



EUROPEAN ORGANISATION FOR ASTRONOMICAL  
RESEARCH IN THE SOUTHERN HEMISPHERE

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**ESO High Level Organisational Structure**

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## Abbreviations

ALMA	Atacama Large Millimeter/submillimeter Array
APEX	Atacama Pathfinder Experiment
BFL	Budget and Forward Look
CP	Contracts and Procurement Department
CSE	Control Software and Engineering Department
DG	Director General
DFI	Dataflow Infrastructure Group
DM	Directors' Meeting
DMO	Data Management and Operations Division
DoA	Directorate of Administration
DoE	Directorate of Engineering
DoO	Directorate of Operations
DoP	Directorate of Programmes
DSC	Directorate for Science
EASC	European ALMA Support Centre Division
ECEN	Electrical Compliancy Engineering Group
EE	Electronic Engineering Department
E-ELT	European Extremely Large Telescope
EDES	Detector System Group
EDEW	Electronic Developments, Lab Facilities and Workshop Group
ePOD	Education and Public Outreach Department
ERP	Enterprise Resource Planning System
ETIE	Telescope and Instrument Electronic Engineering Group
FIN	Finance Department
FLT	Facility, Logistics, Transport Department
HR	Human Resources Department
ICO	Internal Communication Office
ITS	Information Technology and Services Department
JAO	Joint ALMA Observatory
LIA	Legal and International Affairs Office
LPO	La Silla Paranal Observatory Division
MEC	Mechanical Engineering Department
MSE	Maintenance, Support & Engineering Department of Paranal
MTM	Management Team Meeting
NTT	New Technology Telescope at LPO
OPO	Observing Programme Office
PMD	Project Management Department

PPS	Pipeline Systems Group
SCS	Science Operation Software Department
SEQ	Software Engineering and Quality Group
USD	User Support Department
VLT	Very Large Telescope at LPO
VLTi	Very Large Telescope Interferometer at LPO

## **I. Introduction**

ESO's overall mission is: i) to enable major scientific discoveries by constructing and operating powerful observational facilities that are beyond the capabilities of individual Member States and ii) to foster astronomical cooperation within its Member States.

Council set strategic goals for the overall evolution of ESO's programme in its 2004 Resolution (Cou-991 rev.). The ESO Long Term Perspectives document (Cou-1486, July 2013) provides more specifics within the framework defined by the 2004 Resolution.

ESO provides the astronomical community with world-class observational facilities. The construction phase of the E-ELT is moving forward. The ALMA Observatory, in partnership with North America and East Asia, started its operations in 2011. On the same high altitude plateau, Chajnantor, ESO operates the submillimetre antenna APEX in partnership with the German Max Planck Gesellschaft and the Swedish Onsala Space Observatory. ESO's flagship facility, the Paranal Observatory, continues its operations and in parallel carries out upgrades of its telescopes and instruments. ESO continues to operate the 3.6-m telescope and the NTT at La Silla and also hosts many national and robotic telescopes.

Over the past few years ESO's internal organisational structure has been modified in order to be able to deliver the entire programme. The present document describes the internal structure of ESO as applicable from September 2016.

## II. Management Structure

### II.1 Senior Management

The **Director General** (DG) leads the Organisation. The oversight structure of ESO consists of the Council as the governing body, the Finance Committee reporting to Council on all financial matters, and the Science and Technology Committee advising Council and the DG on technical and scientific aspects.

ESO's main organisational and operational units are the **Directorates**. Since 1<sup>st</sup> July 2013, there are five Directorates at ESO: Directorate of Administration, Directorate of Engineering, Directorate of Operations, Directorate of Programmes, and the Directorate for Science.

The **Directors' Meeting (DM)** is attended by the DG, the five Directors and the Head of Cabinet, and is supported by the Council Secretary. The DM is responsible for defining the priorities of the Organisation, both in the mid- and long-term. This includes establishing the goals and strategy for the Directorates and setting the budget envelope for each of the main BFL<sup>1</sup> categories. The DM approves the organisational level horizontal policies and procedures, manages the internal control environment, and decides about potential new programmes and structural changes that could affect the whole Organisation. The DM also ensures that the required documentation/approval processes are in place for Council and the auxiliary bodies (Finance Committee, Scientific Technical Committee, etc.) and that the resulting decisions are implemented. The DM is chaired by the DG, and in his/her absence by a Director appointed by the DG. The DM meets once a month with ad hoc meetings being held when required.

The **Management Team Meeting (MTM)** consists of personnel representing their respective Directorates and of the Cabinet of the DG, and is supported by the Council Secretary. The representatives are either functional managers within a Directorate, or are responsible for horizontal duties for the whole Organisation<sup>2</sup>. The respective Directors nominate the members of the MTM. The MTM supports the work of the DM, and the DM may request the MTM to consider any topic and provide relevant advice as required. As regular agenda items, the MTM discusses the following topics:

1. DM requests;
2. Exchange of information on new/planned Directorate level policies, procedures, and other Directorate level matters;
3. Corporate risk management and revision of actions arising from the Quarterly Reports;

Attendees represent their Directorate at the MTMs. They are responsible for ensuring that the appropriate expertise is available from within their respective Directorates to support the duties of the MTM e.g. possible invitation on an ad hoc basis to attend an MTM to present/discuss a pertinent topic. They also ensure a transparent and efficient flow of information between the MTM and their Directorate. The MTM appoints its Chair from its members for a one-year period on a rotational base among all Directorates. The Chair of the MTM reports after each meeting to the DM, and coordinates the relevant flow of information between the two bodies. The MTM meets four times a year, with ad hoc meetings being held when required.

