
30
40
50
60
70
80
Days since 1 Jan 2016
Closest exoplanet to us


ESO
60
years
Planet formation


First image of
a black hole


Black hole at the centre
of the Milky Way


Accelerating Universe

# Science enabled by ESO

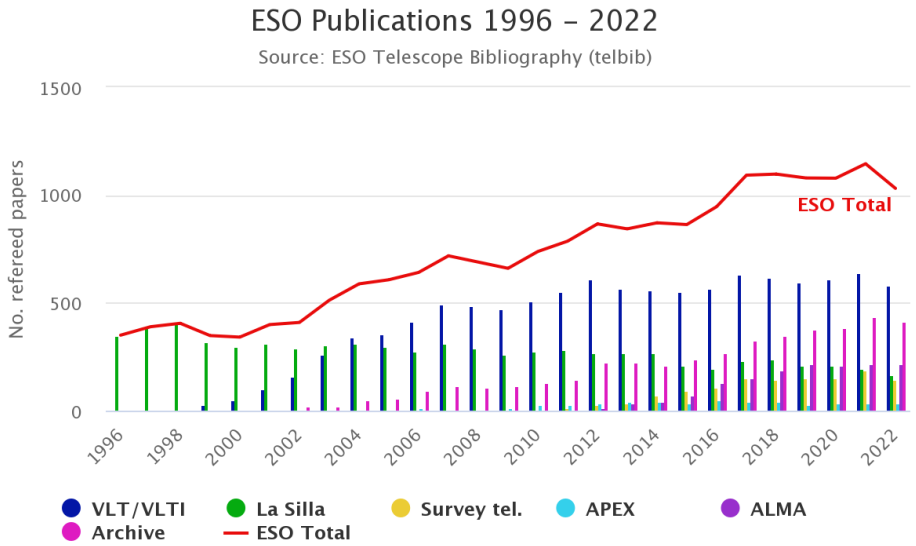



*Fig. 1: Refereed papers using ESO data*

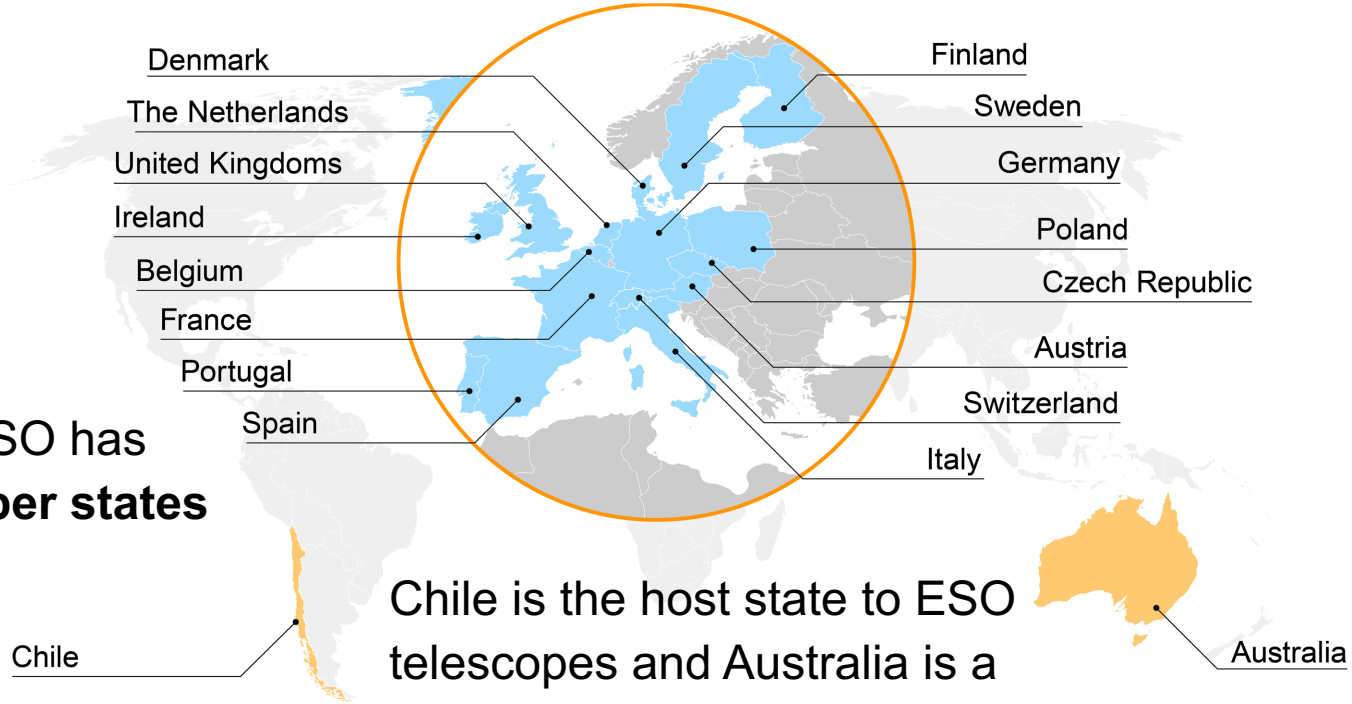
Over 1000 papers/yr

Around 35% use the archive (and 15-20% only the archive)

