

Reflections from Past Directors General

Three Threads through Time

Lodewijk Woltjer

The celebration of 50 years of ESO recalls early discussions about the purpose of ESO. Was this only to construct a 3.6-metre telescope to explore the southern Milky Way, or was ESO part of the European revival in science and technology and, more generally, an attempt to restore its independence? When I came to ESO the latter aspect would gradually assume a dominant importance. Three lines of evolution of ESO were started at that time, and it is interesting to see that, during the last decade, this long-term ambition has more or less been completed. The three lines involved the transformation of ESO from a limited association of the six founding countries into a pan-West-European organisation, the expansion of the wavelength region covered by ESO and the development of a strong European centre for astronomical science and technology.

With the accession of Italy and Switzerland thirty years ago, the representativeness of ESO in the European context was much improved and the successful incorporation of these countries made possible the subsequent further growth of the organisation to fourteen members. Since the ESO budget is based on net

national income (NNI), this growth also implied a strengthening of the financial capacity to undertake more challenging projects. The recent agreement with Brazil further adds to the weight of the organisation. Of course, ESO becomes less European, but the cultural closeness between Latin America and Europe does not make this a very important issue. Moreover, relations with Chile have developed very favourably; although the Chilean contribution consisted mainly of sites, Chilean scientists rapidly became *de facto* members of the broader ESO community.

The agreement between Sweden, Germany and ESO made it possible twenty-five years ago for ESO to become part of the millimetre/submillimetre community that studies the cold Universe. This thread became more fully developed with the Atacama Large Millimeter/submillimeter Array (ALMA) project.

The third thread in ESO's evolution began with some instrumentation projects. This activity became more extensive with the development of the New Technology Telescope, begun after the accession of Italy and Switzerland. The subsequent VLT approval in 1987 sealed ESO's entry into the field of major telescope technology, which has now allowed it to

plan for the 39-metre telescope. In addition, the new instrumentation projects for the VLT interferometer and for the Unit Telescopes of the VLT have made ESO the envy of the world and increased its science productivity by factors unimaginable three decades ago. The model of shared instrumentation development between ESO and its Member States, as planned in the original VLT proposal, has been a full success for both. The technological capabilities of the institutes are infinitely superior to those of only thirty years ago.

ESO has demonstrated that European cooperation works. The sum of its member countries is much larger than a simple addition would suggest. But ESO's long-term future depends not only on factual successes. As in the past, a common ideology will remain necessary. Undoubtedly the current economic problems will pass after a shorter or longer time. Far more serious is the risk of the loss of the European ideals so visible in different places. In this respect it is essential that ESO take care not to lose Member States due to temporary economic problems. ESO activities, including the vital Fellowship programme, should continue to unite the young scientists of the continent towards a common future.

ESO/H. H. Heyer



La Silla Observatory at twilight.

ESO from Age Fifty to Ninety

Harry van der Laan

In 2002 three Directors General wrote their reflections on the state of the organisation to mark ESO's fortieth birthday. Now we stand a decade later, and wiser (?), with the Editor's request to once more reflect on our institution's prospects. I here look ahead another fifteen years to 2027 and then peer into the misty era between 2027 and 2052. ESO as a ninety year old? I dare not presume that I could say anything credible about 2062, the one hundredth birthday.

The period from 2002 until now is clear: Claus Madsen has brilliantly written about its substance in *The Jewel on the Mountaintop*, Govert Schilling and Lars Lindberg Christensen have aptly illustrated the glory of the Jewel's success in *Europe to the Stars*. Both books also anticipate the excitement of the Atacama Large Millimeter/submillimeter Array (ALMA) to come.

In the next fifteen years we may expect a whole lot of ALMA discoveries: there is so much unexplored parameter space now coming within reach.

The above-mentioned authors pay ample attention to the European Extremely Large Telescope (E-ELT), a telescope whose engineering and instrumentation design

are far along. In this note I presume that the go-ahead light for humankind's biggest eye destined for Cerro Armazones will jump from amber to green.

With the survey telescopes VISTA and the VST, as well as ALMA data analysis, prompting urgent needs for optical–infrared information, the four VLT Unit Telescopes will see their coveted observing time allocated in a very ambitious, competitive environment, with a user community facing high oversubscription factors. Astrochemistry will flourish, attracting a new breed of chemistry students to astronomy graduate work. There will be more laboratory astrochemistry to unravel the molecular mysteries hidden in ALMA's data. Astrophysics and cosmology developments will increase the pressure for VLT Interferometer observing as well, by then streamlined for technically unspecialised observers.

