General Statement of Work
Detailed Definition & Requirements for the Work

Annex H
Area: Engineering Support to Product Assurance and Safety
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ANNEX H
AREA: ENGINEERING SUPPORT TO PRODUCT ASSURANCE AND SAFETY

This area covers the following Activity Domains:

- Materials Engineering (MAT)
- Component Engineering (CMP)
- PA Engineering (PAE)
- Business Process Engineering (BPE)

1 ACTIVITY DOMAINS

1.1 Activity Domain MAT: MATERIALS ENGINEERING

1.1.1 Overview

This activity domain encompasses the following Work Packages:

- MAT-01: Contamination and Off-Gassing Engineering Support
- MAT-02: Materials and Processes Engineering Support
- MAT-03: Environmental Effects Testing Engineering Support
- MAT-04: Materials Mechanics and Processes Engineering Support

1.1.2 Specific Requirements

1.1.3 Loan Employment Work Packages

1.1.3.1 WP MAT-01: Contamination and Off-Gassing Engineering Support

1.1.3.1.1 Overview

This work package covers the following activities (in a non-exhaustive manner):

- To set up and operate equipment devoted to the assessment of the effects of contamination on space hardware and its causes. This requires the use of laboratory equipment consisting
mainly of advanced vacuum systems and associated measuring devices such as mass spectrometers, infrared spectrometers, etc.

- To set up and operate the micro-balance systems to determine the out-gassing properties of materials (so-called VBQC systems).
- Performance of tasks related to the assessment of particulate contamination (either airborne or in fluids) using the Particle Fall Out (PFO) method, automatic particle counting, or other ad-hoc test methods.
- To develop new test methods and procedures related to chemical analyses in the field of offgassing and outgassing. This includes GPC, GC-MS, LC-MS, HPLC, IR spectroscopy.
- Performance of standard thermal analysis such as TGA, DSC, TMA, DMA. These equipments are used for the determination of thermal and thermo-mechanical properties of materials used in space applications.
- Installation and subsequent analysis of contamination sensors placed within the environmental chambers of the in-house parent section/division as well as the Co-ordinated Test Facilities.
- Organisation/co-ordination of tests for the certification of external laboratories as per ECSS Q-ST-70-02 and ECSS Q-ST-70-05 and those related to Round Robin tests within Europe and those organised by NASA.
- Maintenance of the relevant test equipment. The Contractor shall ensure that the equipment under his responsibility is kept in an operational state and shall ensure that all necessary routine calibration and maintenance activities are carried out.
- Producing clear and professional reports as specified for the task.
- Supporting the inclusion of results in internal databases.

1.1.3.1.2  Requirements

1.1.3.1.2.1  Qualifications

Technician with several years of experience in material physical and chemical laboratory investigations with particular emphasis on the task descriptions defined above.

1.1.3.1.2.2  Other Requirements

n/a

1.1.3.1.3  Location: ESTEC-On-Site
1.1.3.1.4 Positions

This Work Package includes the following positions:

1.1.3.1.4.1 Position MAT-01-01: Contamination and Off-Gassing Engineering Support

- **Job Class**: Technician
- **Location**: ESTEC On-Site
- **Specific Tasks**: n/a
- **Specific Competence Requirements**:
  - As per Qualification description.

1.1.3.1.4.2 Position MAT-01-02: Off-Gassing and Out-Gassing Engineering Support

- **Job Class**: Engineer
- **Location**: ESTEC On-Site
- **Specific Tasks**:
  - To develop new test methods and procedures related to the analysis of outgassing tests and performing advanced data treatments coming from so called VBQC tests.
  - To design, to set-up, to perform and to monitor (non-) standard tests to meet space project requirements focussing on outgassing assessment.
  - To investigate chemical interactions related to materials and induced environment such as but not limited to contact with propellants, waste products.
  - Assist in the design and validation procedure and loading of a material database covering all disciplines performed by the section (out-gassing, off-gassing, thermooptical properties, thermal characterisation, …) serving as a data repository for internal and external use with focus on outgassing data.
  - Producing clear and professional reports.
- **Specific Competence Requirements**:
  - Several years of experience in material physical and chemical laboratory investigations with particular emphasis on the specific task descriptions defined above.
  - Familiarity with data acquisition systems and SW (e.g. LABVIEW).
  - Familiarity with database SW.
1.1.3.2 WP MAT-02: Materials and Processes Engineering Support

1.1.3.2.1 Overview

This work package covers the following activities (in a non-exhaustive manner):

- Testing of adhesive bonding systems and processes, including adhesives applications for metals and non-metallic materials.
- Selection of specific adhesives for specific end uses (e.g., extreme temperature applications, integrity under thermal loads).
- Performing general failure analysis of materials and assemblies with emphasis on adhesion issues.
- Evaluation of surface treatments and its effects on bonding systems.
- Long-term durability of adhesive joints.
- Surface modification and analysis due to space environmental effects like atomic oxygen and plasma effects.
- Performing materials qualification programmes for non-metallic materials and analysis.
- Stabilisation and degradation analysis of non-metallic materials under space environmental conditions.
- Producing clear and professional reports as specified for the task.
- Supporting the inclusion of results in internal databases.

1.1.3.2.2 Requirements

1.1.3.2.2.1 Qualifications

University degree in materials science with a good working knowledge of (materials) process technology and a good understanding of physics.

Experience in one or more of the following techniques is also required:

- Thermal analysis:
  Differential scanning calorimetry (DSC), temperature-modulated DSC, dynamic mechanical thermal testing (DMTA), thermo gravimetric analysis (TGA), TMA, DEA, coupled thermal analysis, LFA, DDS etc.
- Materials characterisation techniques:
  Optical microscopy, scanning electron microscopy (SEM), atomic force microscopy (AFM), IR & UV spectroscopy, thermo-optical characterisations as well as surface sensitive techniques like ESCA.
• Maintenance of the relevant test equipment. The Contractor shall ensure that the equipment under his responsibility is kept in an operational state and shall ensure that all necessary routine calibration and maintenance activities are carried out.

1.1.3.2.2 Other Requirements

n/a

1.1.3.2.3 Location: ESTEC-On-Site

1.1.3.2.4 Positions

This Work Package includes the following positions:

1.1.3.2.4.1 Position MAT-02-01: Non-Metall ic Materials and Processes Engineering Support

• Job Class: Engineer
• Location: ESTEC - On-Site
• Specific Tasks: n/a
• Specific Competence Requirements:
  o The holder shall have a university degree in materials science with a good working knowledge of (materials) process technology and a good understanding of physics and chemistry.
  o He should be able work independently and have confidence to deal directly with customers, in person or by telephone.

1.1.3.3 WP MAT-03: Environmental Effects Testing Engineering Support

1.1.3.3.1 Overview

This work package covers the following activities (in a non exhaustive manner):

• To set up and monitor standard, materials related tests in a variety of special environmental test chambers (particularly Atomic Oxygen and Low Orbit tests), which simulate various space environments.
• Operating state of the art space simulation facilities (UV and particles) as well as synergistic testing and evaluation of the effects on materials tested.
• Performing common materials analysis investigations like microscopic & spectroscopic analysis after space simulation.

• Performing surface and near surface sensitive characterisation of materials after space environmental simulation. This requires the operation of state of the art instruments like Raman, ESCA, NMR and ESR facilities.

• Improving test procedures and ensuring that these are executed correctly.

• Design and perform non-standard tests to meet special space project requirements as well as develop in situ analysis techniques.

• Traceability of test exposure conditions and follows the effect of the exposure on samples.

• Recording sample properties or condition during and after test, accurately and legibly.

• Checking on test equipment performance and reporting any anomalies or faults.

• Producing clear and professional reports in English as specified for the task.

• Supporting the inclusion of results in internal databases.

• Maintenance of the relevant test equipment. The Contractor shall ensure that the equipment under his responsibility is kept in an operational state and shall ensure that all necessary routine calibration and maintenance activities are carried out.

1.1.3.3.2 Requirements

1.1.3.3.2.1 Qualifications

As per Job Class in materials science with a good working knowledge of (materials) process technology, a good understanding of physics and minimal two years of practical experience in a controlled test environment.

1.1.3.3.2.2 Other Requirements

n/a

1.1.3.3.3 Location: ESTEC-On-Site

1.1.3.3.4 Positions

This Work Package includes the following positions:

1.1.3.3.4.1 Position MAT-03-01: Environmental Effects Testing Support for Materials
• **Job Class**: Engineer
• **Location**: ESTEC - On-Site
• **Specific Tasks**:
  o As per work package overview with particular emphasis on the improvement of existing test set-ups and support to the definition of investment items. Supervision of work performed by less experienced colleagues and training of newcomers. Contributions to the preparation and maintenance of pertinent laboratory documentation and publications.
  o The engineer shall in addition support the section in the evaluation for the procurement of state of the art investment items.
• **Specific Competence Requirements**:
  o The holder shall have a university degree in materials science with a good working knowledge of (materials) process technology, a good understanding of physics and minimal two years of practical experience in a controlled test environment.
  o He should be familiar with testing, monitoring (data acquisition e.g. LABVIEW) and controlling instruments.
  o He should be able to work independently and have confidence to deal directly with customers, in person or by telephone.
  o The senior engineer shall have more than 10 years of relevant work experience.