Close to 20000 refereed papers since 1996

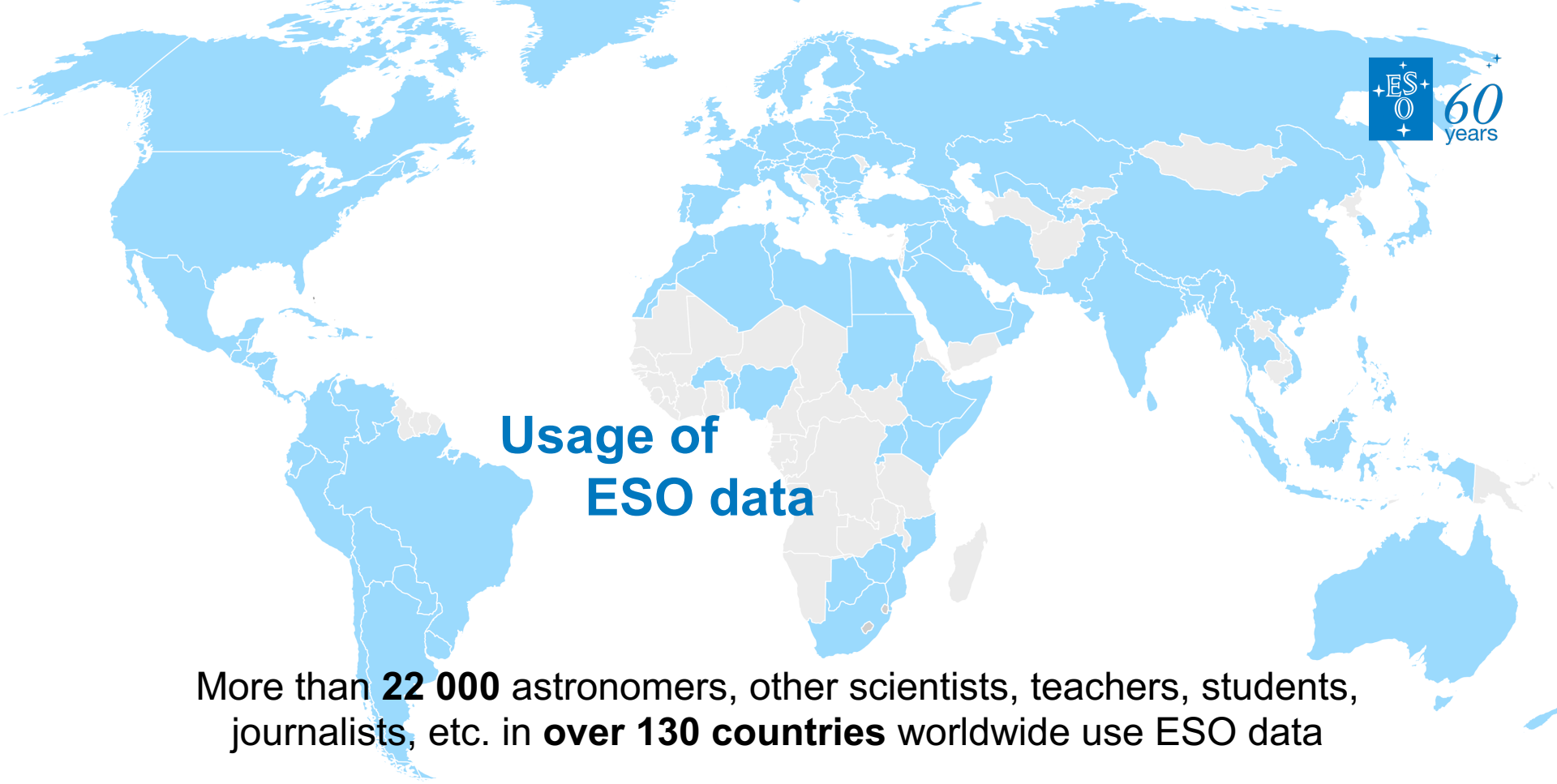
Publications based on data from ESO's telescopes (telbib.eso.org)

# ESO's Member States and Partners




Today, ESO has
**16 member states**

Chile is the host state to ESO telescopes and Australia is a strategic partner



# Usage of ESO data

More than **22 000** astronomers, other scientists, teachers, students, journalists, etc. in **over 130 countries** worldwide use ESO data

# The organisation in a nutshell

# In a nutshell

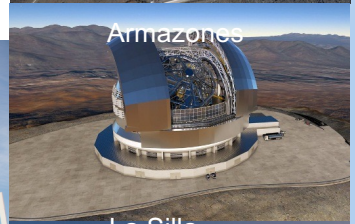
- ESO – European Organisation for Astronomical Research in the Southern Hemisphere (in short: European Southern Observatory)
- Intergovernmental Organisation (Convention 1962)
  - Founding members: BE, DE, FR, NL, SE
  - Today: + DK, CH, IT, PT, UK, FI, ES, CZ, AT, PL, IE
  - Partnership with AU on La Silla Paranal Programme
  - Partnership with USA and JP public institutions on ALMA
- Personnel 750 (450 in Germany, 300 in Chile)
- Budget 350 MEUR (60% construction funds for the ELT)
  - Contributions in proportion to Net National Income
- Important role in European science policy landscape
  - Party to EIROForum, agreements with CERN, ESA, SKA, collaboration with ESFRI, observer in UN COPUOS etc.

# ESO's sites

Garching bei München (Germany)

Santiago (Chile)