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<sup>1</sup> Budget and Forward Look

<sup>2</sup> The MTM members as from 01 Sept 2016 are the Deputy Director of Administration, the Head of Finance, the Deputy Director and the Executive Officer of the Directorate of Engineering, the four Programme Managers and the four Programme Scientists, the Head of Data Management and Operations, the Risk Manager and the Head of the Internal Communication Office.

## II.2 Directorates

The list below provides a brief summary of the activities of each Directorate. The detailed tasks and structure are provided in Sections III through VII.

The **Directorate of Administration** (DoA) provides services in human resources, financial services, contracts and procurement, facility, logistics and transport, safety coordination, Enterprise Resources Planning services, fundraising activities and Guesthouse operations.

The **Directorate of Engineering** (DoE) provides engineering services and solutions for the design, manufacturing, installation, corrective maintenance, upgrade as well as support to the operation of telescopes, instruments and auxiliary equipment.

The **Directorate of Operations** (DoO) is responsible for all science operations-related activities including the preparation and execution of observing programmes, the operation of the ESO Observatories in Chile (La Silla, Paranal, and APEX), and the delivery of their raw, calibrated and science grade data. The Data Management and Operations Division (DMO) provides user support. The ALMA Observatory is operated by the Joint ALMA Observatory (JAO). The DoO contributes to the JAO operations with the ESO Alma Support Centre (EASC) providing off-site maintenance and development support as well as user support.

The **Directorate of Programmes** (DoP) is responsible for the management and delivery of the construction phase of ESO's projects and programmes, in close collaboration with DoE within ESO's matrix organization. This includes instrumentation for the ESO observatories as well as the construction of the E-ELT.

The **Directorate for Science** (DSC) supports community science with the ESO facilities including science communication, provides the scientific environment for the astronomers at ESO, and in particular runs the ESO student and fellowship programmes.

The organigram of ESO is available on: <http://www.eso.org/public/archives/static/about-eso/organisation/public-organigram.pdf>

## **I. Directorate for Science (DSC)**

The DSC was created in 2008 to collect all science activities at ESO in one directorate. It provides the scientific guidance of ESO and works in close connection with the other Directorates.

### **III.1 Role**

DSC's role is to provide close contact with the scientific community as an equal partner to enable ESO to serve the community needs and understand its wishes for an optimal scientific facilities programme and efficient operations. DSC is also responsible for informing the community and the general public about ESO's activities and achievements in general.

In support of ESO's mission, the high-level activities of DSC are:

- Develop a science strategy and define science priorities for the ESO programmes via interactions with the science community, ESO staff and governing bodies;
- Provide science leadership to ESO programmes and projects;
- Select the scientific observing programmes of the operating observatories;
- Provide science support and promote the science of ESO staff, to monitor and ensure their scientific development;
- Maintain a stimulating scientific atmosphere and train the next generation of astronomers (students, interns, fellows);
- Foster scientific collaborations, an effort directed towards the astronomical community, the community driven coordination activities (Astronet, Radionet, etc.), international organisations (ESA, CERN, etc.) and partner organisations, and
- Communicate the excitement of astronomy and the success of the ESO facilities to the community and the wider public.

### **III.2 Organisation**

The Directorate for Science is divided into five departments and is also supported by the work of four Programme Scientists. The management of the Directorate is composed of the Director, the Department Heads, and the Programme Scientists.

The ESO Faculty is an independent body comprising all ESO staff astronomers. Its chair is elected by the Faculty members. The administrative support for the Faculty is provided by the Science Directorate.

#### **III.2.1 Programme Scientists**

There are four Programme Scientists at ESO corresponding to the Very Large Telescope (VLT), VLT Interferometer (VLTI), Atacama Large Millimeter/submillimeter Array (ALMA), and European Extremely Large Telescope (E-ELT) Programmes. The Programme Scientists are responsible for developing and maintaining a strategic science vision for the respective programme by:

- Providing the scientific leadership of the programme;
- Working with the Programme Manager in developing a long-term plan for the programme;

- Developing and maintaining the science requirements of the programme;
- Preparing and ensuring the scientific Top Level Requirements of the programme;
- Approval release of top-level requirements for each project within the programme;
- Advising the DoP and DoO on the strategic scientific goals of the programme, and
- Consulting the scientific community and ESO MT in developing a scientific vision for the programme.

### III.2.2 Project Scientists Department

The Instrument Scientists Department contains the Project Scientists who closely interact with the Programme Scientists, the Programme Managers and the Project Managers at the DoP, and with the Project Engineers at the DoE. The Project Scientists are responsible for developing and maintaining the science requirements for the project, in full compatibility with the overall scientific goals of the respective programme. The tasks include:

- Developing the scientific cases and top-level requirements for the project and agreeing these with stakeholders;
- Monitoring and maintaining the predicted system scientific performance, by following all system and sub-system design processes and performance predictions;
- Ensuring the project includes all tasks and work required to be successful;
- Chairing of the Instrument or Project Science Team if one is appointed, and
- Supporting the Project Manager and Project Engineer in presenting the project to management.