1.1.3.3.4.2 Position MAT-03-02: Space Environmental Testing Support for Materials

• **Job Class**: Technician
• **Location**: ESTEC - On-Site
• **Specific Tasks**: n/a
• **Specific Competence Requirements**:
  o As per Job Class. The holder of the post shall speak/write English with a technical working level, with several years of experience in material physical and chemical laboratory investigations.
  o A good understanding of metallography, optical microscopy, Scanning Electron Microscopy and mechanical testing is a specific asset.
  o More than 15 years in vacuum technology and electrical and mechanical systems in a laboratory environment.

1.1.3.4 WP MAT-04: Materials Mechanics and Process Engineering Support
1.1.3.4.1 **Overview**

Support tasks are required to be carried out by the Contractor within certain of the activities covered by the Activity Domain through the provision of specialist personnel as detailed (in a non-exhaustive manner) below:

- Organizing and controlling the internal and external laboratory work concerning the surface mount verification programmes.
- The assessment of PCB joining techniques and repair (e.g. solder joints, surface mount technology) for space application suitability.
- The assessment of PCB products in the frame of manufacturer evaluation and qualification requirements.
- Performance of failure and defect investigations as part of the evaluation of materials and processes used for electronic assemblies.
- General metallurgical assessment related to failure analysis including the assessment of metallic joining techniques and repair (welding, bonding, brazing, etc.).
- Providing expert support to projects and participation in project meetings, reviews and audits for the ESA projects and activities.
- Use of the various optical, electron microscopy (including EDX) and mechanical test equipments for the evaluation of materials ranging from small electrical interconnects to structural materials.
- Assisting with Mandatory Inspections on populated printed circuit boards at supplier’s premises on request of projects.
- Reporting of work in the form of professional technical memoranda, reports and presentations in English.
- Improving test procedures and ensuring that these are executed correctly.
- Design and perform non-standard tests to meet special space project requirements as well as develop in situ analysis techniques.
- Recording sample properties or condition during and after test, accurately and legibly.
- Checking on test equipment performance and reporting any anomalies or faults.
- Supporting the inclusion of results in internal databases.
- Maintenance of the relevant test equipment. The Contractor shall ensure that the equipment under his responsibility is kept in an operational state and shall ensure that all necessary routine calibration and maintenance activities are carried out.

1.1.3.4.2 **Requirements**

1.1.3.4.2.1 **Qualifications**
Technician or University Masters degree or equivalent in Materials Technology with demonstrated laboratory work experience.

1.1.3.4.2.2 Other Requirements

n/a

1.1.3.4.3 Location: ESTEC-On-Site

1.1.3.4.4 Positions

This Work Package includes the following positions:

1.1.3.4.4.1 Position MAT-04-01: Materials and Processes for Electronic Assemblies Lab Support

- **Job Class**: Technician
- **Location**: ESTEC - On-Site
- **Specific Tasks**:
  - All of the above related to PCB manufacturing and electronic assemblies.
- **Specific Competence Requirements**:
  - Several years of experience in material physical and chemical laboratory investigations with particular emphasis on the task descriptions defined above.
  - Familiarity with relevant ECSS standards.

1.1.3.4.4.2 Position MAT-04-02: Materials and Processes for Electronic Assemblies

- **Job Class**: Engineer
- **Location**: ESTEC - On-Site
- **Specific Tasks**:
  - All of the above related to PCB manufacturing and electronic assemblies with particular emphasis on Organizing and controlling the internal and external laboratory work concerning the surface mount verification programmes.
- **Specific Competence Requirements**:
  - As per Job Class. The holder of the post shall speak/write English with a technical working level and several years of experience in material physical and chemical laboratory investigations.
A good understanding of surface mount technology, failure analysis, metallography, microscopy and mechanical testing is a specific asset.

1.1.3.4.4.3 Position MAT-04-03: Metallic Materials and Processes for Spacecraft and Launchers

- **Job Class**: Technician
- **Location**: ESTEC - On-Site
- **Specific Tasks**:
  - General metallurgical assessment related to failure analysis including the assessment of metallic joining techniques and repair (welding, bonding, brazing, etc.).
  - Use of the various optical, electron microscopy (including EDX) and mechanical test equipments for the evaluation of materials ranging from small electrical interconnects to structural materials.
- **Specific Competence Requirements**:
  - Several years of experience in material physical and chemical laboratory investigations with particular emphasis on the task descriptions defined above.
  - Familiarity with relevant ECSS standards.

1.1.3.4.4.4 Position MAT-04-04: Project Support for Metallic Materials and Processes for Spacecraft and Launchers

- **Job Class**: Technician
- **Location**: ESTEC - On-Site
- **Specific Tasks**:
  - Providing expert support to projects and participation in project meetings, reviews and audits for the ESA projects and activities (project liaison).
  - Reporting to the Head of the QTM section about the extent of project support required in terms of anticipated and actual support and special technical project issues encountered.
  - Distribution of pertinent project documentation and support requests to the assigned specialists in the QTM and QEM sections as required.
- **Specific Competence Requirements**:
  - Several years of experience in project support activities including material physical and chemical laboratory investigations with particular emphasis on the task descriptions defined above.
- Familiarity with relevant ECSS standards and general space product assurance requirements and processes.
1.2 Activity Domain CMP: COMPONENT ENGINEERING

1.2.1 Overview

This activity domain encompasses the following Loan Work Packages:

- CMP-01: EEE Components Laboratory
- CMP-02: TEC-Q Radiation Effects Facilities and Component Analysis Techniques
- CMP-03: TEC-Q Laboratory Technical Administration
- CMP-04: Component Technology
- CMP-05: ESCC Executive Secretariat Support for Technical Editing

This activity domain encompasses the following Service Work Packages:

- CMP-06: ESCC Secretariat Support for Technical Writing

1.2.2 Specific Requirements

1.2.3 Loan Employment Work Packages

1.2.3.1 WP CMP-01: EEE Components Laboratory

1.2.3.1.1 Overview

The capabilities of the Support Service Group encompass:

- Electrical characterisation and measurements over temperature range: digital, analog, microwave.
- Surface analysis: Scanning Electron Microscope (SEM), Energy Dispersive Analysis (EDA) by X-Ray, Focussed Ions Beam Milling (FIBM) and deposition, Electron Spectroscopy for Chemical Analysis (ESCALAB), Optical Techniques, Raman Spectroscopy.
- Thermography: infra-red microscopy.
- Chemical processing: Potting, Etching, Sectioning.
- Radiation effects: Support to irradiation test campaigns in terms of HW and SW test set-up preparation and verification for TID by Gammabeam (Co60) and X-Ray, Single Event
Effects by Californium and Heavy Ion beams, Displacement Damage, and emerging methods.

- Reliability testing (environmental, life tests, etc.): Thermal, mechanical, Partial Impact Noise Detection (PIND), Leak testing, Bond strength, Electrostatic Discharge (ESD), Burn-in.
- Use of the laboratories own analysis equipment and of other internal/external facilities to perform Failure Analysis and evaluation task for component qualification.
- Design and implementation of adapted test setups in HW and SW.
- Proficiency in reporting on tasks and analysis results in English Language.
- Support to ISO accreditation / certification activities.
- Support to departmental QMS activities within the scope of the specific tasks.

A diverse range of support tasks are required to be carried out by the Contractor through the provision of experienced expert professionals as described below (in non-exhaustive detail) per speciality area.

1.2.3.1.2 Requirements

N/A

1.2.3.1.2.1 Qualifications

Demonstrated background and experience in EEE component technologies in terms of constituent materials, production technology, test equipment, test tools, test methods and standards (industrial and standardisation bodies), laboratory techniques, laboratory equipment, laboratory work and procedures including common health and safety regulations.

1.2.3.1.2.2 Other Requirements

N/A

1.2.3.1.3 Location: ESTEC-On-Site

1.2.3.1.4 Positions

This Work Package includes the following positions:
1.2.3.1.4.1 Position CMP-01-01: Component Engineer and Team Coordinator

- **Job Class**: Engineer
- **Location**: ESTEC - On-Site
- **Specific Tasks**:
  - Report to the head of the Component Space Evaluation and Radiation Effects Section (TEC-QEC).
  - Coordinate the activities of the laboratory and provide administrative support.
  - Schedule and supervise the work of the members of the laboratory team members and ensure a high standard of work and outputs.
  - Provide monthly status reports to the Head of the Component Space Evaluation and Radiation Effects Section (TEC-QEC).
  - Maintain a database of all laboratories tasks, manpower, equipment, etc. Administer the maintenance of laboratory equipments (including inventory) and the provision of consumables.
  - Provide inputs on requirements for investments in laboratory equipment, software and computing provisions.
  - Provide expertise in the field of EEE components, materials and processes investigations.
  - Carry out analyses on EEE components, materials and processes.
  - Follow-up on the production of Analysis reports by team members and consistency check for adherence to technical procedure.
- **Specific Competence Requirements**:
  - As per Job Class in Electrical Engineering, Physics or related specialisation.
  - 10+ years of relevant professional work experience.