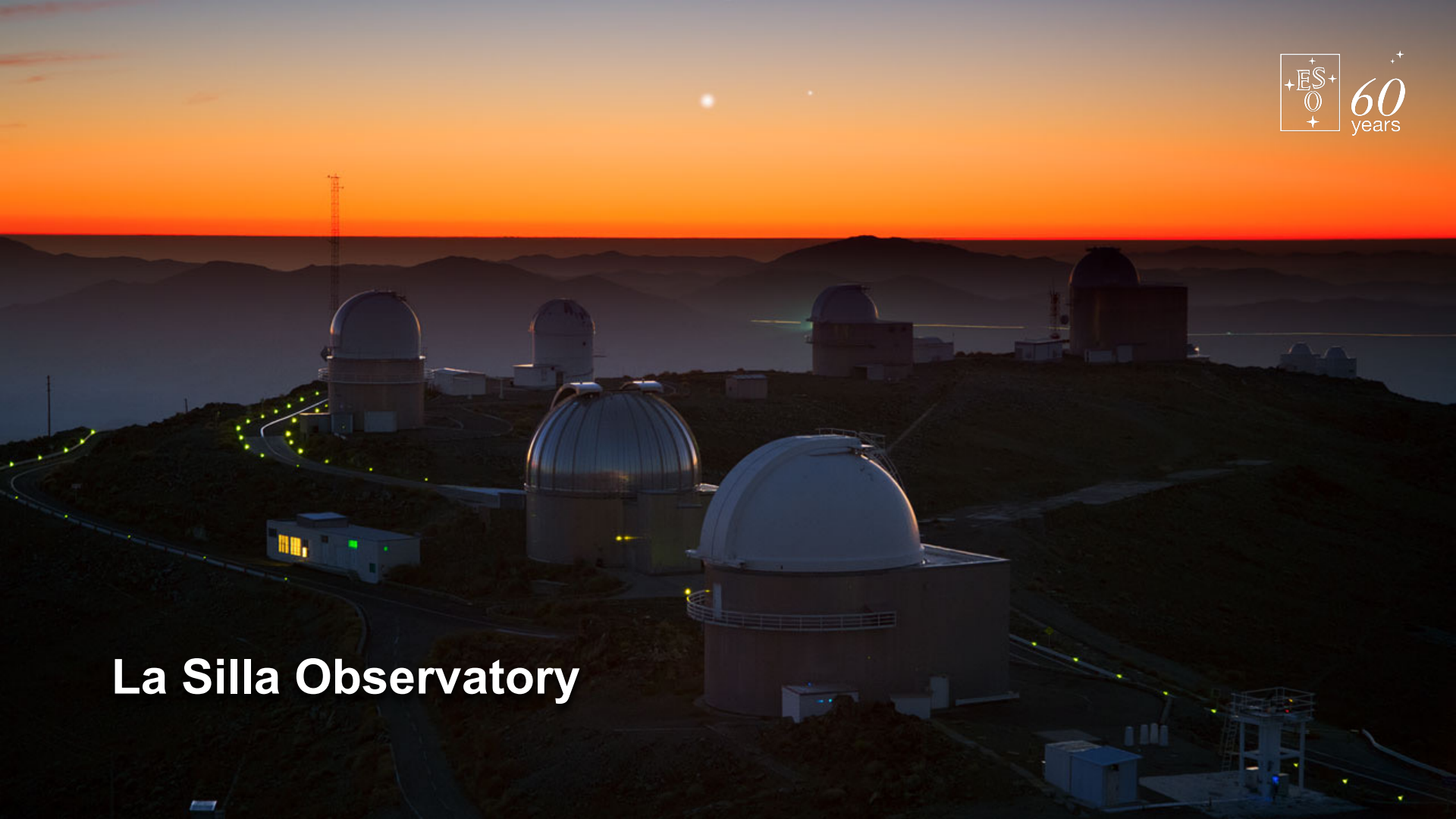





# How does ESO work

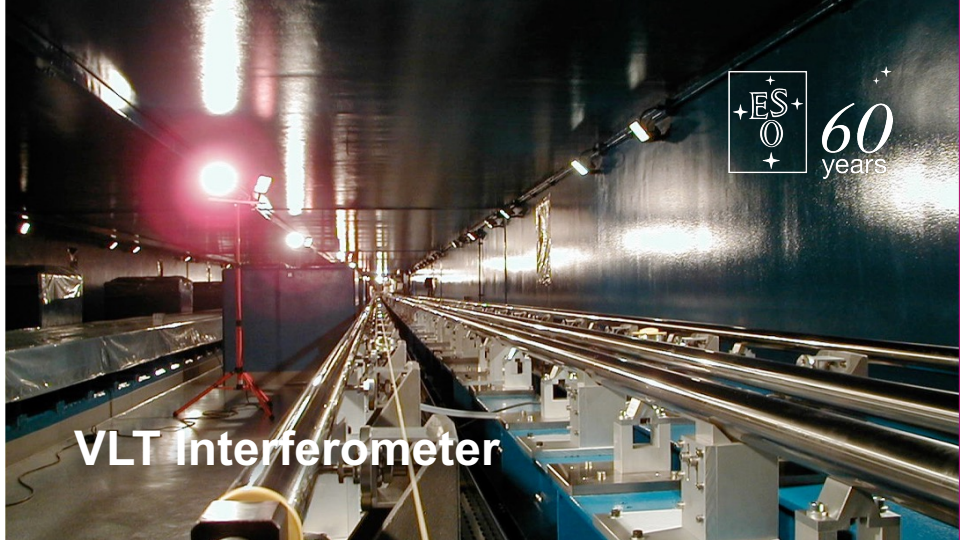
- Garching headquarters
  - Administration and general services
  - Astronomical research activities
  - Development of new programmes and projects: engineering and science
  - Observatory operations back-end
- Chile (Santiago)
  - Administration and general services support
  - Astronomical research facilities
  - Joint ALMA Observatory central office
- Chile (Observatory sites)
  - Observatory operations front end (incl science operations, maintenance, updates etc)
  - Site construction activities