### III.2.3 Observing Programmes Office

ESO interacts with the community scientists for the observing programme definition, selection and scheduling of successful proposals via the Observing Programme Office (OPO). The OPO is charged with all activities related to the proposal handling:

- Preparation and release of the Call for Proposals;
- Organisation of the Observing Programmes Committee meetings twice per year;
- Keeping track and handling of the contractual obligations of ESO towards guaranteed observing time holders;
- Handling of the Director's Discretionary Time proposals;
- Management of ESO's contribution to on-going public surveys;
- Preparation of statistics concerning observing time to the ESO governing bodies, and
- Defines the specifications of an integrated proposal handling system, including the processes required for the E-ELT.

### III.2.4 Education and Public Outreach Department

ESO's Education and Public Outreach (ePOD) Department publicises astronomy and promotes recent science highlights. The activities continue to expand in parallel with the evolution of new communication technologies. The overall objective of the activities of ePOD is to make ESO a household science brand in the eyes of the Member State tax-payers and worldwide by:

- Conveying that ESO is one of the most productive observatories in the world, as well as by promoting the fact that ESO is a major player in astronomy in general and that astronomy is an exciting and inspiring science;
- Managing ESO's communication tasks vis-à-vis the main target groups within current and future Member States including the general public, the media and informal and formal educators. In addition, ePOD's activities reach secondary target groups such as the ESO scientific user community, decision-makers and industrial partners;
- Issuing press releases, producing, distributing and promoting high quality audiovisual and print products;
- Organising media and public visits to the observatory sites in Chile, and by organising special public events, and selected educational activities, and
- Enhancing the close cooperation between space- and ground-based astronomical endeavours in Europe.

### III.2.5 Offices for Science

For the optimal support of the research activities of the ESO astronomers (about 80 Faculty astronomers) and of the fellows and students (35 Fellows and 30 Students), two Offices for Science have been set up. The overall role of the Offices is to provide local support for the research activities of the ESO astronomers by:

- Organising colloquia, seminars and local research groups;
- Managing the budgetary resources for the science travel of all astronomical staff, fellows and students;
- Organising the ESO workshops;
- Managing and administering the ESO fellowship programme, other fellows, and students;
- Serving as a link between ESO astronomers and OPO and ePOD with regard to identifying science expertise within ESO or science results, and
- Establishing close contacts and collaborations with the local astronomical communities (e.g. with International Max-Planck Research School, Excellence Cluster, TUM, LMU, ESO-Gobierno de Chile Comité Mixto, ESO-Chile Committee).

The ESO libraries are part of the respective Offices for Science and act as a science information centre at ESO and for its community. The librarians interact with scientists, engineers and management following the needs of the users and develop and maintain productivity measures for ESO's projects and facilities. They establish links with ESO ePOD in the context among others Press Releases or historical documents. The ESO Library cooperates with OPO for seamless import of information on observing programmes into the ESO Telescope Bibliography from relevant databases. The libraries work towards maximising coordination between the sites and foster collaboration among the astronomy librarians community at large.

## IV. Directorate of Operations (DoO)

The DoO is responsible for the La Silla Paranal Observatory (LPO) in Chile, the Data Management and Operations Division (DMO), and the ESO ALMA Support Centre (EASC) in Garching.

### IV.1 Role

DoO is responsible for all science operations-related activities including the preparation and execution of observing programmes, the operation of the LPO and of the EASC including the ALMA Regional Centre in Europe and the delivery and preservation of scientific data from the observatories. The goal of these activities is to enable front-line research in astrophysics by delivering highest-quality data to the astronomical community by operating and maintaining a wide range of world-class telescopes and state-of-the-art instruments; and to provide high reliability support to the operations of the ESO facilities and to their users in the framework of an integrated end-to-end system.

### IV.2 Organisation

The Director of Operations leads the DoO and reports to the DG.

The Directorate of Operations is divided into three divisions: the LPO Division, the DMO Division and the EASC Division. Altogether 11 Departments support the work of the Divisions, as shown above by the organigram.

In this structure the Director of Operations acts in person as the Director of the La Silla Paranal Observatory in Chile.

#### IV.2.1 La Silla Paranal Observatory (LPO)

The LPO is responsible for the on-site operational activities of ESO's telescopes: the VLT, the VLTI, the VST Optical Survey Telescope and the VISTA Infrared Survey Telescope at the Paranal site, the 3.6-m, and the New Technology Telescope (NTT) at the La Silla site and the Atacama Pathfinder Experiment (APEX) 12-m sub-mm radio antenna at the Chajnantor site. LPO also supports the operation of hosted telescope projects at Paranal and La Silla<sup>3</sup>.

The LPO is structured into six departments.

##### IV.2.1.1 LPO Director's Office

The Director is responsible for setting the overall goals, priorities, and strategies within LPO for all operational aspects. The Director acts as the Programme Manager for LPO Projects. The Director is the safety responsible of LPO and is supported by the LPO Safety Office in this task. The LPO Change Control Board and the Quality Management Commission provide further support to the LPO Director. The Director's Office shares secretarial support with the Science Operations and Maintenance, Support & Engineering Departments of LPO.

The department heads of LPO and the head of the LPO Safety Office form together with the LPO Director the La Silla Paranal Observatory Management Team.

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<sup>3</sup> See list on <http://www.eso.org/sci/facilities/lasilla/telescopes/national.html>

#### IV.2.1.2 Science Operations Department Paranal

The Paranal Science Operations Department is in charge of the execution of the approved scientific programmes in Service and Visitor Mode and the quality of the delivered scientific and calibration data. The department further supports the commissioning of new facility instruments and telescope systems.