1.2.3.1.4.2 Position CMP-01-02: Component Engineer

- **Job Class**: Engineer
- **Location**: ESTEC - On-Site
- **Specific Tasks**:
  - Provide expertise in the field of Passive Components, Discrete Semiconductors for RF and non-RF, Complex Microcircuits for Digital, Analog, Mixed Signal and Microwave, Hybrid Technology, Micropackaging, Optoelectronics and Micro-/Nano-Systems (proficiency in at least 4 out of the previous 12 categories is required).
  - Carry out Failure Analysis tasks and other analysis tasks as required.
Prepare reports on the analysis tasks as required.

Support and advice concerning the performance of analysis tasks sub-contracted to external laboratories.

Provide related technical support on EEE components to ESA projects and other D/TEC divisions in the area of hybrid technology.

Provide technical assistance in the definition and to the management of ESA Technology programmes in the field of hybrid technology.

Provide technical input to the formulation, review and maintenance of the technical standards and specifications relating to the evaluation and capability approval of hybrid manufacturers.

Provide technical assistance in the formulation and monitoring of Capability Approval programmes for hybrid manufacturers.

Support ISO certification activities.

Specific Competence Requirements:

As per Job Class in Electrical Engineering, Physics or related specialisation.

5+ years of relevant professional work experience.

1.2.3.2 WP CMP-02: TEC-Q Radiation Effects Facilities and Component Analysis Techniques

1.2.3.2.1 Overview

The support tasks include the following:

• Provide support to the Space Component Evaluation and Radiation Effects Section (TEC-QEC) for the preparation and implementation of environmental and reliability tests of EEE components in accordance with established standards and laboratory procedures.

• Support the update and definition of new relevant test standards, test methods, laboratory procedures and ancillary documentation as required.

• The implementation and configuration of radiation test set-ups (hardware and software) for radiation effects testing (e.g. Total Ionising Dose (Co60), Single Event Effects, Displacement Damage, etc.) of components, test structures or electronic assemblies.

• The support of radiation tests performed in ESTEC or external radiation facilities.

• The support of radiation test data analysis and result reporting.

• The support of activities related to the development, implementation and verification of radiation monitors, instruments and in-orbit technology test beds / radiation flight experiments.
• The provision of expert support concerning national and international regulations applicable to the operation of radiation sources for research purposes.

• The support of administrative activities in terms of site safety and security matters concerning TEC-QEC internal radiation test facilities, document handling (distribution, archiving, etc.) and such related to the maintenance of the radiation effects test report database and internet homepage.

• Support to ISO accreditation / accreditation activities of the 60Co and CASE facility.

### 1.2.3.2.2 Requirements

N/A

### 1.2.3.2.2.1 Qualifications

Demonstrated background and experience in EEE component technologies in terms of constituent materials, production technology, test equipment, test tools, test methods and standards (industrial and standardisation bodies), laboratory techniques, laboratory equipment, laboratory work and procedures including common health and safety regulations and in particular those related to Radiation Testing.

### 1.2.3.2.2.2 Other Requirements

N/A

### 1.2.3.2.3 Location: ESTEC-On-Site

### 1.2.3.2.4 Positions

This Work Package includes the following positions:

#### 1.2.3.2.4.1 Position CMP-02-01: Radiation Effects Engineer

- **Job Class:** Engineer
- **Location:** ESTEC - On-Site
- **Specific Tasks:**
  - Provide support to the Division Space Component Evaluation and Radiation Effects Section by; preparing, participating, executing irradiation test campaigns for Total Ionising Dose (TID), Displacement Damage (DD) and Single Event Effect (SEE) radiation testing of EEE components.
The operation of TEC-QEC internal radiation test facilities, coordination of beam time scheduling.

Instructing new facility users about radiation safety requirements and the supervision of external users.

The coordination of beam time scheduling of ESA supported external test facilities.

The maintenance and improvement of TEC-QEC internal radiation test facilities unless covered by other contracts and the supervision of such work performed by other contractors.

- **Specific Competence Requirements:**
  - As per Job Class in Electrical Engineering, Physics or related specialisation.
  - Preferably Radiation Worker with radiation test experience.
  - 5+ years of relevant professional work experience.

### 1.2.3.2.4.2 Position CMP-02-02: Component Test Engineer

- **Job Class:** Engineer
- **Location:** ESTEC - On-Site
- **Specific Tasks:**
  - Provide support to the Division Space Component Evaluation and Radiation Effects Section by; preparing, participating, executing irradiation test campaigns for Total Ionising Dose (TID), Displacement Damage (DD) and Single Event Effect (SEE) radiation testing of EEE components.
  - Provide expertise in the field of Discrete and Complex Digital and Mixed Signal Semiconductor components.
  - Carry out functional and parametric electrical testing and analysis tasks, particularly concerning Discrete and Complex Semiconductor components.
  - Perform test preparations including data sheet/specification analysis, determine and create the required test set-up in hardware (design and adaptation of test boards and jigs, and software incl. test pattern definition/generation for the test system(s) used.
  - Plan and implement reliability tests (environmental, endurance, stress, ESD, etc.).
  - Perform selected tasks concerning the installation and upkeep of laboratory equipment and software. Undertake other physical analysis and test tasks as required.
  - Contribute to the assessment of test methods, test flows, test programmes, test equipment and the planning of relevant laboratory investments.

- **Specific Competence Requirements:**
  - As per Job Class in Electrical Engineering, Physics or related specialisation.
  - Good overall knowledge of semiconductor technologies in terms of process, production, testing, component design, component types, component application and reliability.
  - Practical experience in the use of laboratory equipment such as parameter analysers, logic analysers, data loggers, VLSI testers, writing and adapting test SW for SZ and similar test system.
Experience with the ESCC Qualification and Procurement System and the US MIL Standards for semiconductor components is an asset.

5+ years of relevant professional work experience.

1.2.3.3 WP CMP-03: TEC-Q Laboratory Technical Administrator

1.2.3.3.1 Overview
To be provided in full for the whole TEC-Q laboratory under TEC-QE responsibility and reporting to the Head of the Component Space Evaluation and Radiation Effects Section (TEC-QEC).

- Ensure the periodic calibration of laboratory instruments, mainly performed by third parties.
- Scheduling and supervision of equipment maintenance.
- Support to the process of purchasing key laboratory equipment including quotation requests, organisation of equipment demonstration and price negotiation.
- Support to the 17025 accreditation/certification process in terms of preparing laboratory processes and coordinate the activity.
- Implementation and management of the laboratory Work Load Management System.
- Updating and maintaining the TEC-Q laboratory investment budget in coordination with the relevant TEC-QE and TEC-QT sections. To coordinate and support the implementation of planned investment items.
- Ordering and maintaining stocks of consumables and general laboratory supplies.
- Requests and supervision of installation and maintenance works in the laboratory.
- Maintenance and periodic checking of the inventory.
- Tracking and control of loan equipment.
- Interfacing with site services concerning site infrastructure matters.

1.2.3.3.2 Requirements

1.2.3.3.2.1 Qualifications

1.2.3.3.2.2 Other Requirements

1.2.3.3.3 Location: ESTEC-On-Site

1.2.3.3.4 Positions
This Work Package includes the following positions:

1.2.3.3.4.1 Position CMP-03-01: TEC-Q Laboratory Technical Administrator
• **Job Class**: Engineer

• **Location**: ESTEC On-Site

• **Specific Tasks**: n/a

• **Specific Competence Requirements**:  
  o As per Job Class in Electrical Engineering, Physics or related specialisation and advanced level of computer literacy to support the duties of a Laboratory Administrator.
  o 3+ years of relevant professional work experience.

### 1.2.3.4 WP CMP-04: Component Technology

#### 1.2.3.4.1 Overview

The Work Package will be allocated to the Components Technology Section TEC-QTC, which is responsible for the engineering, standardisation, and approval activities for all electrical, electronic and electro-mechanical (EEE) components and related technologies, including the relevant assembly and packaging aspects with particular emphasis on technology and processes developments, reliability and quality.

A diverse range of support tasks are required to be carried out by the Contractor through the provision of an experienced expert professional as described below (in non-exhaustive detail). This work package includes the provision of support to ESA staff from the Component Technology Section in the following domains: Optoelectronics devices, Hybrids, RF and Microwave technologies, VLSI, Passive components, MNT, w.r.t. design, manufacturing and testing, standardisation and qualification.

Production of reports, presentations and other pertinent documentation incl. web publications in English language.

#### 1.2.3.4.2 Requirements

N/A

#### 1.2.3.4.2.1 Qualifications

• As per Job Class in Electrical Engineering, Physical science or related specialisation related to the subject EEE component area.
• Preferably 5+ years of relevant professional work experience in an Industrial, Academic or R&D environment.
• Qualifications and experience of working in an integrated project team.

1.2.3.4.2.2 Other Requirements
N/A

1.2.3.4.3 Location: ESTEC-On-Site

1.2.3.4.4 Positions
This Work Package includes the following positions:

1.2.3.4.4.1 Position CMP-04-01: Photonics Component Engineer

• Job Class: Engineer
• Location: ESTEC On-Site
• Specific Tasks:
  o A diverse range of support tasks are required to be carried out by the Contractor through the provision of an experienced professional as described below. The contractor will be requested to provide shared support between two of the technology domains covered by TEC-QTC; primarily Optoelectronic devices. The contractor will report to the Component Technology Section Head.