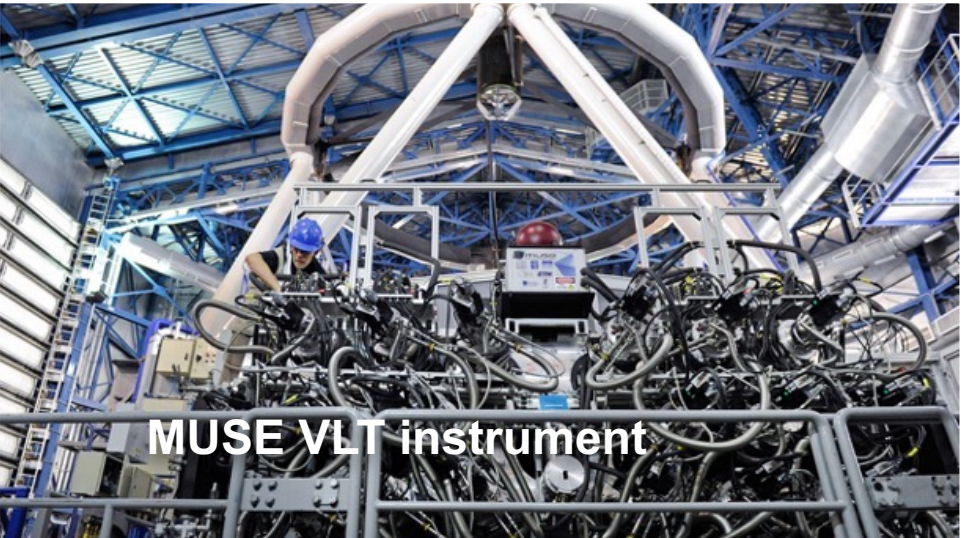
# Our observatories and telescopes


La Silla Observatory


Paranal Observatory


VLT with Laser Guide Star


ESO
60
years
VLT Interferometer


MUSE VLT instrument

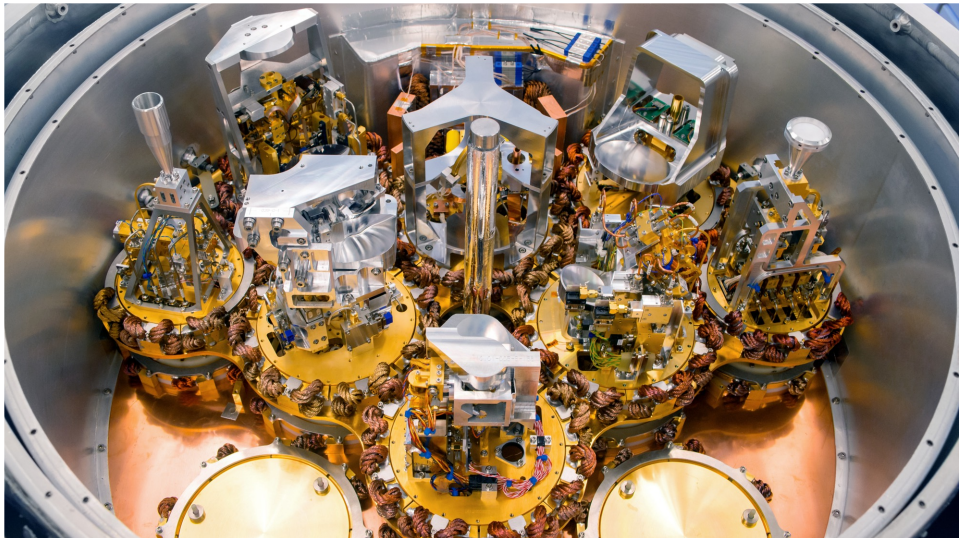

GRAVITY VLTI instrument

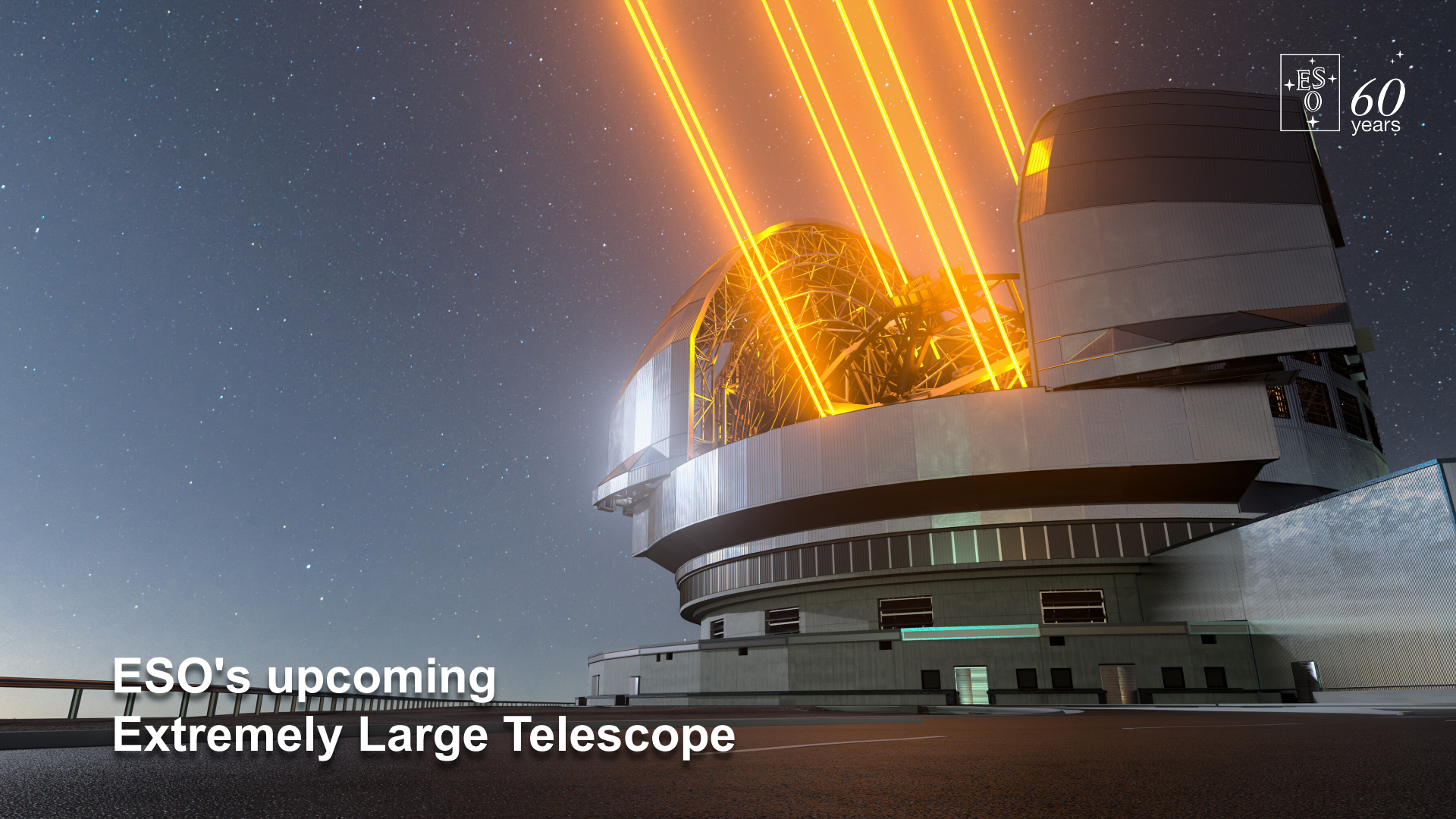
# ALMA

- Largest sub/mm radio interferometer (in operations since 2011)
- Global partnership between:
  - ESO – 37.5%
  - NSF (USA) – 37.5%
  - NINS (Japan) – 25%
  - In cooperation with the Republic of Chile