#### IV.2.1.3 Paranal Logistics Department

The Logistics Department is in charge of all logistics aspects of the Paranal Observatory. This includes transport, accommodation, catering, cleaning, building and road maintenance, security and other services, mostly provided by external service providers.

#### IV.2.1.4 Paranal Maintenance, Support & Engineering Department

The Maintenance, Support & Engineering Department (MSE) provides all technical maintenance services and engineering support to the operational systems of the Paranal Observatory and guarantees their highest availability and performance. The operational systems include the telescopes and their systems and subsystems including the scientific instruments and the power station. Furthermore, MSE also provides assembly, integration, verification and commissioning support to new facilities and systems delivered to the Observatory by DoP or DoE. The MSE also provides all warehouse services to the Observatory. The MSE activities are supported by external services providers.

#### IV.2.1.5 La Silla Department

The La Silla Observatory operates according to the LS 2010+ streamlined operations model, which was introduced in 2009. It operates the 3.6-m telescope and the NTT telescope, and provides support to a number of telescope projects hosted on the La Silla site. La Silla offers only Visitor Mode observations but is fully integrated in the DoO end-to-end operations model.

#### IV.2.1.6 APEX Department

ESO is a 27% partner in the Atacama Pathfinder Experiment (APEX) and on behalf of the partnership is responsible for the operation of its base station site at Sequitor, the 12-m antenna site on Chajnantor at 5100 m altitude, and the science operation of the complete facility. Operations support is provided by ESO staff. External companies provide additional technical and logistical support services. APEX is partially integrated in the end-to-end operations model of DoO with additional operational support being provided by DMO to ensure efficient use of the ESO time-share and the archiving of APEX data.

#### IV.2.2 DMO Division

The DMO is responsible for all off-site operational activities and user support of LPO. It carries out user and operations support, quality control and data product generation, and operates the Science Archive Facility. DMO ensures an efficient scientific exploitation of the Observatory with integrated end-to-end operations and maintains a coherent development program for its data-flow system. Until 30 June 2015 it coordinated the ALMA Regional Center nodes in the Member states and delivers user and operations support to the ALMA community and observatory. Effective 1 July 2015, the ALMA Regional Centre has migrated to the EASC. The DMO is divided into three organisational units:

##### IV.2.2.1 DMO Office

The DMO Office is responsible for coordinating off-site operations support and systems, with the help of all the departments within DMO. The head of the DMO Division acts as Program Manager for Data Flow and Pipeline Projects and ensures a coherent development program. The DMO Office is supported by a Data Flow System Project Manager and an administrative assistant.

##### IV.2.2.2 User Support Department

The User Support Department (USD) is a central link between ESO and the user community. The USD provides expert advice to the users during the preparation and execution of their Service Mode observing proposals, participate in the execution of observations to maintain and update detailed knowledge of on-site observatory operations, provides observations tracking services and reporting tools, processing of night logs, management of a helpdesk system, management of the external modules of the observation handling system tools, and distribution of observation preparation tools to users. It is also in charge of the travel logistics of visiting astronomers to Chile, and the organisation of the Users Committee meetings.

##### IV.2.2.3 Back-End Operations Department

The Back-End Operations Department enables the full scientific exploitation of data obtained on-site the Observatory. It is responsible for the processing of raw science and calibration data collected at LPO, and ensures their completeness and quality. It provides scientific expertise to define and develop data reduction tools. It produces science grade data products through automated reduction systems, and collects highly processed data from Principal Investigators. It operates and develops the Science Archive Facility that makes all ESO data available to the community at large.

##### IV.2.2.4 ALMA Regional Centre Department (up to 30 June 2015)

Effective 1 July 2015 the ARC Department has been integrated into the EASC Division (cf. below).

### IV.2.3 EASC Division

The EASC Division is responsible for the off-site operational activities and user support for the ALMA Observatory, both within ESO and vis-à-vis the Joint ALMA Observatory. EASC leads and administers the ESO participation in ALMA, with particular focus on user support, data quality control and data product generation, computing and technical support as well as continuing ALMA development in particular in the Member States. The EASC is also the interface to the ALMA offsite organizations in North America and East Asia. The EASC has four departments: the ALMA Regional Centre, The ALMA Technical Team, Computing, and Science.

#### IV.2.3.1 ALMA Regional Centre Department

The ALMA Regional Centre Department is the single-point of contact for the community of ALMA users in the Member States and the primary science operations interface to the ALMA Observatory, and is in charge of the provision of core support services as specified in the ALMA Operations Plan. It also coordinates its activities with those of the ALMA Regional Center nodes across Europe, which are mainly in charge of providing specialized and added-value services to European ALMA users.

With the ramp up of ALMA operations to steady state, it has become increasingly important to concentrate the ALMA operations activities in a single division. Effective 1 July 2015, the ARC department has therefore migrated from the DMO division to the EASC division. Nevertheless, the ARC maintains a special link and synergies with DMO due to overlapping activities and synergies.

#### IV.2.3.2 ALMA Technical Team Department

The ALMA Technical Team (ATT) is responsible for hardware support to the ALMA observatory and managing hardware development projects in the Member States. It forms part of the ALMA-wide Integrated Engineering Team (IET), which is a coordination body across the ALMA partnership. The core responsibilities of the ATT include technical support, coordinate and perform maintenance activities, especially highly specialized corrective maintenance of ESO deliverables, identify opportunities for improvement, in particular for ESO deliverables, provide engineering support for development studies, and carry out hardware development projects.