  The photonics technology domain to be covered includes:
  o Light Sources: VCSELs (vertical Cavity Surface Emitting Laser), semiconductor lasers, Fiber optic lasers, Semiconductor Pump lasers, LEDs. (Laser stacks, laser bars, high and low powers.
  o Light Detection: Pin and APDs receivers.
  o Planar Waveguide Photonic Devices: Optical modulators, Fiber optic amplifiers, Erbium doped waveguide amplifier, Planar waveguide splitters.
  o Fiber optics links: Fiber optics Jacket for fiber optic cable, Single fiber and Multifiber optic connectors, Fiber optic isolators and splitters.
  o Fiber Optic Sensors: FOGs.
  o CCD, APS, SWIR and VNIR image sensors.

  The specific duties of the post include:

  To support TEC-QTC ESA Staff Member Photonics Component Engineer in:
  o Support for provision of expert technical support to ESA programmes, National Space Agencies and European Space Industry concerning the selection,
characterisation, evaluation, qualification and application of photonic components for space applications.
- Assistance to the technical assessment of parts non-conformances and participation in manufacturer audits.
- Assistance in the technical assessment and monitoring of European Photonics space manufacturers.
- Support to the determination of technology needs of ESA projects, defining technology study activities and the preparation and evaluation of research proposals in the relevant technology domain.
- Support to formulation and management of technology programmes for the Agency’s foreseen requirements for photonic components.
- Support to standardization activities w.r.t. ESCC and ESCC working groups for the coordination of photonic components development activities; including the definition, review and maintenance of component engineering standards and specifications.
- Provide assistance in the definition and monitoring of work to be performed by the Materials and Components Laboratory.
- Maintenance of the section component database.

- **Specific Competence Requirements:**
  - As per Job Class in Electrical Engineering, Physical Science or related specialisation in related to the subject EEE component area.
  - Preferably 5+ years of relevant professional work experience in an Industrial, Academic or R&D environment.

### 1.2.3.4.4.2 Position CMP-04-02: Hybrid and Packaging Component Engineer

- **Job Class:** Engineer
- **Location:** ESTEC On-Site
- **Specific Tasks:**
The contractor will report to the Component Technology Section Head. The contractor will support TEC-QTC ESA Staff Member Hybrid and Packaging Component Engineer in:
  - Support the provision of expert technical support to ESA programmes, National Space Agencies and European Space Industry concerning the selection, characterization, evaluation, qualification and application of hybrid components for space applications.
  - Assist the technical assessment of parts non-conformances and participation in manufacturer NRBs and audits.
  - Provide support for the technical assessment and monitoring of European hybrid space manufacturers and of as well as the various Assembly and Test Houses (ATH) used by European component manufacturers.
  - Help in the determination of technology needs of ESA projects, defining technology study activities and the preparation and evaluation of research proposals in the hybrid domain.
Contribute to the formulation and management of technology programmes addressing the Agency’s foreseen requirements for hybrid components.

- Support to standardization activities w.r.t. ESCC and ESCC working groups for the coordination of hybrid components development activities; including the definition, review and maintenance of component engineering standards and specifications.
- Assistance in the definition and monitoring of work to be performed by the Materials and Components Laboratory

### Specific Competence Requirements:

- As per Job Class in Electrical Engineering, Physical science or related specialisation to the subject EEE component area.
- Preferably 5+ years of relevant professional work experience in an Industrial, Academic or R&D environment.
- Demonstrable knowledge in component failure analysis and advanced characterisation techniques.
- Produce written reports and presentations.

#### Position CMP-04-03: Wide Band Gap Component Engineer

- **Job Class:** Engineer
- **Location:** ESTEC On-Site
- **Specific Tasks:**
  - The contractor will report to the Component Technology Section Head. The contractor will support TEC-QTC ESA Staff Member Senior Microwave Component Engineer in the domain of Microwave electronics which covers:
    - Microwave active devices and their use in Solid State Power Amplifiers (SSPA’s), low noise amplifiers, mixers, switches, oscillators, etc.
    - Failure mechanisms associated with microwave device operation.
    - Basic circuit design know-how.
    - System application know-how, space operating issues and their impact on technology requirements.
    - Experience in use of microwave simulation/analysis or reliability prediction tools (e.g. IC-CAP, ADS, Microwave Office, HFSS, TAS thermal analysis, AUTOCAD 3D, etc) is desirable.

  The specific duties include:

  **In general:**
  Performance of reliability testing: DC+ RF Life tests, temperature storage tests, step stress tests, etc. This will require day to day operational skills in the following:
  - RF on wafer (RFOW) testing.
  - High voltage pulsed IV measurement.
  - CW and pulsed S-parameter measurements (dc to 110GHz).
  - Source and Load pull measurements.
  - CW and pulsed RF power bench measurement.
• DC and RF accelerated reliability test techniques.
• RF and microwave test fixture design.
• Channel temperature assessment techniques.
• Ability to write control software (e.g., using HP-Vee, LabView).
• Data analysis and reliability prediction.
• Writing of procedures and day-day running of laboratory.

Specific Competence Requirements:
• Electrical testing.

1.2.3.5 WP CMP-05: ESCC Executive Secretariat Support for Technical Editing

1.2.3.5.1 Overview
The Work Package concerns support to the ESCC Executive Secretariat related to the Editing of ESCC specifications for Electrical, Electronic and Electromechanical components and includes (non-exhaustive) the following tasks:

• Editing of new and existing ESCC component specifications in compliance with the ESCC editing rules.
• Word processing in a technical environment.
• Illustrating using simple 2D drawing packages.
• Clear communication.

1.2.3.5.2 Requirements

1.2.3.5.2.1 Qualifications
• User level experience with a UNIX operating system.
• Some background in electrical engineering and EEE components.
• English as a native language or complete fluency. Good writing, spelling and grammar.
• Accurate and rapid typing.
• Familiarity working with varied software programmes and utilities.
• Reading accuracy on screen and on paper.
• Ability to read mark up and produce completed documents.

1.2.3.5.2.2 Other Requirements
1.2.3.5.3 **Location: ESTEC – On-Site**

1.2.3.5.4 **Positions**

This Work Package includes the following positions:

1.2.3.5.4.1 Position CMP-05-01: Editor

- **Job Class**: Technician
- **Location**: ESTEC – On-Site
- **Specific Tasks**:  
  - As per work package description.
- **Specific Competence Requirements**:  
  - As per work package description.

1.2.4 **Service Work Packages**

1.2.4.1 WP CMP-06: ESCC Secretariat Support for Technical Writing

1.2.4.1.1 **Overview**

The Work Package concerns support to the ESCC Executive Secretariat related to the Technical Writing of ESCC specifications and includes (non exhaustive) the following tasks:

- Development, review and maintenance of new ESCC component specifications in compliance with the ESCC policies, document architecture and editing rules following instructions of the ESCC Executive.
- Processing of Document Change Requests in terms of technical content, consistency, technical completeness, terminology and clarity.
- Regular contact with and reporting to the ESCC Executive Secretariat.
- Liaison with ESCC bodies ESA technical experts and EEE component manufacturers and others as required.
- Deliver clearly defined mark up and/or instructions to the document editor and to be responsible for the correct implementation of final drafts.
1.2.4.1.2 **Requirements**

1.2.4.1.2.1 Qualifications

- As per Job Class in Electrical Engineering or equivalent with specialisation in EEE components.
- Minimum 5 years experience in technical writing for the ESCC System.
- Solid background in standardisation systems and good familiarity with the US MIL system for EEE components and good knowledge of industrial component standards e.g. JEDEC.
- English as a native tongue or complete fluency. Good writing, spelling and grammar.

1.2.4.1.2.2 Other Requirements

1.2.4.1.3 **Location: ESTEC-Off-Site**

1.2.4.1.4 **Positions**

This Work Package includes the following positions:

1.2.4.1.4.1 Position CMP-06-01: ESCC Technical Writer 1

- **Job Class:** Engineer
- **Location:** Off-Site
- **Specific Tasks:**
  The ESCC publishing activity encompasses the configuration management, technical writing and physical preparation of Basic, Generic, Component Detail specifications and other system related documents. This position is the primary technical writing post and includes a coordinating and supervisory role. It is supported by position CMP-05-02.
  The technical writing comprises:
  - Establishing a clear and comprehensive understanding of the structure and content of the ESCC System and the component policies implemented therein. In addition the style and terminology of the specifications and the constraints imposed by the ESCC structured editing tool need to be understood.
  - Review of new specification drafts and their correction for technical errors and omissions and alignment to the system policies, style and terminology. Providing mark up to the editor for implementation. Proof reading and further correction until a final version is agreed for publication.
  - Review of DCRs and their correction for technical errors and omissions and alignment to the system policies, style and terminology. Ensuring a submitted DCR
is either rejected or withdrawn or, if approved, is capable of unambiguous implementation.