ALMA
A partnership between ESO, NSF and NINS


ESO
60
years

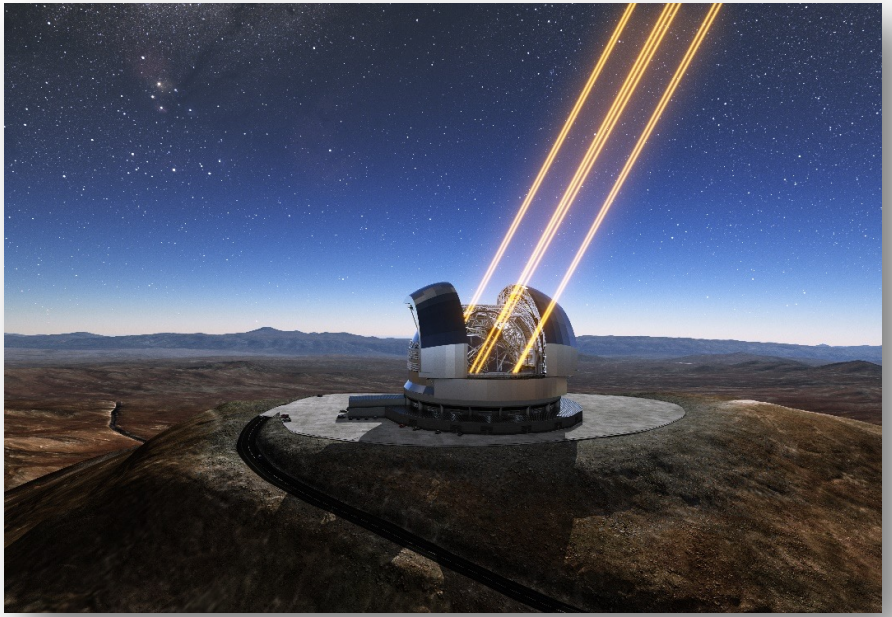



ESO
60
years
ESO's upcoming
Extremely Large Telescope

# ESO's Extremely Large Telescope (ELT)

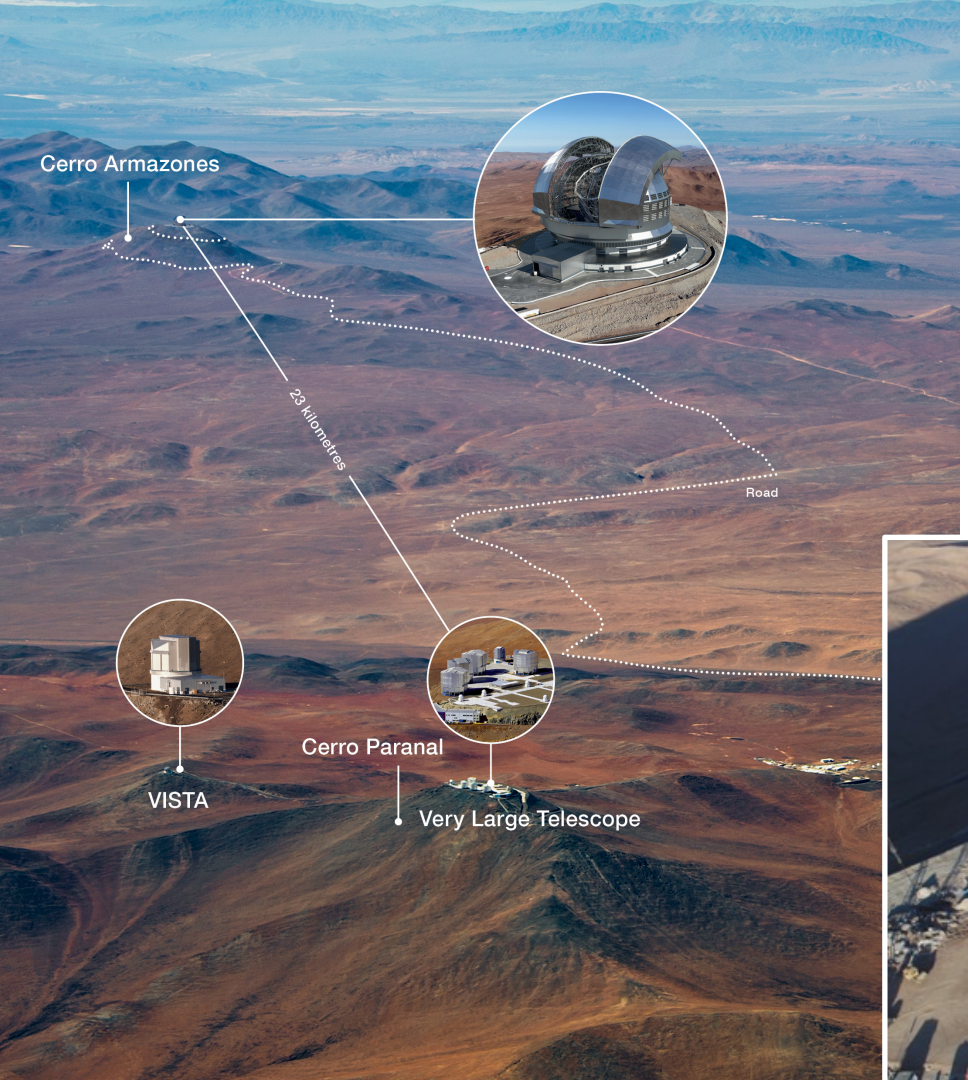
elt.eso.org

- Largest optical/infrared telescope in the world
- 39.3 m segmented primary mirror with 798 segments and adaptive optics
- Transformational science objectives
- Construction 2015-2028 €1.4 bn
- On Cerro Armazones, to be operated as part of the Paranal observatory



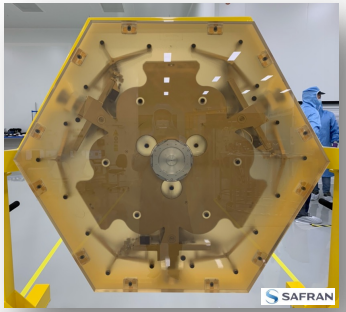
# ESO's ELT

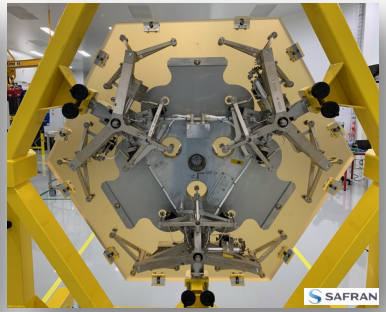
is being built on Cerro Armazones in the Chilean Atacama Desert, at 3046 metres altitude and just 23 kilometres from the site of ESO's Very Large Telescope (VLT) at Paranal.