#### IV.2.3.3 EASC Computing Department

The EASC Computing department is responsible for the on-going development, maintenance and support of parts of the ALMA software subsystems deployed at the Observatory (AOS and OSF), the SCO and the three ARCs. In particular, the department maintains responsibility for the software subsystems developed and delivered by ESO during the ALMA construction period. The ALMA computing activities include not only the software for antenna control, instrumentation and data filling, but also the development and maintenance of the software for preparing observations, and the development and maintenance of a specialised programme for data processing and reduction.

#### IV.2.3.4 EASC Science Team

The EASC Science Team (EST) department comprises the European ALMA Programme Scientist, the ESO-ALMA Instrument Scientist, the European ALMA Commissioning Scientist, and effort from the Project Science Department. The core responsibilities of the EST include scientific guidance and support to the EASC activities, interface with the ESO ALMA scientific and technical communities through organization and support of workshops and conferences,

collect and coordinate high level strategic scientific and technical advice on the overall ALMA Programme through the ESAC and STC and supporting the European members of the ASAC, monitor the scientific effectiveness of the Observatory in the ESO community, develop and maintain the scientific priorities and requirements for ALMA Development on short and long timescales, provide science cases, analysis, calculations and simulations as needed in support of ALMA development projects, and monitor the compliance with scientific requirements of ESO deliverables including upgrades.

## **V. Directorate of Programmes (DoP)**

The DoP was fully reorganised in 2013, following ESO's new programmes and projects structure within the matrix organisation.

### **V.1 Role**

The DoP is responsible for the management and delivery of ESO's construction projects within ESO's matrix organization. The work is broken down into five programmes that are run from the DoP:

- The ALMA Construction Programme;
- The E-ELT Construction Programme;
- The Armazones Instrumentation Programme;
- The Paranal Instrumentation Programme, and
- The Technology Development Programme.

Each of these programmes has a Programme Manager who has both the responsibility and the authority to set priorities for the work in their area. Within the programmes there are many projects. The matrix organization at ESO separates the management of the people from the management of the projects. The DoP is responsible for the management of the projects, including the responsibility for the budget of the projects.

The following principles are defined and act as guides to decision making within the DoP :

- ESO delivers a world leading programme in partnership with the Member States;
- Projects should be delivered to time, cost and specification;
- Where appropriate, work should be project based and science driven;
- Where appropriate, a project should include all the necessary work to be able to extract science at the end of the project;
- ESO should carry out and sponsor a Technology R&D programme to enable future world class facilities; sometimes R&D may be included in the scope of a project rather than being a standalone development, and
- ESO maintains a forward looking set of engineering standards (done by DoE).

### **V.2 Organisation**

The DoP consists of six organisational units: Office of the DoP, ALMA Programme Office, E-ELT Programme Office, Armazones Instrumentation Programme Office, Paranal Instrumentation Programme Office, Technology Development Programme Office and the Project Management Department.

#### **V.2.1 Office of the DoP**

The Director of Programmes is supported by a Deputy and an assistant, and is responsible for setting the overall priorities within and between the programmes, and the approval of projects.

### V.2.2 ALMA Programme

The ALMA Programme Manager is responsible for the delivery of the European share of the construction of the ALMA Observatory. Upon completion of all activities of the ALMA Construction Programme, this office will be closed, and all activities will be transferred to the EASC for operations. The last European antenna was delivered in September 2013, which was an important milestone in completing the ALMA construction phase. What remains for ESO as deliverable is the ALMA Residence<sup>4</sup>.

### V.2.3 E-ELT Construction Programme

The E-ELT Programme Manager is responsible for the delivery of the E-ELT Construction Programme, including its first instruments. Dedicated personnel for budget control, quality and product assurance and ILS/RAMS<sup>5</sup> support the Office in order to ensure the central management of the activities of the E-ELT Work Packages.

### V.2.4 The Armazones Instrumentation Programme

The Armazones Instrumentation Programme Manager is responsible for the ongoing E-ELT instrumentation programme beyond what is funded as part of the E-ELT construction. The Office is lead by a Programme Manager, who is supported by a deputy and programme coordinator.

### V.2.5 The Paranal Instrumentation Programme

The Paranal Instrumentation Programme Manager is responsible for the delivery of all new instruments and major instrument upgrades for the VLT. The Office is lead by a Programme Manager, and is supported by a Programme Engineer and a controller.

### V.2.6 Technology Development Programme

The ESO Technology Development Programme aims to develop and secure key technologies which will maintain our facilities at the cutting edge of astronomy and which will contribute to achieving ESO's mission in astronomy. In practice this means taking technologies which are at low TRLs<sup>6</sup> and developing them to a level sufficient for them to be incorporated within new projects without undue risk. The Technology Development programme also supports technology development for new ESO standards. The Office is lead by a Programme Manager, and is supported by a controller.

### V.2.6 Project Management Department

Within the programmes of DoP, multiple projects are defined and implemented. Many of these projects are lead by the project managers, who form the Project Management Department (PMD). The establishment of the PMD aims to ensure that projects are implemented within the framework, plans and standards defined by the DoP programmes, and according to common standards and quality within all of the projects.