- Implementation of approved DCRs by marking up the affected specifications and providing the mark up to the editor for implementation. Preparing supplementary DCRs, where necessary, to correct editorial and similar issues when implementing an approved DCR and incorporating these into the mark up. Proof reading and further correction (including supplementary DCRs as necessary) until a final version is agreed for upissue and publication.
- Liaison with the ESA components engineers and the ESCC bodies to the extent necessary to communicate the results of the technical writing review process, the changes arising and the associated engineering rationale. Where problems are encountered to propose solutions.
- Liaison, in agreement with the ESA components engineers, with the component manufacturers to resolve technical questions as they arise and to establish if a specification is supported, i.e. will a manufacturer accept an ESCC specification and supply against it to the user community. Where specifications are no longer supported propose, via DCR, the retirement of the specifications affected from the active ESCC System.
- Supervise additional technical writing effort, as necessary, to ensure a harmonised approach to the maintenance of the component policies, style and terminology of the system.

- **Specific Competence Requirements:**
  - Minimum of five years experience in technical writing for the ESCC System.
  - Additional background in electronics - degree, certificate or diploma.
  - Additional background in Space EEE components.
  - Prior work in the same or a similar field. (The role is to deliver clearly defined mark up and/or instructions to the editor and to be responsible for the implementation.)
  - Good understanding and prior use of editing systems.
  - English as a native tongue or complete fluency. Good writing, spelling and grammar.
  - Reading accuracy on screen and on paper.
  - Clear communication.

1.2.4.1.4.2 Position CMP-06-02: ESCC Technical Writer 2

- **Job Class:** Engineer
- **Location:** Off-Site
- **Specific Tasks:**
  The ESCC publishing activity encompasses the configuration management, technical writing and physical preparation of Basic, Generic, Component Detail specifications and other system related documents. This post is supporting position CMP-05-01.
  The technical writing comprises:
  - Establishing a clear and comprehensive understanding of the structure and content of the ESCC System and the component policies implemented therein. In addition the
style and terminology of the specifications and the constraints imposed by the ESCC structured editing tool need to be understood.

- Review of new specification drafts and their correction for technical errors and omissions and alignment to the system policies, style and terminology. Providing mark up to the editor for implementation. Proof reading and further correction until a final version is agreed for publication.

- Review of DCRs and their correction for technical errors and omissions and alignment to the system policies, style and terminology. Ensuring a submitted DCR is either rejected or withdrawn or, if approved, is capable of unambiguous implementation.

- Implementation of approved DCRs by marking up the affected specifications and providing the mark up to the editor for implementation. Preparing supplementary DCRs, where necessary, to correct editorial and similar issues when implementing an approved DCR and incorporating these into the mark up. Proof reading and further correction (including supplementary DCRs as necessary) until a final version is agreed for upissue and publication.

- Liaison with the ESA components engineers and the ESCC bodies to the extent necessary to communicate the results of the technical writing review process, the changes arising and the associated engineering rationale. Where problems are encountered to propose solutions.

- Liaison, in agreement with the ESA components engineers, with the component manufacturers to resolve technical questions as they arise and to establish if a specification is supported, i.e. will a manufacturer accept an ESCC specification and supply against it to the user community. Where specifications are no longer supported propose, via DCR, the retirement of the specifications affected from the active ESCC System.

- Work under the direction of the primary ESCC Technical Writer as regards work package assignments and priorities as well as for a common approach to the technical writing standards.

- **Specific Competence Requirements:**
  - Minimum of two years experience in technical writing for the ESCC System.
  - Additional background in electronics - degree, certificate or diploma.
  - Additional background in Space EEE components.
  - Prior work in the same or a similar field. (The role is to deliver clearly defined mark up and/or instructions to the editor and to be responsible for the implementation.)
  - Good understanding and prior use of editing systems.
  - English as a native tongue or complete fluency. Good writing, spelling and grammar.
  - Reading accuracy on screen and on paper.
  - Clear communication.
1.3 Activity Domain PAE: PA ENGINEERING

1.3.1 Overview

This activity domain encompasses the following Work Packages:

- PAE-01: PA & Safety Support
- PAE-02: Software PA Support
- PAE-03: Dependability and Safety Support
- PAE-04: Quality Information Systems Support
- PAE-05: Operations PA Support
- PAE-06: System Safety Engineering

1.3.1.1 WP PAE-01: PA & Safety Support

1.3.1.1.1 Overview

Support the ESA PA & Safety Manager for designated project(s) in conducting, monitoring & assessing the implementation of the PA & Safety Programme. This includes support to any or all of the following activities:

- Establishing the PA&S requirements baseline for all elements of the project, in compliance with the ESA general Product Assurance and Safety policy; Produce and implement plans, define inputs, outputs, participants, responsibilities, interfaces, coordinate efforts of participants, and produce resulting consolidated inputs.

- Reviewing contractor’s plans, specifications and effort proposed for the execution of the project PA&S programme; Produce reports of review activities performed (e.g. documents reviewed, checklists used, spot check performed) and conclusions/recommendations.

- Monitoring project & PA status & identify relevant PA issues, including NCR / SPR / Waivers / Problems / Critical Items and systematically tracking all items. Produce monthly reports of monitoring activities performed (e.g. inspections, checks, visits, reviews), including conclusions and recommendations.

- Assessing the implementation of PA&S requirements by contractors, participating in design and safety reviews and directing the necessary preventive or corrective actions; Produce monthly reports with assessment activities performed (e.g. documents reviewed, checklists used, spot check performed), contribution to design and safety reviews, and activities related to preventive/corrective action.

- Representing ESA in the Boards established within the project for the disposition of Non-conformances / Failure Reviews, Test Reviews, etc.; Produce reports of participation to
boards, indicating the contribution made to these boards (e.g. review of agendas, participants, minutes of meeting, action follow up, close-out).

- Guiding and monitoring the application and procurement of EEE parts, materials and processes and controlling implementation of applicable requirements; Produce reports on guidance provided, monitoring activities performed and status of compliance to applicable requirements.

- Monitoring the manufacturing, integration and test activities with quality assurance audits, mandatory and key inspection points, test witnessing and configuration inspections; Produce report on activities performed with conclusion and recommendations.

- Defining the formal acceptance requirements and conducting the Acceptance Reviews of all contractual deliverable items; Produce and implement plans for the preparation of the formal acceptance requirements, defining steps, inputs, outputs, participants, responsibilities, interfaces, and coordinating efforts of participants to produce resulting consolidated inputs to project documents. Produce also reports on the activities performed for conduction of Acceptance Reviews.

- Supporting the organisation & management of the support from all PA disciplines

- Controlling NCR / Waivers / Problems / Critical Items. Produce meeting agendas, check that all inputs are available for the NRB or CCB, check that all needed participants are involved, produce NRB or CCB minutes of meeting, follow-up on actions identified, ensure proper non-conformance/wavier/problem/critical item close-out. Produce also reports on control activities performed.

- PA for the verification, qualification, acceptance & delivery activities.

- The launch campaign.

- Participating in progress meetings and CCB meetings. Produce inputs to the meeting and whenever requested, produce meeting agendas, check that all inputs are available, check that all needed participants are involved, produce minutes of meeting, follow-up on actions identified, ensure proper close-out.

- Participating in all project reviews, including safety reviews. Produce reports on all review activities performed (e.g. documents reviewed, checklists used, spot check performed), conclusions and recommendations.

- Reporting project PA status (deviations from plan / schedule of all of above).

### 1.3.1.1.2 Requirements

#### 1.3.1.1.2.1 Qualifications

- As per Job Class in engineering or technical sciences.

- Minimum of 6 years experience in Product Assurance and Quality Assurance in the aerospace domain.
• Good interpersonal, organisation and communication skills, with the ability to work in a
diverse team environment.

• Knowledge of Configuration Management or the implementation of Product Assurance
within a quality system certified to ISO 9001 would be an asset.

1.3.1.2.2 Other Requirements

None.

1.3.1.1.3 Location: ESTEC - On-Site

1.3.1.1.4 Positions

This Work Package includes the following positions:

1.3.1.1.4.1 Position PAE-01-01: PA and Safety Support Engineer

• Job Class: Engineer

• Location: ESTEC On-Site

• Specific Tasks:
  o As per work package description.

• Specific Competence Requirements:
  o As per Job Class in engineering or technical sciences.
  o Minimum of 6 years experience in Product Assurance and Quality Assurance in the
    aerospace domain.
  o Good interpersonal, organisation and communication skills, with the ability to work
    in a diverse team environment.
  o Knowledge of Configuration Management or the implementation of Product
    Assurance within a quality system certified to ISO 9001 would be an asset.

1.3.1.2 WP PAE-02: Software PA Support

1.3.1.2.1 Overview

The support tasks including the following:

• Contribute the establishing of the programmatic and technical software PA requirements
  within the framework of the ESA Software policy.

• Evaluate Contractors’ plans, technical specifications and efforts proposed for the execution
  of S/W PA programme.

• Monitor and evaluate S/W PA analyses, reports and technical notes.
• Participation to project reviews, meetings, Configuration Control Boards, Nonconformance Review Boards and Software Review Boards.
• Prepare design trade offs, analyses and reports using metrics to support project decisions.
• Participate to software product evaluations and process assessments.
• Establish and maintain databases to track NCRs, RFWs, action items etc. as required.