# Armazones Construction Site (Oct. 2022)

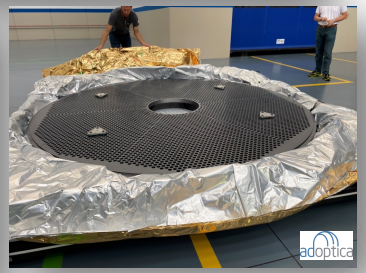
# ELT at 50% of construction

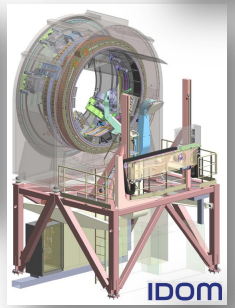


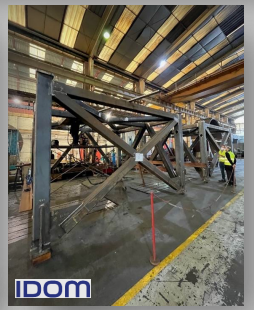



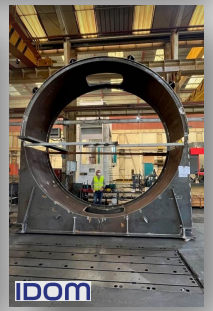






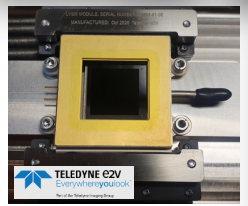







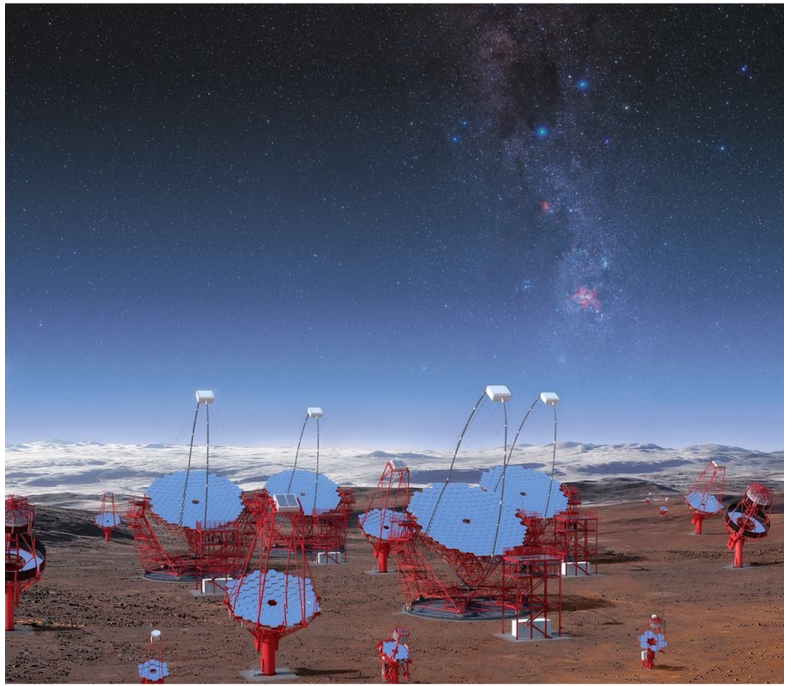

# Cherenkov Telescope Array - CTA

CTA-S array hosted and operated by ESO in Paranal-Armazones

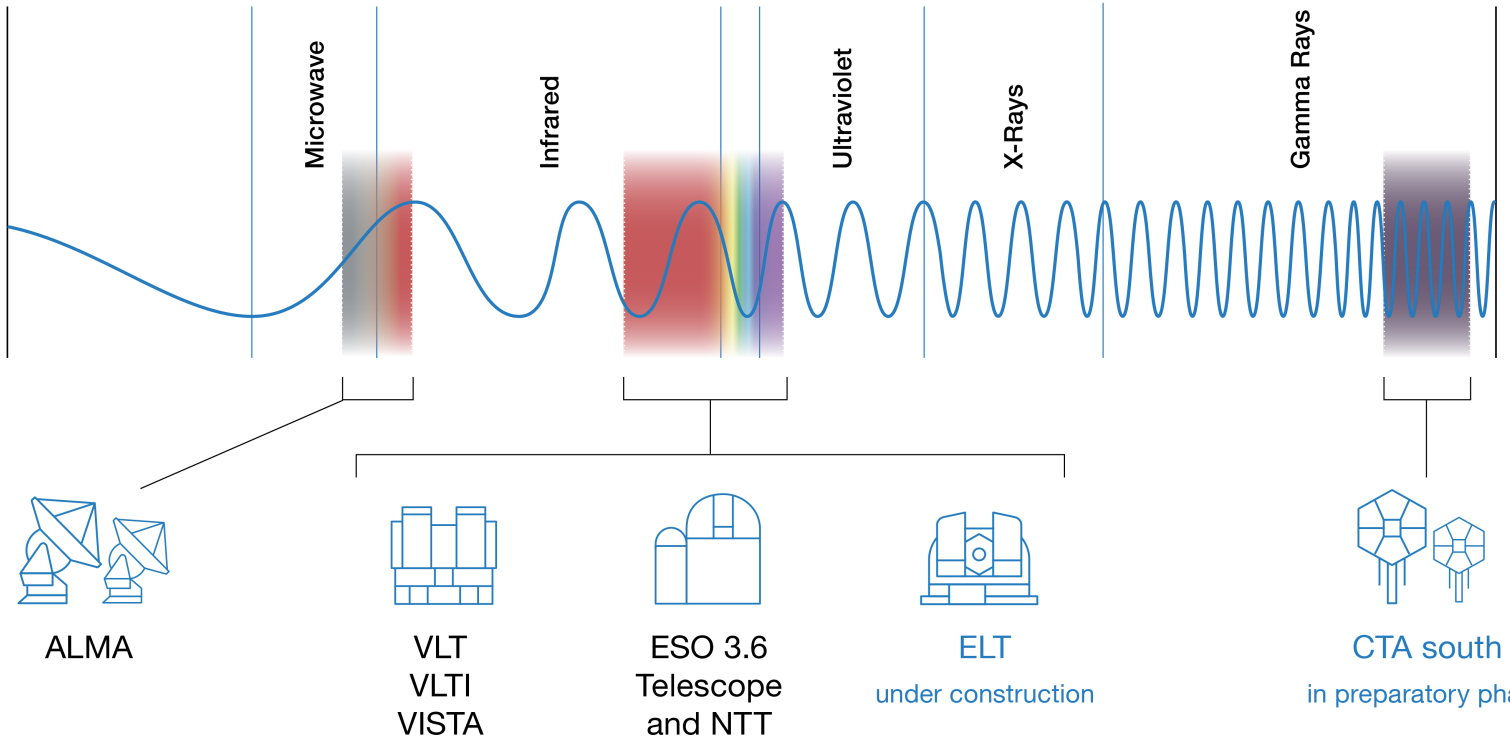
ESO is 8% partner of CTA. Will offer 10% of observing time to the ESO community both North (La Palma, E) and South (Paranal-Armazones)

Synergies with other ESO facilities important

Infrastructure construction started



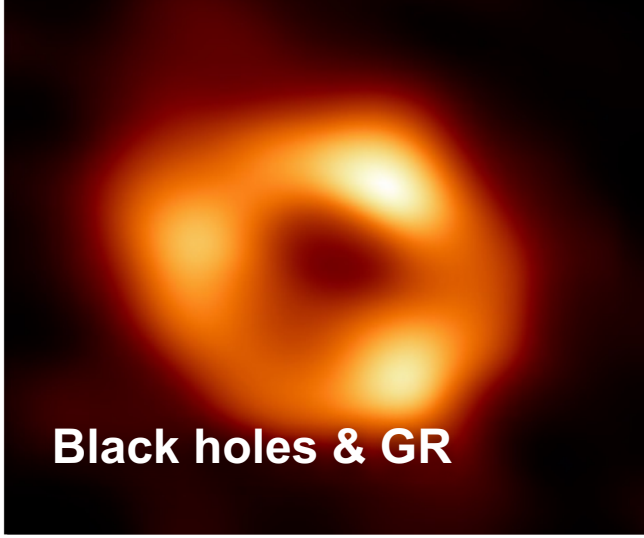
# ESO across the electromagnetic spectrum



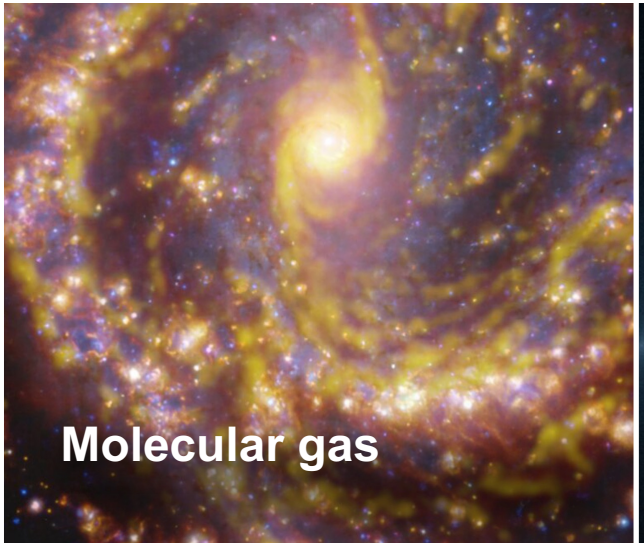
# Breakthrough discoveries we're enabling