The Head of the PMD is the key project manager within the organisation who drives the culture, set standards and provides an example for others involved in project management. He works closely with the Programme Managers to ensure that their requirements are met and that the allocated staff is suited to the tasks ahead.

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<sup>4</sup> <http://www.eso.org/public/announcements/ann15004/>

<sup>5</sup> ILS – Integrated Logistics Support; RAMS – Reliability, Availability, Maintainability and Safety

<sup>6</sup> Technology Readiness Levels

## VI. Directorate of Engineering (DoE)

The DoE was created in 2010 by merging the former Technology Division with the former Software Development Division, and later reorganised, by the addition of five units from the Directorate of Programmes in 2013. As a part of the Matrix project, the DoE has been further re-organised in 2014. Currently it comprises six departments that correspond to one engineering discipline. Within the departments there are altogether 24 groups that represent a subset of core competency or product that ESO delivers.

This optimized structure was defined in July 2014 (and deployed in October 2014) to meet the following requirements:

- Allocation of DoE resources to projects is optimized across ESO;
- Core competencies required to execute ESO's program including support of the Observatory are maintained and further developed;
- Members of each department can benefit from exchanging ideas and experience with the colleagues of the same department;
- There will be a meaningful number (not too many, not too few) reporting lines for each supervisor. Ideally each person should have around 10 staff reporting to them, and this is achieved by the creation of Groups within Departments.

### VI.1 Role

The DoE provides engineering services and solutions for the design, manufacturing, installation, corrective maintenance and upgrades of the ESO programmes and projects, as well as to the operations teams. It also provides consultancy and support to project design activities, as well as contract follow up (including preparation of plans, specifications and budget estimates). The main customers of the DoE are the DoP, the DoO as well as the DSC. The DoE, via the Information Technology (IT) Department, also provides general IT services to the whole Organisation.

DoE is a matrix organization, which provides resources to projects that are initiated by the DoP or the DoO. While the two latter Directorates are responsible for the management of projects, the DoE is responsible for the management of people. The Directorate also provides regular maintenance and emergency support to the LPO.

### VI.2 Organisation

#### VI.2.1 IT Department

The IT Department was set up in 2013 by merging the previously existing IT groups and departments across ESO. The IT Department is structured around four groups:

- Local IT Chile,
- Local IT Garching,
- Central Strategy & Governance,
- Central Service Desk & Procurement,

The two Local IT groups are responsible for the day-to-day IT operations and the delivery of the agreed upon services to the site customers. The Central Strategy & Governance Group is

responsible for developing technical and operational strategies, technical standards, processes and procedures that are applicable across the whole of ESO. The main responsibilities of the Central Service Desk & Procurement Group is the operation of the helpdesk, coordination of all IT-related procurements with ESO's Contracts & Procurement Department, and the management of the IT hardware and software inventory.

#### VI.2.2 Control Software and Engineering Department

The responsibility of the Control Software and Engineering (CSE) Department is to specify, analyse, design, implement, verify and maintain control systems, and develop control software for (optical and radio-) telescopes and astronomical instruments over the full software lifecycle. The CSE is divided into four groups:

- Control Engineering
- Infrastructure software and integration
- Instrument control software
- Observatory control software

#### VI.2.4 Electronic Engineering Department

The Electronic Engineering (EE) Department is responsible for the definition, design and manufacturing of control electronic and detectors system/subsystem for telescopes and instruments as well for electrical compliance verification for all ESO projects. The EE's domain of expertise is quite large and ranges from instrument and telescope control electronics/automation to detector system design, production qualification and test. Its mission is also to define the electrical and electronic standards at the organisation level and to enforce their use in all projects to minimise the impact of technology evolution and guaranty uniformity over systems. The EE consists of four groups:

- Detector Systems
- Electrical and Compliancy Engineering
- Electronic Developments, Lab facilities & Workshop
- Telescope and Instrument Electronic Engineering

#### VI.2.5 Mechanical Engineering

The Mechanical Engineering (MEC) Department is responsible for the definition, design, analysis, procurement and initial assembly of mechanical, opto-mechanical, cryogenic and vacuum systems for advanced astronomical telescope and instrumentation systems for all ESO projects in support of all ESO observatories. The MEC is divided into three groups:

- Instruments and Cryo Systems
- Structural Analysis
- Telescopes and Large Structures

#### VI.2.6 Optical Engineering

The Optical Engineering Department provides support in the field of optics and photonics to all ESO projects. The technical expertise offered by the department includes the optical

design, integration and testing of optical systems as well as photonics technologies and laser guide stars. The Department supports projects in the field of system engineering and provides managers for integration. In addition, it supports the observatory solving optical problems arising in systems in operation. The Department has two groups:

- Laser & Photonics
- Telescope and Instrument Optics

#### VI.2.7 Science Operation Software Department

The Science Operation Software Department (SCS) is responsible for all science operation software for the end-to-end operations of ESO observatories. Science operation software includes all components required for proposal submission, scheduling, execution, archiving, processing, visualization, and quality control of the observations. This software is used by operational teams within the organization for planning and running scientific operations, as well as by scientific users in the community for the handling of observing proposals, the preparation of observations, as well as the access and processing of observation data. The SCS is structured in three groups:

- Dataflow Infrastructure (DFI)
- Pipeline Systems (PPS)
- Software Engineering and Quality (SEQ)

#### VI.2.8 System Engineering Department

The System Engineering Department provides system engineering services to all ESO projects. All essential functions are covered, including requirement engineering, verification, disciplinary integration & technical coordination, system architectural design and system analysis.