During all this time, we trust that the finesse of the E-ELT's design will be transformed into the construction of this unprecedented machine by Member State industries, while the first generation suite of instruments is realised in the — by now — well-tested collaboration between the user community and ESO. By 2027 all the power of the 40-metre-class telescope, based on its built-in informatics and technological ingenuity, should be fully unfolding: the new era for astronomy

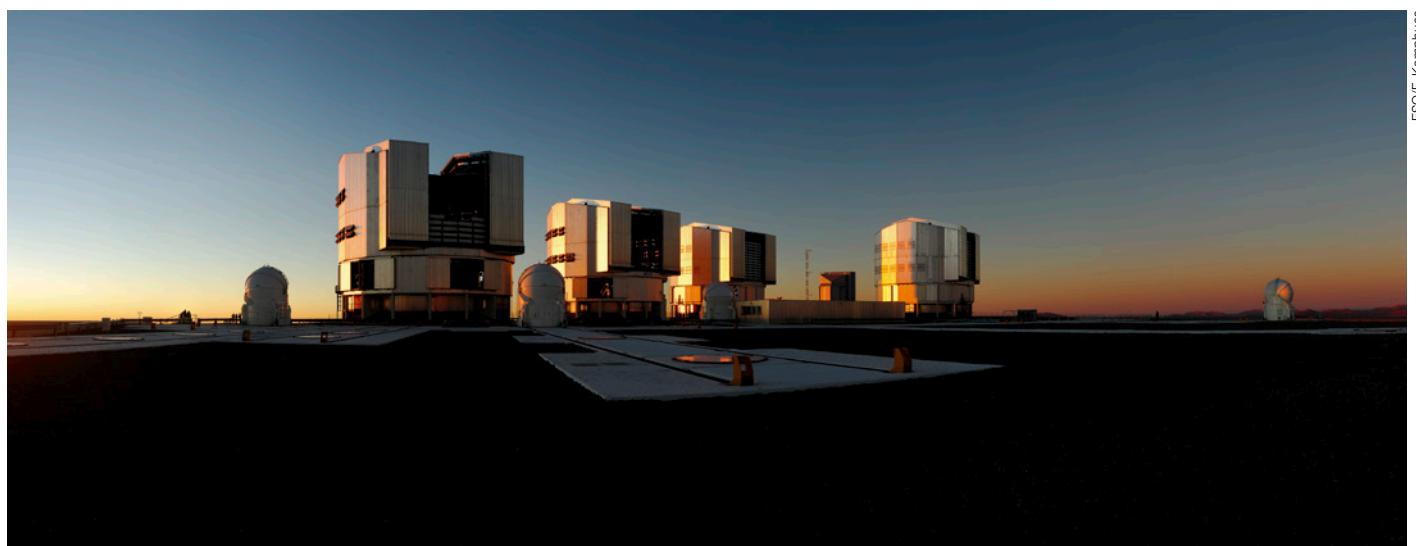
that is expected to begin with the E-ELT and the James Webb Space Telescope has arrived.

2027, the sixty-five-year-old ESO: what could be the overview?

Our beloved La Silla Observatory may well still have two or three highly specialised and stably operated telescopes. (Remember that the Hale 5-metre telescope on Mount Palomar is nearly sixty-five years old today). The whole of La Silla is an opportunity for a Chilean Maecenas to preserve this splendid place as an interactive cultural/educational scientific/technological monument.

At the Paranal Observatory I expect the VLT to be exploited to the hilt, with instruments not yet conceived, but probably with a greater emphasis on high-precision spectro-polarimetry. On nearby Armazones the E-ELT will be the world's outstanding telescope, as the VLT is today. On Chajnantor the amazing sub-millimetre array will have many observing modes in numerous (sub)configurations to satisfy ALMA's worldwide community. So the prospects for the 65-year-old ESO are breathtaking, the opportunities for ESO-community astronomers abundant, the challenges for ESO staff fascinating.

There must be a catch ...



ESO/F. Kamphues

Paranal Observatory at sunset.

Humankind from 2027 till 2052

ESO is an organisation owned and supported by its Member States for its user community. Continuity requires the commitment of governments, and the engagement of civil servants in Council and the Finance Committee. The dedication of users we can practically take for granted. Will all this hold then even in an additional twenty-five years?

Switch to another level of aggregation. In 2012 the confidence within many of our Member States is eroding. There is no political consensus about the optimum location on the scale — if there is such a one-dimensional choice, it is one that we

do not want to make — between *shareholders capitalism* and *compassionate social democracy*. The former rules resource flows in the process of *globalisation*; the latter strives for small-scale uniqueness, preservation of local character and values in the process of *“glocalisation”*. The stability of holding to both is highly uncertain and therewith the cohesion and even long-term viability of a European Union. Will it be resilient and prosperous enough to maintain explorative adventures, of which ESO is a prime example? In parallel there is the support for pure scientific research and education in the universities of our Member States. The inflow of future generations of ESO users depends on their vigorous pursuit.

Over all these questions looms the habitability of Planet Earth for the projected nine thousand million people. There is an unmistakable change of climate occurring, tangible on the timescale of a single human lifetime, explosive on a geological one. Before the middle of the century, countless millions of humans, now living in coastal areas and continental regions bordering on deserts, may be on the move. Humankind’s greatest achievement, the rule of law, may be in jeopardy. I appeal to fellow astronomers, while we so ardently hunt down other planets and search for signs of life, to heed the signals threatening our own.

Riccardo Giacconi

On the 50th anniversary of its foundation it is a pleasure to see ESO striving to achieve and maintain a leadership role in ground-based astronomy in the world. *Arete* is the ancient Greek term meaning “to be the best one can be”, and I hope it will be the motto of ESO.