1.3.1.2.2 Requirements

1.3.1.2.2.1 Qualifications
• Master’s degree in software engineering or computer science with background on space engineering.
• 10+ years of relevant professional work experience.
• Familiarity with space product assurance practices together with a good working knowledge of appropriate working tools.
• Practical experience in applying ECSS S/W standards.
• Knowledge and proven experience in the following areas:
  • Configuration management of complex systems.
  • Software engineering and PA in critical applications.

1.3.1.2.2 Other Requirements
None.

1.3.1.2.3 Location: ESTEC - On-Site

1.3.1.2.4 Positions
This Work Package includes the following positions:

1.3.1.2.4.1 Position PAE-02-01: Software PA Support Engineer
• **Job Class:** Engineer
• **Location:** ESTEC On-Site
• **Specific Tasks:**
  • As per work package description.
• **Specific Competence Requirements:**
  • As per work package description.
1.3.1.3 WP PAE-03: Dependability and Safety Support

1.3.1.3.1 Overview

- Contribute to establishing project specific programmatic and technical dependability and safety requirements within the framework of the ESA Product Assurance & Safety baseline.
- Support to projects in the evaluation and monitoring of Contractor’s plans, technical specifications and efforts proposed for the execution of the dependability and safety programs.
- Evaluation of dependability and safety analyses, technical notes, technical risk assessments, risk reduction processes and the associated preventive or corrective actions.
- Defining and controlling the implementation of the applicable dependability and safety related acceptance requirements including risk acceptance criteria.
- Support dependability and safety verification activities, including hazard close-out and disposition of related NCR, RFW and Critical Items.
- Participating in project reviews to assess compliance with the applicable RAMS requirements and to formulate accept/reject recommendations.

1.3.1.3.2 Requirements

1.3.1.3.2.1 Qualifications

- At least five years relevant experience of application of RAMS engineering to space programs, especially in ground and/or ground based systems.
- At least three years of relevant experience in design and engineering of safety critical systems.
- A hands-on knowledge of the RAMS analyses and methodologies (Hardware and Software), preparation of relevant RAMS documentation during the overall project life-cycle and application of ECSS dependability and safety standards.
- Experience in dependability and safety engineering management processes and objectives and experience during operations is an advantage.
- Experience in the field of ground safety and projects assistance in obtaining the relevant launch centre safety certification is an advantage.
- Knowledge of RTCA/DO-178B “Software Considerations in Airborne Systems and Equipment Certification” and related certification schemes, and experience in interfacing certification authorities is considered an asset.
- Familiarity with space product assurance practices together with a good working knowledge of appropriate RAMS tools is an advantage.
- Good communication skills are required.
1.3.1.3.2.2 Other Requirements
None.

1.3.1.3.3 Location: ESTEC - On-Site

1.3.1.3.4 Positions
This Work Package includes the following positions:

1.3.1.3.4.1 Position PAE-03-01: Dependability and Safety Support Engineer

- **Job Class**: Engineer
- **Location**: ESTEC - On-Site
- **Specific Tasks**:
  - As per work package description.
- **Specific Competence Requirements**:
  - As per work package description.

1.3.1.4 WP PAE-04: Quality Information Systems Support

1.3.1.4.1 Overview
Administer / manage the information systems used to process quality data and information in accordance with the respective policies, procedures and instructions. These include systems such as:

- ESA Alert System.
- ESA Internal Problem Notification (IPN) System.
- NonConformance control Tracking System (NCTS).
- ESA Audit Database.

Specific tasks will be defined for each assignment. Tasks will include:

- Maintain databases of the information system as required.
- Establishing & maintaining files & records for all items.
- Advising originators of information regarding the preparation & processing of the required data and inputs.
- Manage and coordinate the exchange of information among the parties concerned, ensuring the timely & correct flow of information.
- Maintain the list of users to the system, and support users’ access.
• Maintain distribution lists.
• Responding to queries from users, surveying the user needs & feedback regarding the information systems.
• Produce monthly and yearly reports on activities performed, conclusions and recommendations.

1.3.1.4.2 Requirements

1.3.1.4.2.1 Qualifications

• As per Job Class in engineering or technical sciences.
• Minimum of 4 years experience in Product Assurance and Quality Assurance, preferably in the aerospace domain.
• Good interpersonal, organisation and communication skills, with the ability to work in a diverse team environment.
• Knowledge of Configuration Management or the implementation of Product Assurance within a quality system certified to ISO 9001 would be an asset.

1.3.1.4.2.2 Other Requirements

None.

1.3.1.4.3 Location: ESTEC - On-Site

1.3.1.4.4 Positions

This Work Package includes the following positions:

1.3.1.4.4.1 Position PAE-04-01: Quality Information Systems Support Engineer

• Job Class: Engineer
• Location: ESTEC - On-Site
• Specific Tasks:
  ○ As per work package description.
• Specific Competence Requirements:
  ○ As per work package description.

1.3.1.5 WP PAE-05: Operations PA Support

1.3.1.5.1 Overview

The support tasks including the following:
• Monitor the execution of the PA Plan.
• Assist the Ground Segment/Project Manager in the identification and resolution of problems with respect to Quality.
• Support the definition of PA requirements and plans in accordance with Directorate policies and to ensure the implementation of agreed procedures.
• Review the tailoring measures of applicable standards reflected in the Software Project Management Plan.
• Review the Software Quality Assurance Plan issued for the subsystems.
• Witness the provisional and final acceptance tests in order to recommend the formal release of software for operational use.
• Monitor that all PA documentation and records related to the contracted work are maintained.
• Perform, where required project internal and suppliers’ quality audits relating to the scope of the project.
• Identify and help to resolve problems that may represent an unacceptable risk to Product Quality.
• Attend Review Boards as applicable.
• Organize the review and approval of project quality related documentation.
• Review and approval of changes to project quality related documentation.
• Facilitate the implementation of risk management within the project team.
• Contribute to the disposition of non-conformances, anomalies and problems.
• Define the composition, call and chair the Non-conformance Review Board (NRB).
• Initiate the marking, segregation (as applicable) and further treatment of failed items.
• Ensure the proper filing and documentation process of NCRs.
• Initiate the non-conformance correction.
• Perform the close-out procedure of the NCRs.
• Manage, update and issue the Configuration Item & Status Report.
• Maintain a configuration management database with change report mechanisms being put in place. (Essential during system freeze).
• Ensure that there is a good configuration control mechanism being followed in all software & hardware being used and monitor the applicable subcontractors/subsystems and Ground Stations to ensure these practices are being followed.
• Prepare and maintain the configuration management plan.
1.3.1.5.2 Requirements

1.3.1.5.2.1 Qualifications

- Good interpersonal skills.
- Good written and oral English.
- Ability to participate and chair meetings with multinational environment.
- Ability to work in a matrix oriented organisation (reporting to both Project PA responsible and the functional PA organisation) without continuous supervision.

1.3.1.5.2.2 Other Requirements

None.

1.3.1.5.3 Location: ESOC - On-Site

1.3.1.5.4 Positions

This Work Package includes the following positions:

1.3.1.5.4.1 Position PAE-05-01: Operations PA Support Engineer

- **Job Class:** Engineer
- **Location:** ESOC - On-Site
- **Specific Tasks:**
  - As per work package description.
- **Specific Competence Requirements:**
  - As per work package description.

1.3.1.6 WP PAE-06: System Safety Engineering

1.3.1.6.1 Overview

The safety of ESA systems, payloads and cargo is achieved through a series of safety reviews and related actions and verifications. The safety reviews are carried out by the dedicated multidisciplinary panels of specialists from various technical and functional areas (structures, power/avionics, laser, operations, etc.) which reviews and grants flight safety certification.

A highly competent system safety engineering support team is required for providing technical assistance to the ESA projects and users, for the verification of completeness, consistency and adequacy of the safety data packages submitted to the safety review panels, for supporting the preparation and conduct of formal safety reviews, and to follow up the relevant action items.
1.3.1.6.2 Requirements

The system safety engineering team is required to perform the following technical and administrative ground-work tasks: a) appraisal of adequacy (completeness and technical content) of received safety data packages; b) assistance to system and payload developers in the interpretation of technical safety requirements; c) tracking and processing of action items responses and safety verifications closeouts; d) support to flight readiness certification; e) issuing official minutes of meetings, loading of formal safety data into the safety data management system, scheduling and planning, etc. f) performance of advanced studies and standardization activities.

1.3.1.6.2.1 Qualifications

1.3.1.6.2.2 Other Requirements

System safety engineering is a highly specialised branch of system engineering unique to human spaceflight. It requires extended understanding of the hazards which are intrinsic of a system and/or induced by space operations, and the way they are either eliminated or controlled. It requires a detailed knowledge of system, subsystems and payloads/experiments, of program safety requirements and of their implementation constraints. It requires a perfect knowledge of the way safety data are generated, validated and retained in support of the program safety certification and follow up operations, including astronaut’s awareness and training as necessary.