System engineering refers to “an interdisciplinary approach how to realize complex systems”. The system engineer assumes the leading role in technical coordination and interface management in every project. He defines and controls technical processes and is in charge of system analyses and architectural design. The technical expertise offered by the department ranges from telescope to instrument systems, including adaptive optics and interferometry.

The System Engineering Department is structured in four groups:

- Processes and Standards
- Adaptive Optics Systems
- Instrument Systems
- System Analysis

## **VII. Directorate of Administration (DoA)**

The DoA was established on 1 July 2013, by merging the Administration Division with the Human Resources Division. By this move the prerequisite for providing harmonized services with regard to all assets (human, financial and infrastructural) within the whole Organisation and across all projects, was established.

### **VII.1 Role**

The DoA is accountable towards the Member States of the use of all human and financial resources and is in charge of the site management of Garching, Vitacura and the Guesthouse. It provides all administrative services, products and support to the Member States, to the management of ESO, to ESO personnel and to other users. The mission of the DoA is to provide these services, products and support in the highest quality, most effective and efficient way in order to achieve the maximum use of financial, human and infrastructural resources.

To fulfil this role, DoA provides a wide range of services and activities:

- Financial planning, budgets, controlling, accounting and treasury,
- Employment contracts management, human resources policy planning and advice on applicable human resources rules and procedure,
- Procurement and conclusion of contracts,
- Management of facilities, building construction and logistics' activities,
- General administrative service in Chile (including the management of the Guesthouse),
- Enterprise Resource Planning system (ERP) development and maintenance,
- Safety policy management, advice and control.

### **VII.2 Organisation**

The DoA contains six organisational units. The management of the Directorate is composed of the Director and the Department Heads, forming the DoA Core Team.

The main responsibilities of the organisational units within DoA are as follows.

#### **VII.2.1 Administration Office**

The Administration Office deals with a varied scope of activities. The Director of Administration, besides the overall supervision of all activities within DoA, deals with fundraising, provides support to the DG and DG Cabinet with international relations' activities, represents ESO in the ALMA Heads of Administration meetings, and in the CERN Pension Fund. The Administration Office organises the Finance Committee meetings.

The ERP Team is responsible for the maintenance and update of the ERP system; implements new business processes as required, and provides User support.

Safety at ESO Headquarters Garching, Vitacura and the Guesthouse covers all aspects of occupational health and safety, environmental protection, safety of equipment and installations as well as operational safety. The sustainable and continuous improvement

process at the site is an integral management goal to ensure a safe and healthy work environment to everybody.

#### VII.2.2 Contracts and Procurement Department

The Contracts and Procurement Department (CP) is responsible for executing procurement actions identified by the Users, and in this respect is the sole representative of the Organisation in all dealings with suppliers and contractors involving commercial matters. CP also plays an active role in procurement-related upstream and downstream activities, including in the definition of efficient procurement strategies and in the monitoring of the procurements after the orders are placed/contracts are awarded. CP ensures that goods and services are procured in full compliance with ESO's policies, rules and procedures. CP operates in an integrated way between the units in Garching and in Santiago. Within these functions, CP:

- Maintains an up to date suppliers' database and in this respect ensures adequate coordination with ESO's industrial liaison officers (nominated by each Member State) so as to further develop the pool of suppliers in the ESO Member States.
- Coordinates the timely preparation of all relevant documentation required for approval and procurement actions, including:
  - Direct responsibility for the preparation of the tendering documents,
  - Critical review of the technical documentation, where possible (i.e. Statement of Work),
  - Issue Preliminary Inquiries, Price Inquiries, Call for Tenders, Call for Proposals etc. and from there on coordinate both internally as well as with the suppliers all subsequent steps of the procurement process, until contracts are awarded or purchase orders placed,
  - Participate, together with the users, in monitoring the performance of suppliers after contracts/orders are placed,
  - Lead the preparation of all procurement related documents, including the procurement statistics, to be submitted to Finance Committee.

#### VII.2.3 Facility, Logistics, Transport Department

The Facility, Logistics and Transport Department (FLT) is responsible for the planning, operation and maintenance of the ESO facilities, grounds and infrastructure. Within these responsibilities, FLT:

- Manages all shipments (including removals) and logistical matters between the ESO sites and worldwide,
- Coordinates the work of janitors, reception team, daily help, cleaning personnel, gardening (contractors),
- Coordinates all kind of construction work,
- Provides care and repair for technical installations,
- Administers office/building plans, office furniture, key management system, identity cards, cars park, and the ESO apartments,
- Runs the warehouse and the copy shop.

#### VII.2.4 Finance Department

The Finance Department (FIN) ensures that financial resources are used according to the applicable rules and regulations, and in line with the directions defined by ESO's governing bodies. The activities of FIN cover four main areas: budgeting & controlling, accounting (including payroll), invoice control and treasury. FIN operates in an integrated way between the units in Garching and in Santiago. Within the above responsibilities, FIN conducts the following activities:

- Budget preparation for approval by governing bodies, budget planning support to managers, and monitoring and coordination with the controllers,
- Financial planning for medium and long range, as well as cash flow planning,
- Cash management and general accounting services,
- Payroll accounting,
- Invoice control,
- Bank and treasury,
- Periodical Financial Statements,
- Financial analyses,
- Coordination with External Auditors.