Solar system objects

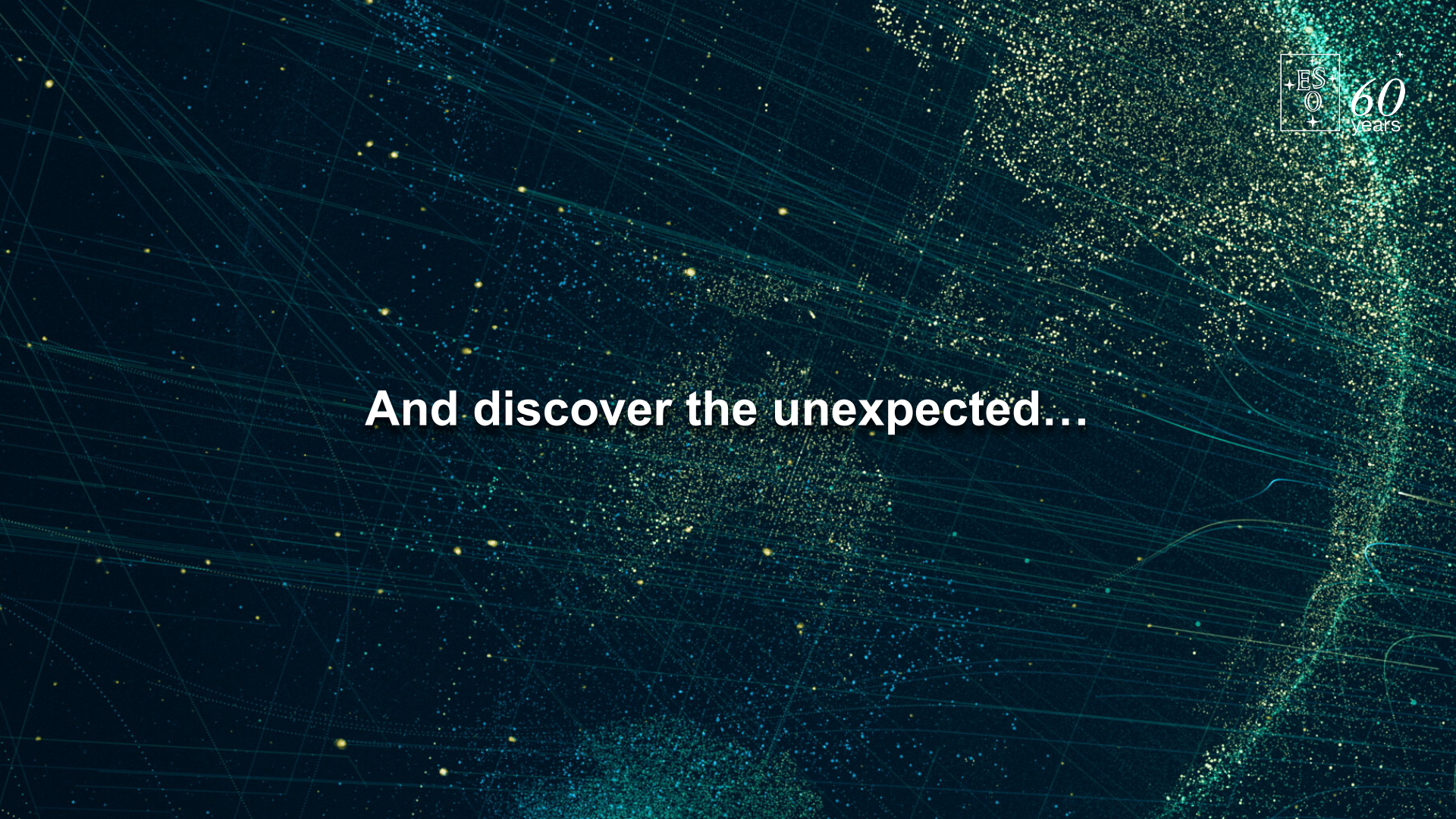

Other Earths


Black holes & GR


Distant star formation

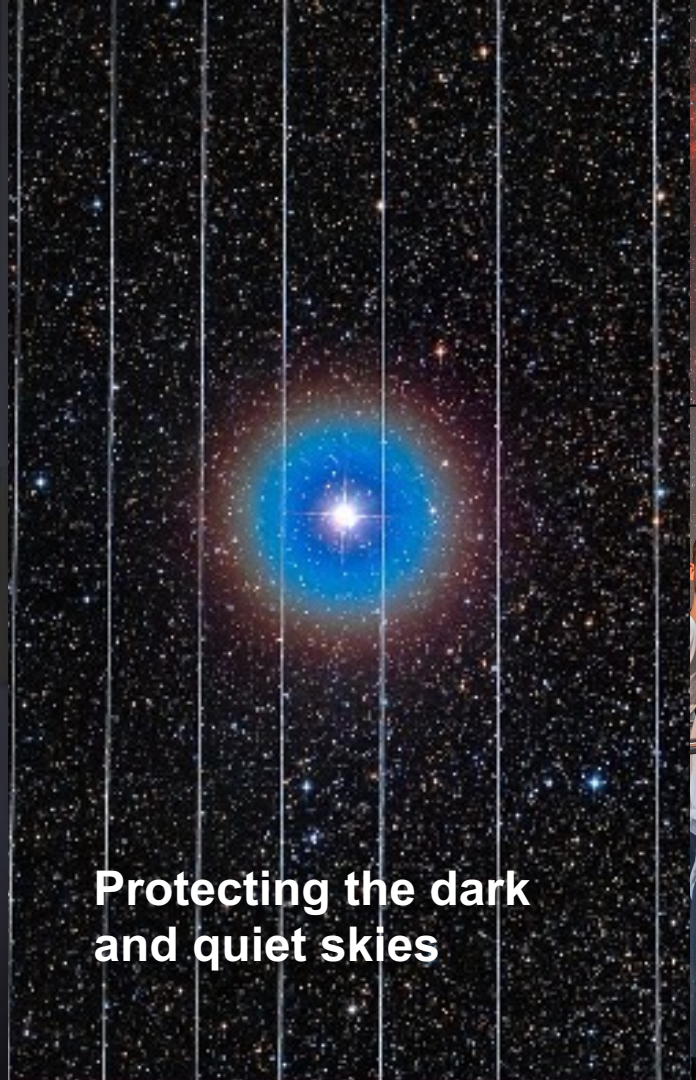

Molecular gas


Accelerating Universe


And discover the unexpected…

# A sustainable way to better serving society

Open data for open science



Protecting the dark and quiet skies

Programmes for the new generations


Reaching out


Event
Horizon
Telescope

# Sustainability at ESO


Social

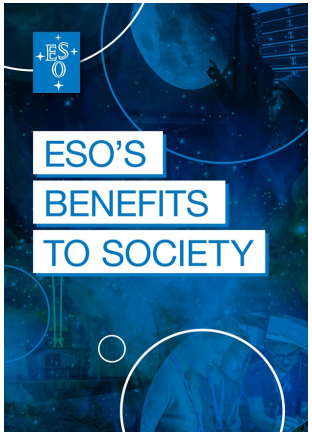

Economic


Environmental

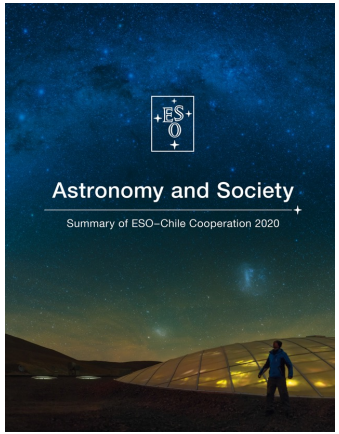

Guzmán-Mesa, Lyubenova & Williams, 2022
The Messenger, 2022, 189 33

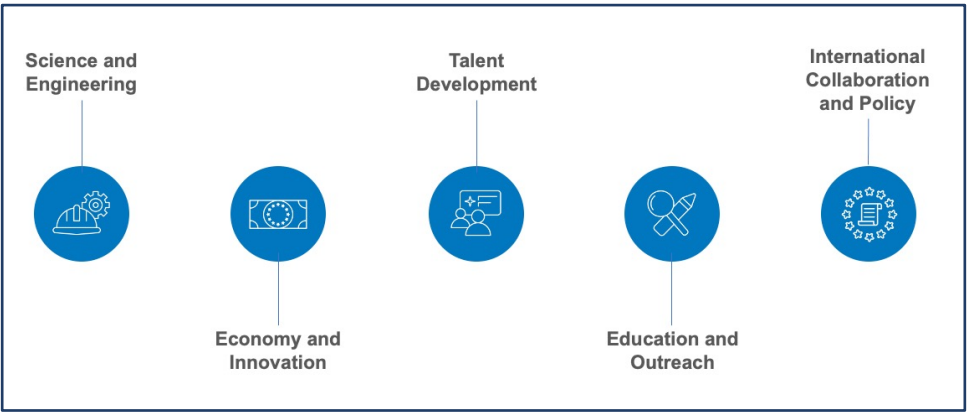
- Social & economic sustainability aspects at ESO

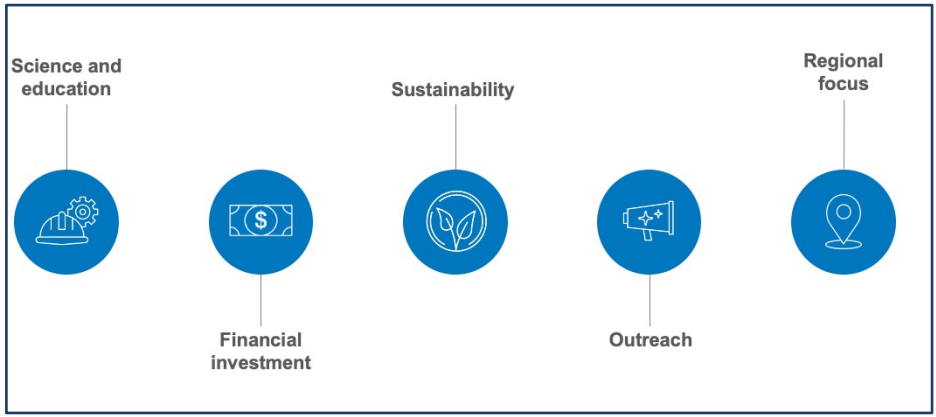
## ESO's benefits to society




## Astronomy & Society: summary of ESO-Chile cooperation 2020

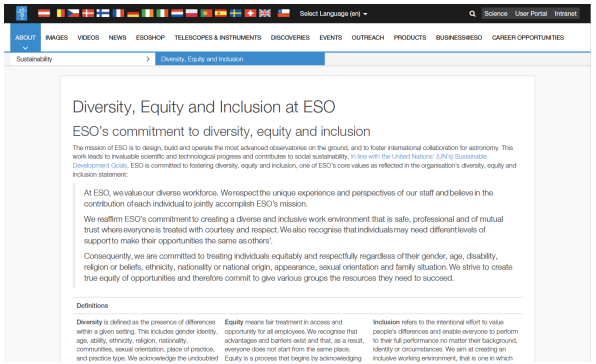


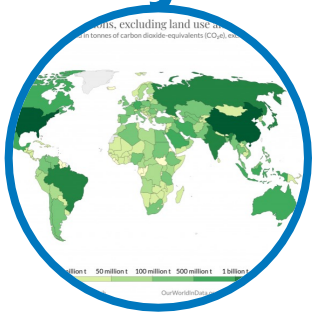



# Social sustainability / Diversity & inclusion: on-going actions

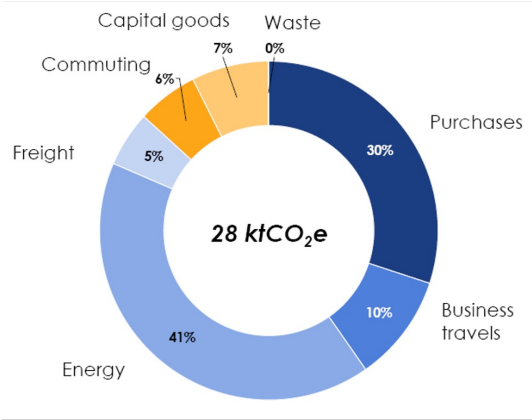
- ESO and UN Women signed a cooperation agreement in 2019
  - Second Chance (*Tu Oportunidad*) programme to train women to expand their knowledge and improve job opportunities. Training provided to 7 women in optical technologies.
  - **A Diversity, Equity and Inclusion plan** was released in 2022