1.3.1.6.3 Location: ESTEC - On-Site

1.3.1.6.4 Positions

This Work Package includes the following positions:

1.3.1.6.4.1 Position PAE-06-01: System Safety Engineering Manager

- **Job Class:** Engineer
- **Location:** ESTEC - On-Site
- **Specific Tasks:**
  - Manage advanced safety studies contracts and standardization activities.
  - Ensure that safety reviews and follow-up activities are planned and executed according to applicable safety process requirements.
  - Provide instructions/technical assistance to ESA projects, contractors and other development organization in preparation for their presentation to formal safety reviews and technical meetings.
  - Provide support in the detailed definition of safety review panels internal processes and preparation of relevant procedures.
  - Support external and internal audits of safety review panel processes and track implementation of corrective actions.
• Liaise with medical teams for joint safety processing of experiments on human research subjects, as necessary.

• Draft certification of flight readiness statements for panel chairman review and agreement.

• Manage the safety support team personnel by distributing/planning the workload, establishing work priorities, and monitoring performance and correct output. Authorising missions, when strictly necessary and cost-effective.

• Generate monthly progress report.

• Providing technical support for interpretation of safety requirements, and for impact evaluation of new/revised requirements.

• Reviewing flight and ground safety analyses and safety compliance data packages prepared by industrial contractors, experimenters, agencies, and commercial companies and provide detailed written assessments. Assist safety engineers as necessary.

• Providing written technical assessment of system, payload/cargo design and operation respect to special problem areas and possible suitable alternate solutions.

• Providing safety-engineering support during mission preparation and execution (in case of anomalies and unplanned maintenance).

• Providing safety assessment of on-orbit anomalies. Support MRBs, failure investigations, anomaly resolutions, as required.

• Finalise the minutes of formal review meetings for panel chairman review and approval.

• Assess adequacy and status of responses to action items assigned during safety reviews, in coordination with nominated experts.

• Manage the establishment and exploitation of lessons learned.

• Performing tutorial or training activities as required, and support the development of web-based training courses and multimedia resources in the field of space safety engineering.

• **Specific Competence Requirements:**

  • Perfect knowledge of system safety engineering principle, methods and processes. Detailed knowledge of system engineering key principle, methods and procedures.

  • Proven multi year experience in space system safety engineering.

  • Perfect knowledge of relevant system, payload/cargo safety technical requirements, interface requirements, and of their interpretation, and possible design implementation and constraints.

  • Knowledge of vehicles and subsystems, technical characteristics and operational constraints.
Knowledge of ESA safety certification procedures, including verification methods and procedures.

Proven multi year experience in system safety engineering, as team lead, and/or as mission safety manager.

Experience in managing an engineering team, and in technical coordination with external team leads at the same organizational level.

1.3.1.6.4.2 Position PAE-06-02: System Safety Engineer

- **Job Class:** Engineer
- **Location:** ESTEC - On-Site
- **Specific Tasks:**
  - Performance of advanced studies and standardization activities.
  - Providing technical support for interpretation of safety requirements, and for impact evaluation of new/revised requirements.
  - Reviewing flight and ground safety analyses and safety compliance data packages prepared by industrial contractors, experimenters, agencies, and commercial companies and provide detailed written assessments.
  - Providing written technical assessment of payload/cargo design and operation respect to special problem areas and possible suitable alternate solutions.
  - Producing, when required, complete safety data packages, including summary technical description, safety analyses, and hazard reports.
  - Tracking implementation of safety verifications identified in hazard reports.
  - Preparing and supporting system, payloads, cargos and integrated safety reviews, including consolidation of initial findings from technical discipline experts and functional areas representatives.
  - Providing safety engineering support to Acceptance Reviews, Test Reviews, Flight Readiness Reviews, and late-access verification activities at launch site, as required.
  - Providing safety-engineering support during mission preparation and execution (in case of anomalies and unplanned maintenance).
  - Providing safety assessment of on-orbit anomalies. Support MRBs, failure investigations, anomaly resolutions, as required.
  - Verifying flight and ground procedures that include procedural hazard controls, for compliance with relevant baselined hazard reports.
  - Processing cargo safety certificates and attached supporting documentation prepared by cargo providers.
  - Perform safety engineering tasks for parabolic flight campaigns.
  - Develop/implement lessons learned.
Performing tutorial or training activities as required, and support the development/implementation of web-based training courses and multimedia resources in the field of space safety engineering.

**Specific Competence Requirements:**

- Wide theoretical background on system safety engineering principle, methods and processes. Knowledge of system engineering key principle, methods and procedures.
- Proven multi year experience in space system safety engineering.
- Perfect knowledge of relevant system, payload/cargo safety technical requirements, interface requirements, and of their interpretation, and possible design implementation and constraints.
- Knowledge of vehicles and subsystems, technical characteristics and operational constraints.
- Knowledge of ESA safety certification procedures, including verification methods and procedures.

### 1.3.1.6.4.3 Position PAE-06-03: System Safety Technical Assistant

- **Job Class:** Engineer
- **Location:** ESTEC - On-Site
- **Specific Tasks:**
  - Take the official minutes of formal safety review meetings and ensure their receipt, approval, distribution and controlled archiving.
  - Maintain the master schedule of safety reviews.
  - Liaise with counterparts to ensure that safety data packages are received on time, and ensure their internal distribution to safety review panel members and technical support.
  - Maintain Configuration Control of safety data. Perform data entry into on-line databases (tracking/archiving of formal safety documents released and approved by the ESA PSRP).
  - Support and assist in the preparation of audits.
  - Support the development of on-line safety analysis and verification tools.
  - Maintenance of safety lessons learned data base.
  - Support the implementation/administration of web-based safety courses and multimedia training resources.

- **Specific Competence Requirements:**
  - Detailed knowledge of systems and payloads/cargos safety program.
- Basic knowledge of vehicles and subsystems technical characteristics and operational constraints.
- Knowledge of the establishment and maintenance of data bases and on-line tools.
1.4 Activity Domain BPE: BUSINESS PROCESS ENGINEERING

1.4.1 Overview

This activity domain encompasses the following Work Packages:

- BPE-01: Quality Management System Support
- BPE-02: Business Information Analysis

1.4.1.1 WP BPE-01: Quality Management System Support

1.4.1.1.1 Overview

The Work Package concerns support related to the development, implementation and maintenance of a repository of business processes and procedures, in convergence with established Quality Management Systems (QMS) and ISO 9001:2008 Compliant Management System (IMS).

The Work Package also includes support to the utilisation of related tools and infrastructure for tailoring and application of ECSS Standards and Requirements in ESA Projects.

It includes the following main tasks:

- Development and implementation of business processes and procedures in coherence with ESA IMS, QMS’s and using applicable standard methodologies and tools, including training for ESA personnel and user operational support.
- Maintaining relevant databases, supporting development of specific Tools and ESA corporate applications.
- Modelling Agency processes (using ARIS Toolset).
- Drafting official ESA Procedures, their Configuration Control from inception through to publication of documents.
- Supporting projects or other customers in the definition and development of new or improvement to existing Processes and Tools.
- Performing detailed analyses on current Agency Processes and production of associated reports.
- Monitoring of the implementation of new Processes within the Agency, as appropriate, and provision of management information as required.
- Tailoring of ECSS standards and requirements (Management, Engineering and Product Assurance) for application in space projects.

1.4.1.1.2 Requirements

1.4.1.1.2.1 Qualifications
Relevant professional work experience in process engineering, preferably in the space domain as well as exposure to engineering concepts.

1.4.1.1.2.2 Other Requirements

None.

1.4.1.1.3 Location: ESTEC – On-Site/Off-Site

1.4.1.1.4 Positions

This Work Package includes the following positions:

1.4.1.1.4.1 Position BPE-01-01: Quality Management System Support

- **Job Class**: Engineer
- **Location**: Off-Site
- **Specific Tasks**:
  - Development and implementation support for the establishment and maintenance of the Agency's processes architecture, including provision of documentation and training. Supporting projects in the review and application of management standards, and contributing to external standardisation (ECSS, ISO), primarily in the domain of project management.
  - The work will be performed in the frame of TEC QMS Office activities, and will be aligned with the Agency's ISO 9001:2008 certification.
- **Specific Competence Requirements**:
  - ESA Experience required.
  - >8 years support in programme and support directorates.
  - Knowledge of standards and their application.
  - Knowledge of requirements databases.
  - Experience of process definition work.
  - Process integration.
  - Superior drafting and communication ability.
  - Facilitation of workshops.

1.4.1.1.4.2 Position BPE-01-02: Quality Management System Support

- **Job Class**: Engineer
- **Location**: ESTEC - On-Site
• **Specific Tasks:**
  
  o Determining the organisation’s requirements for documented processes and procedures, and the levels of detail necessary for implementation.

  o Defining and documenting the organisation’s processes and procedures, including mapping/modelling and describing them in a way that can be useful for understanding how the organisation operates, and can be applied as guidelines for the performance of day-to-day work.

  o Assessing the organisation’s existing processes and procedures for their efficiency, coherency within themselves and between different domains, analysing gaps, and developing improved processes.

  o The scope of business process engineering activities include the review and harmonisation of existing practices, documentation, workflows, optimisation of IT tools used supporting the processes, and/or introduction of new tools as appropriate.

  o The business process engineering responsibilities are discharged in close collaboration with the performers of the business functions by means of workshops, interviews and brainstorming sessions.