I was Director General of ESO for only seven years from 1992 to 1999. I was lucky that they were the years in which the dream of the VLT, first proposed by Lodewijk Woltjer and initiated by Harry van der Laan, was translated into reality, and I consider those years among the more interesting in my scientific and managerial life.

The undertaking of such an ambitious project (costing some six times the yearly organisational budget) required the technical and scientific preparation of the ESO staff and a rearrangement of the organisational structure to carry it out successfully. The most important aspects of this rearrangement were those required to fully engage the interest and sense of ownership of the project by the staff. They included building up a sense of unity in all institutional activities, and a great deal of communication both vertically and horizontally to best share knowledge, experience and mutual help.

The personnel policies were changed to ensure recognition of performance and the opening up of opportunities to some of the ablest and youngest of the staff. The rather autocratic style of management that had prevailed for many years

was slowly turned into a participative management approach where decisions were discussed openly and reached by consensus, whenever possible.

It was fun to turn La Silla into a technically up to date and scientifically productive observatory, while using it also as a test bed for instruments and software, and while building, together with other institutions, a superb set of instruments for the VLT. It was rewarding to ensure that even the hotel for the resident staff of Paranal was up to the same standard of excellence. The satisfaction of working at this high level of competence was an indispensable driver for the achievement of our goals.

I hope this enthusiasm will continue in the future as ESO undertakes more and more ambitious projects. *Arete!*

Perspective on ESO’s 50 Years

Catherine Cesarsky

When my husband and I decided to settle in Europe in 1974, after a few years at Caltech, we immediately made contact

with ESO, as some of our close friends were working there. ESO was then a young organisation, growing under the wing of its elder sibling, CERN, and it did not even yet own a 4-metre-class telescope; the ESO 3.6-metre only started

operations in 1977. But soon, ESO acquired its own headquarters, near Munich, and, more importantly, new member countries, Italy and Switzerland, and new ideas and techniques. The design and construction of the New

Technology Telescope (NTT) was the first turning point, and served as basis for the VLT decision in 1987, even before the glorious first light of the NTT. After a few years of preparation, the VLT construction went on the right path, with a solid methodology inspired by space developments.

I was lucky to take the helm just after the inauguration of the first VLT telescope, and could oversee the end of the deployment of the telescopes, of the first generation of instruments, and of much of the interferometry. During those years ESO took the lead among astronomical observatories in the world, so that it was, as is fitting, in full adulthood for its 40th birthday. It was time for new adventures, and this required an enlarged budget, which was obtained by attracting new Member States. The successive entry of Portugal, United Kingdom and Finland made possible the launch of the Atacama Large Millimeter/submillimeter Array (ALMA) on an equal partnership with the United States; soon after, Japan, associated to Taiwan, joined in. With the ALMA construction, ESO has extended its wavelength range and the breadth of its science, and has learnt to participate successfully in a truly worldwide project. I am looking forward to the ALMA inaugu-

ration next March, while enjoying the magnificent results obtained during the early science phase that is still ongoing.

By 2004, ESO and its Council had reflected upon the future of ESO, and had established the following strategic principles: retain European astronomical leadership into the era of Extremely Large Telescopes (ELTs); ensure completion of ALMA, and efficiently exploit its superb scientific capabilities; maintain VLT in a world-leading position for another 10–15 years by continued upgrades; exploit the unique capabilities of the VLTI; lead in the construction of an ELT on a competitive timescale.

These principles guided the last years of my mandate, and I am pleased to see that they remain in practice today, with Tim de Zeeuw. To ensure the competitiveness of the VLT, the construction of a set of highly sophisticated second generation instruments, both for regular observations and for interferometry, has been launched; they have begun to be installed. The Adaptive Optics Facility will transform one of the 8-metre telescopes into an adaptive telescope, by replacing the secondary mirror with an adaptive one, and adding a laser launch facility with four beams, and will strongly enhance the

performance of present instruments, such as HAWK-I and future instruments such as MUSE. On the VLTI, MATISSE will fully exploit the power of four telescopes and GRAVITY will probe space-time close to the event horizon of the black hole in the centre of the Milky Way.

The ESO strategic principles do not mention the future of the La Silla Observatory, which was united with Paranal and has been devoted increasingly to large programmes, and that is still yielding first class science, such as the recent discovery of an Earth-sized planet around α Centauri b, nor the installation in Paranal of two survey telescopes, which fill a gap in ESO's programme.

As for the ELT, the community approved the innovative design proposed by Delabre. The joining of two new Member States, Spain and the Czech Republic, helped to fund a thorough study, now completed. With the help of Austria, which joined ESO in 2009, and Brazil which signed an accession agreement in 2010, the programme is ready to be launched. At 50, ESO is a mature organisation, brimming with expertise, enthusiasm and efficiency; I can only wish it a bright future.



ALMA antennas and the technical building on Chajnantor.

ALMA (ESO/NAOJ/NRAO) and J. Guarda (ALMA)