  - **A sustainable procurement policy** looking at social (incl diversity & inclusion), environmental and financial responsibility is being worked on. Expect approval in the next months.

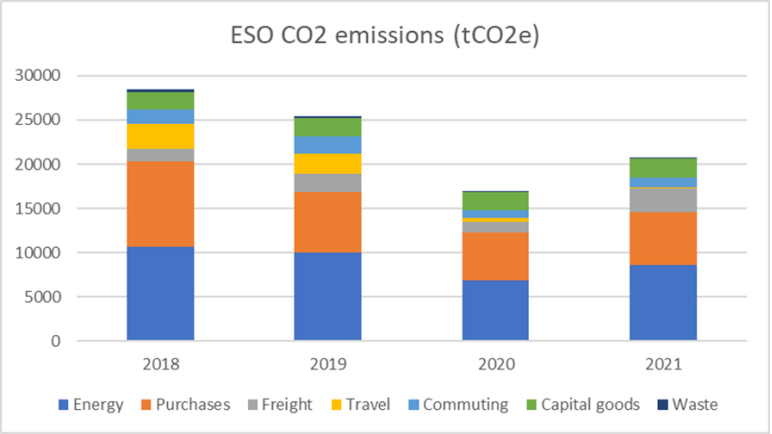


# Environmental sustainability

- Energy
- Water
- $CO_2$
- Waste, sewage, biodiversity, etc



# Environmental priorities at ESO

- Running its observatory sites on renewable energy
- Divesting from air shipping
- Reducing duty travel
- Extending lifetime of IT equipment
- Increasing the share of electric vehicles and/or encourage low CO2 transportation at ESO sites
- Integrating sustainability into the design phase of new projects and procurements
- Monitor ESO's emission sources on a periodic basis


# ESO: looking forward

# Looking forward

ESO@60 remains world-leading

- Outstanding science results, from both big and small projects, including breakthroughs, from forefront facilities
- Building largest & most advanced optical/IR telescope, fully funded, and more advanced in construction
- Multi-project and multi-wavelength: addressing broad science objectives and serving a large community

Ambitious long-term strategic objectives for the current decade and beyond

Barcons, 2022, ESO@60: Looking forward,The Messenger, 188, 3

# Thank you!

**Xavier Barcons**

**ESO Director General**

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