• **Specific Competence Requirements:**
  
  o As per Job Class and in field industrial engineering or in economics and business administration.

  o Minimum of 5 yrs of relevant professional work experience, preferably in the space domain; exposure to engineering concepts.

1.4.1.4.3  Position BPE-01-03: Business Process Architect

• **Job Class:** Engineer

• **Location:** ESTEC - On-Site/Off-Site

• **Specific Tasks:**

  o Augmenting the existing corporate process map with the design of related processes using the ARIS application suite.

  o Maintaining the integrity of the Agency’s corporate process map in accordance to the new Financial Management Model, the new Procurement Model and the new HR Model.

  o Supporting the definition and implementation of corporate process governance policies, guidelines and principles for new projects and customers.

  o Evaluating proposed business cases, contributing to cost and trade-off analyses for improvements to the efficiency and effectiveness of the Agency’s corporate activities and alignment to the Agency’s long-term strategic goals.

  o Configuration management of the Agency’s corporate processes and associated roles, linked to the organisational structure, as they evolve.
- Supporting the measurement of the implementation of the Agency’s corporate processes and contributing to analysing ongoing performance.
- Supporting the updating of the Agency’s related Policies, Instructions & Business Procedures, role-job mapping, and content evolution for communications and training.
- Provide System Administration for the ARIS installation.

**Specific Competence Requirements:**

- Proven experience in public sector corporate governance and business process architecture: design and integration of complex set of processes, preferably in relation to a large inter-governmental organisation.
- Strategic and systems-thinking, analytical and organisational capabilities are required. Experience using ARIS is essential.
- Knowledge of SAP, configuration management and the implementation of procedures within a quality management system certified to ISO 9001 would be assets.
- Good interpersonal skills with the ability to work effectively in a diverse team environment, an attitude to cooperation and a proactive approach to solving problems.

1.4.1.4.4 Position BPE-01-04: Business Process Engineer

**Job Class:** Engineer

**Location:** ESTEC - On-Site

**Specific Tasks:**

- Detailed design of processes down to level 4 process models.
- Implementing approved change requests to Level 4 models in process map and Job to Role mapping under configuration control, ensuring consistency with Level 3 and adherence to agreed process standards.
- Producing simplified versions for every modified process model to update training materials.
- Uploading and maintaining up-to-date versions of all process models (including simplified versions) and reports on the Process Governance Library.
- Maintaining change log and versioning of process models in ARIS under configuration control.
- Producing and publishing weekly ARIS reports.
- Providing hard-copies of models, various reports, process-related support to various teams, as needed.
Performing ARIS database maintenance functions including periodic backups, consolidation of objects and reorganisation, as needed.

Supporting the drafting and updating of process-related reference material, including the ARIS Convention Manual for the Agency and hard-copy publications of the entire process map.

Producing customised reports/templates, analyses of process map, as needed.

Assisting with the evaluation of change requests.

Support the analysis and development of process-based end-to-end test scenarios, including review of test scripts for coverage of process map.

Support maintenance of Process Governance library.

**Specific Competence Requirements:**

Proven experience and In-depth knowledge of ARIS process modelling and process design convention. In-depth knowledge of relationship between ARIS process model and ERP implementation, e.g. with SAP.

Knowledge of configuration control and documentation management with relational databases, e.g. SharePoint, would be an asset.

Good interpersonal skills with the ability to work effectively in a diverse team environment, an attitude to cooperation and a proactive approach to solving problems.
1.4.1.2 WP BPE-02: Business Information Analysis

1.4.1.2.1 Overview

The work package covers tasks related to evolution of requirements for process and tools in support to ESA Corporate and/or Business Unit level controlling as well as analysis of related information. As such it includes the following main tasks:

Task 1: Evolution of Requirements and Processes

- Provision of input to the controlling requirements of financial and resource management support system and defining the necessary processes and related monitoring and reporting requirements.
- Supporting the implementation of such management support system, in particular:
  - Coordination of elaboration of requirements, preparation of change requests and, participation to change control boards.
  - Analysis of the solutions proposed, follow up of implementation.
  - Participation to User Acceptance Tests and support to data migration needs and validation of migration.
  - Support to Organisation Readiness for organisation: 1) defining roles, structure, users access, 2) defining needs for training.
- Supporting the elaboration of the related procedures in view of ISO 9001 certification.
- Contributing to improving related processes, methods and tools.

Task 2: Business Information Analysis

- Support data mining and analysis for corporate controlling activities at ESA level.
- Support the definition and development of data models.
- Support the production of internal and external reports.

1.4.1.2.2 Requirements

1.4.1.2.2.1 Qualifications

In general:

- Financially literate and university degree or equivalent qualification in engineering, business administration or a related discipline.
- Relevant experience in the controlling domain.
- Good knowledge of financial management systems.
- Understanding of Information Systems management issues.
• Excellent analytical, communication and inter-personal skills.
• Ability to work in an organised and highly coordinated fashion.
• Capability to cope with tight deadlines and ensure high quality and reliable output.

More specifically for Task 2 above:
• Strong mathematic and statistical modelling skills, with specific knowledge in mathematic-business models for financial planning and forecasting.
• Good knowledge of programming (Relational Databases, SQL, Oracle, Matlab, Visual Basic).
• Basic knowledge of SAP and Business Object.
• Knowledge of Corporate Finance, Financial Reporting and Economics.

1.4.1.2.2 Other Requirements
None.

1.4.1.2.3 Location: ESTEC – On-Site

1.4.1.2.4 Positions

This Work Package includes the following positions:

1.4.1.2.4.1 Position BPE-02-01: Corporate Controlling Process Analyst

• **Job Class:** Engineer
• **Location:** ESTEC - On-Site
• **Specific Tasks:**
  o Provide input to the controlling requirements of the Agency’s future financial and resource management system and defining the necessary processes and related monitoring and reporting requirements, in particular:
    ▪ Improving the multi-year planning and controlling processes, methods and tools.
    ▪ Supporting the definition of IT systems needs in support of multi-year planning and controlling.
    ▪ Support the elaboration of the corporate controlling procedures in view of ISO 9001 certification.
  o Support the implementation of the ESA Integrated System, in particular:
    ▪ Coordination of the Reporting requirements.
    ▪ Analysis of the solutions proposed for future releases of the Integrated System.
- Preparation of change requests and follow up of their implementation, participation to change control boards (CCB, DCB).
- Support to the definition of future releases data migration needs and validation of migration.
- Participation to User Acceptance Tests.
- Support to Organisation Readiness for Corporate Controlling: 1) defining roles, structure, users access, 2) defining needs for training.
- Coordination with the Finance division as well as with Corporate Governance office for the elaboration and update of Financial Instructions.

- **Specific Competence Requirements:**
  - As per Job Class with relevant knowledge and experience in finance and in the controlling domain.
  - Good knowledge of financial management systems.
  - Excellent analytical, communication and inter-personal skills.
  - Ability to work in an organised and highly coordinated fashion.
  - Capability to cope with tight deadlines and ensure high quality and reliable output.

1.4.1.2.4.2 Position BPE-02-02: Business Information Analyst

- **Job Class:** Engineer
- **Location:** ESTEC - On-Site
- **Specific Tasks:**
  - Support the production of internal and external reports.
  - Support data mining and analysis for corporate controlling activities at ESA level.
  - Support the definition and development of data models to be implemented in corporate controlling tools.
  - Improve the multi-year planning and controlling processes, methods and tools.
  - Supporting the definition and development of IT systems and databases in support of multi-year planning and controlling.

- **Specific Competence Requirements:**
  - Strong mathematic and statistical modelling skills.
  - Understanding of mathematic-business models for financial planning and forecasting.
  - Good knowledge of programming (Relational Databases, SQL, Oracle, Matlab, Visual Basic).
  - Basic knowledge of SAP and Business Object.
- Knowledge of Corporate Finance, Financial Reporting and Economics.
- Understanding of Information Systems management issues.
2 POSITION INSTANTIATION TABLE

The instantiation table is provided in electronic form as part of the ITT package.
<table>
<thead>
<tr>
<th>Activity Domain (1-3 digits)</th>
<th>Work Package (2 digits)</th>
<th>Type</th>
<th>Generic Position Id (2 digits)</th>
<th>Instance (2 digits)</th>
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Product Assurance and Safety
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Product Assurance and Safety
## Position Instantiation Table

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**Unique identifier of the Position Instance within the New Frame**

1. X-ABC with X identifying uniquely Directorate responsible for the Domain (in case of Domain going cross Directorates, use X) and ABC AD identifier. For directorate specific AD use first letter of Dir with the exception of TEC/TIA: for TEC use Q for TIA T
2. (1) = Loan or Service
3. (2) = title of instance of a generic position
4. (3) = CNTR if work is not on ESA premises or in their vicinity / = ESA site Id if on ESA premises or is required to work in vicinity thereoff. TBD code for cases where location is on premise of ESA project supplier (EADS TLS) or external partner (e.g. DLR OPH)
5. (4) = Off-Site means close location to ESA premise required /
6. (5) = CNTR then value of field (8) is not relevant leave empty (means no specific location requirement)
7. (6) = C => position closed (not present in new FC), = V => position is to be filled with new incumbent (even if incumbent is in position under current FC), = I => incumbent in position no replacement planned