#### VII.2.5 Human Resources Department

The Human Resources Department (HR) deals with all services provided to employees in connection to their employment at ESO, starting from the definition of applicable policies to the conclusion and execution of employment contracts. Within this scope, HR deals with the following tasks:

- Planning and definition of personnel resources policy and strategy,
- Coordination of the recruitment and selection procedure,
- Employment contracts,
- Support to employees with regard to the implementation of the applicable rules, regulations and contractual terms,
- Personnel Records,
- Occupational Health and Welfare,
- Social Security,
- Training and Professional Development,
- Family matters of employment contracts, including the day-care and European School.

#### VII.2.6 Infrastructure Chile

The scope of tasks of the Infrastructure Chile Department includes logistics and transport, facilities management, safety, general services and the Guesthouse management. Within these assignments, Infrastructure Chile conducts the following tasks:

- Administer and maintain the Guesthouse service that provides board and lodging for visiting astronomers and Garching staff, including assistance to guests and coordination of guest logistics and transport,

- Maintenance and renovation of the Vitacura Facilities (including ALMA building) and car park and ensure optimal and cost effective operation,
- Provide local administration for the insurance coverage of the facilities in Vitacura, including the car park,
- Organize and support Vitacura activities and social events,
- Monitor Vitacura's safety and provide security and safety support to Guesthouse,
- Coordinate import and export of official goods, including the supervision of documentation, custom clearances and customs/Ministry procedures, monitor the inland transport to/from sites and dispatch diplobag to Garching and sites.

## VIII. Support for the Director General

As of 15 March 2013, a new structure consisting of three organisational units replaced the former Office of the Director General: the Cabinet of the Director General, the Internal Audit Office and the ESO Representation in Chile.

### VIII.1 Role

The DG Cabinet and the ESO Representation in Chile provide support for the ESO Council, the Director General and the ESO Management Team, as well as partial support for the Finance Committee.

The ESO Internal Auditor provides independent, objective assurance and consulting activity designed to add value and improve the Organisation's operations.

### VIII.2 Organisation

#### VIII.2.1 Cabinet of the Director General

The Cabinet of the Director General supports the DG, the DM and the MTM, as well as the Council, as appropriate, in the development and implementation of ESO's strategy. The Cabinet also provides executive support to the Council, to the DM and to the MTM, and deals with Protocol matters, and is responsible for the minutes of the Finance Committee meetings.

The Cabinet of the Director General consists of four functional units based in Santiago and Garching: the Legal and International Affairs Office (LIA), the Internal Communication Office (ICO), Corporate Risks and IP<sup>7</sup> Management, as well as an Astronomical Editor. LIA advises and assists the DG in matters concerning international relations of the Organisation, coordinates the relations with Member States, other governments, international organisations and the European Union, provides legal advice with regard to international law, status of ESO vis-à-vis host states, Member States and applicant states, employment law, construction law and environmental law, and drafts and negotiates agreements in these fields. ICO ensures that persons working at ESO have access to accurate and timely organisational information, and creates a communication link between the different parts of the Organisation. Corporate Risks and IP Management deals with enterprise risk management matters, including ESO's insurance programme and operational continuity planning; IP matters, including technology and knowledge protection and licensing, as well as compliance with ITAR<sup>7</sup> UN embargo and EU rules. The Astronomical Editor edits the ESO Annual Report, which is presented to Council at its June meeting, in addition to editing The Messenger and coordinating the ESO Science Newsletter.

#### VIII.2.2 Internal Audit

ESO's Internal Auditor reviews the reliability and integrity of financial information, the efficiency and economy of resource management, as well as the compliance with the rules and regulations of ESO. Internal Audit is an independent appraisal function established within the Organisation for the review of activities as a service to all levels of management. The role of Internal Audit is one of support through consulting and assurance activities. The overriding objective of Internal Audit is to assist the DG and line managers in the effective discharge of

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<sup>7</sup> Intellectual Property

<sup>7</sup>International traffic in Arms Regulation of the USA

their responsibilities and to provide them with advice about the efficiency and effectiveness of the Organisation's operations. The Internal Auditor also supports the External Auditors and is based in Garching.

#### VIII.2.3 ESO Representation in Chile

The Office of the ESO Representation in Chile represents the DG in all matters and relations with Chilean governmental, regional and local authorities where ESO projects are located, as well as with the diplomatic missions representing the ESO Member States in Chile. It coordinates the representation of ESO's political and legal interests in Chile and promotes the positive relationship of ESO with Chile at large. The ESO Representative takes care of particular public relations in close cooperation with the DoO and the ePOD. He coordinates all activities in close interaction with the Deputy Head of Administration in Chile.

### VIII.3 Safety Structure

The DG has overall responsibility for Safety within the Organisation.

He/she shall ensure that the Organisation is operated in a safe manner and that the resources required by the operating directorates to implement the ESO Safety Policy at the sites are available.

The Director General is advised by the ESO Safety Commission, which is responsible for:

- Monitoring the evolution of the Safety Policy and standards and advising when a change in the ESO regulations or policies may be necessary.
- Coordinating between the sites to ensure a coherent set of standards and norms for the operations or manufacturing/procurement of goods/services.
- Advising the DG when deviations from the ESO policy occur at any site or on other issues relating to Safety requiring his/her attention.

### VIII.4 Reporting Structure

The Annual Report provides a summary of the activities and highlights of the Organisation through the year. It is published on the internet after Council approval, and is also provided directly to the main stakeholders.