The First 50 Years of ESO, 7 Sep 2012

The Organization

- **Mission**
  - Develop and operate world-class observing facilities for astronomical research
  - Organize collaborations in astronomy

- **This is achieved by**
  - Motivated and highly-skilled staff
    - Engaged and able to carry out a multi-project programme
  - In-house science, engineering and support activities
    - Without these ESO becomes a management agency, the quality of the programme will suffer and support by the MS will decline
  - Matched by effort in the Member States
    - In industry and in technical and scientific institutions
    - In good coordination with ESO
La Silla, where it all started

The Very Large Telescope
Perspective through 2025

- Keep the Paranal Observatory world-leading
  - Integrated system of VLT, VLTI, VISTA, VST...
  - Add the E-ELT on Armazones to this system
  - Long-term instrumentation plan

- Further develop ALMA on Chajnantor

- Continue successful partnership with community
  - Student and fellowship programme
  - Construction of instrumentation
  - Data archive including science products
  - Smaller telescopes and targeted experiments on La Silla

- Programme is affordable for the 15 Member States
2nd Generation Instruments

- **VLT**
  - KMOS: Near IR MOS, deployable IFUs (2013)
  - SPHERE: XAO + Near IR/Vis planet finder (2013)
  - MUSE: Visible IFU spectrograph (24 modules; 2014)
  - ESPRESSO: High-resolution ultra-stable spectrograph at incoherent combined focus (can use all UT’s; 2016)
  - Phase A studies: CUBES, ERIS, MOONS

- **VLTI**
  - PRIMA: astrometry at 10 μas accuracy (2013+)
  - GRAVITY: K Band, 4 tel. astrometry near GC (2016)
  - MATISSE: L, M, N band, 4 tel. image/spec (2016)

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E-ELT Instrument Roadmap

<table>
<thead>
<tr>
<th>Year</th>
<th>ELT-IFU</th>
<th>ELT-CAM</th>
<th>ELT-MIR</th>
<th>ELT-4 MOS or IFU-ED</th>
<th>ELT-5 MOS or IFU-ED</th>
<th>ELT-6 MOS or IFU-ED</th>
<th>ELT-POS</th>
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<tbody>
<tr>
<td>2012</td>
<td>Decide science requirements, IOC architecture</td>
<td>VISIR start</td>
<td>Develop science requirements for MOS-IFU</td>
<td>Call for Proposals for IFU-ED</td>
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<td>2013</td>
<td>TRL Review</td>
<td>MOS/HARPES</td>
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<td>2014</td>
<td>Selection ELT-4 MOS-IFUES</td>
<td>Call for Proposals</td>
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<td>2015</td>
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<td>2022</td>
<td>Two technical feasibility studies</td>
<td>Development of Technical Specifications, Statement of Work, Agreement, Instrument Start</td>
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Future of Astronomy

- New scientific questions will continue to emerge
  - Hard to predict which ones; paradigm shifts expected
  - Likely to see much activity in, e.g., the exoplanet field with a strong interdisciplinary link (origin of life)

- Use continued technology development to enable new and improved ways to observe the Universe
  - On the ground and from space
  - And also using particles, gravitational waves

- This provides opportunities for further ESO facilities
  - Assuming our society remains interested in science
    - Effective outreach and communication is critical for this
  - And ESO continues to provide high-quality ‘products’
    - In continued good partnership with Member State institutions

Context

- Global astronomy
  - Active community in North America
    - Supported by public and private funding
    - Well organized in the radio, less so in the optical/infrared
  - Rapidly growing programmes in Asia
    - Japan, Taiwan, South Korea, China, India, …
  - Natural foci for optical/infrared
    - Mauna Kea with four 8-10m telescopes and TMT
    - Pachon with Gemini South and LSST/Las Campanas with GMT
    - Paranal-Armazones with VLT system and E-ELT

- Continued competition in O/IR is beneficial
  - Likely to lead to better and faster results ⇒ ESO should not become a ‘world-lab’ (like CERN)
  - Also because field is not focused on few experiments
Strategy for ESO

- **Membership**
  - Moderate further growth by addition of Member States with high-quality scientific communities that are keen to join, bring added value, and have government support
    - Number of countries fit this today, others may need some time

- **Operational model**
  - Continue to build and operate world class facilities
    - Balance multi-purpose telescopes and experiments
    - Complemented by strong national programs in the Member States
    - Keeping the observatory staff well connected to the astronomy communities in the member states (mix of Service/Visitor mode)
  - In some cases complementary to what is done elsewhere
    - E.g., a 12-15m wide-field spectroscopy facility instead of LSST2
  - In good coordination with space observatories