SKA1 SDP Integrated Logistics Support (ILS) Plan

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LIST OF ABBREVIATIONS

Ai	Inherent Availability
AIV	Assembly Integration and Verification
AOR	Annual Operating Requirement
AR	Array Release
Assy	Assembly
BITE	Built-In Test Equipment
BOM	Bill Of Material
CA	Criticality Analysis
CCB	Configuration Control Board
CDR	Critical Design Review
CI	Configuration Item
CoDR	Conceptual Design Review
COTS	Commercial off the Shelf
CRR	Construction Readiness Review
CSP	Central Signal Processing
DEF-STAN	Defence Standard
D-Level	Depot Level Maintenance
DM	Data Module
DMRL	Data Module Requirements List
EU	European Union
FAT	Factory Acceptance Tests
FIT	Failures-in-Test
FMEA	Failure Modes and Effects Analysis
FMECA	Failure Modes, Effects and Criticality Analysis
FRACAS	Failure Reporting and Corrective Action System
GHz	Gigahertz
H/A	High Availability
HQ	Headquarters
Hrs	Hours
IETM/P	Interactive Electronic Technical Manual/Publication
I-Level	Intermediate Level
ILS	Integrated Logistic Support
ILSP	Integrated Logistic Support Plan
iOBL	Interim Operational Baseline
LFAA	Low Frequency Aperture Array
LoC	Lines of Code
LORA	Level of Repair Analysis
Low	Low Frequency : Telescope
LRU	Line Replaceable Unit
LSA	Logistic Support Analysis
MHz	Megahertz
Mid	Mid Frequency : Telescope
MIL-STD	Military Standard
MMIS	Management Information System
MRO	Murchison Radio Observatory
MTBcF	Mean Time Between Critical Failures
MTBF	Mean Time Between Failure

MTTR	Mean Time To Repair
OBL	Operational Baseline
OEM	Original Equipment Manufacturer
O-level	Organisation Level
OTLR	Operator Task List Report
PBS	Product Breakdown Structure
PDG	Physical Deployment Graph
PDR	Preliminary Design Review
PHS&T	Packaging, Handling, Storage & Transport
PPPM	Preparation, Preservation, Packing and Marking
Proc	Tender and Procurement
PRR	Production Readiness Review
PSS	Product Supplier Support
PSU	Power Supply Unit
QA	Quality Assurance
QoS	Quality of Service
R&R	Remove & Replace
RAM	Reliability, Availability and Maintainability
RBD	Reliability Block Diagrams
RF	Radio Frequency
RFI	Radio Frequency Interference
S&TE	Support and Test Equipment
SAT	Site Acceptance Test
SDP	Science Data Processor
SE	System Engineering (Group)
SEMP	Systems Engineering Management Plan
SKA	Square Kilometre Array
SKAO	SKA Office
SLA	Service Level Agreement
S-Level	Supplier Level
SMR	Source, Maintenance and Recoverability
SRR	System Requirements Review
SRU	Shop Replaceable Unit
Std & Proc	Standards and Procedures
TBD	To Be Decided / Determined / Defined
TEMP	Test and Evaluation Plan
TM	Telescope Manager
TRR	Test Readiness Review
WBS	Work Breakdown Structure

1 Introduction

1.1 Purpose of the document

The Integrated Logistic Support Plan (ILSP) provides a process supporting the activities for project management, system engineering design and development together with full life-cycle management of the SDP hardware and software. The ILSP addresses how the SAFe program team shall manage and execute the Logistic Engineering and Support activities for the SDP up to the achievement of the Operational Baseline as defined in the SDP Construction Plan [AD1]. The aspects of the SDP hardware through factory build and test, acceptance at factory, installation on-site, and acceptance on-site are detailed in the Operations Plan [RD4]. The impact of the ILS will be measured in terms of metrics such as reliability, availability, maintainability and testability (RAMT) ([RD4], [RD1]). The process includes a costing process centred upon the following:

- the life cycle-cost and Level of Repair Analysis;
- engineering process which influences the design via means of reliability, modularisation, and reproducibility;
- technical documentation publishing process - encompassing international specifications and standards where appropriate - and
- an ordering administration process for supply support.

1.2 Scope of the document

The ILSP takes into consideration the SDP Architecture Design Documentation and related SKA Integrated Logistics Support Plans together with L2 requirements. The following principles for the development of the SDP architecture (See SDP Architectural Overview in [RD2]) guide the ILS Plan:

- **Maintainability and extensibility:** it must be possible for the SKA Observatory to keep the SDP software running efficiently as the algorithms for data processing evolve and the underlying hardware is refreshed.
- **Affordability:** the SDP must be affordable, i.e., the chosen architecture should ideally minimise expenditure on capital and operational costs. This may be in conflict with the other design principles and in that case the selected architecture should not be significantly greater cost than the other possible architectures.
- **Support for current best-practice algorithms:** the SDP must support all of the current best-practice algorithms used in radio interferometry and in particular those used by the pathfinders and precursor instruments.
- **Scalability:** the overall design of the SDP system should be scalable to handle a range of computational and data throughput requirements. This is in contrast to a potential architecture which aims to achieve a solution for a particular design parameter point. In particular, the architecture must scale down efficiently since the current system sizing defines a maximal capability for the SDP and that is likely to only be achieved after some years of operation.

The ILS plan will lead through to a Logistics Support Analysis (LSA) to develop a final system that is:

- Environmentally sound;
- Affordable (lowest life cycle cost);
- Operable;
- Sustainable and Supportable.

2 References

2.1 Applicable documents

The following documents are applicable to the extent stated herein. In the event of conflict between the contents of the applicable documents and this document, **the applicable documents** shall take precedence.

[AD1] SKA-TEL-SDP-0000047 SDP Construction and Verification Plan, Rev 05
[AD2] SKA-TEL- SKO-0000484 SDP TO INFRA-AUS AND SKA SA ICD, Rev 02
[AD3] SKA-TEL-SKO-0000307 SKA1 Operational Concept Document
[AD4] SKA-TEL-SDP-0000033 SDP L2 Requirements
[AD5] SKA-TEL-SKO-0000103 SKA Support Concept
[AD6] SKA-TEL-SKO-0000104 SKA ILSP
[AD7] SKA-TEL-SDP-0000048 SDP Configuration Item Data List
[AD8] SKA-TEL-SKO-0000990 SKA Software Verification and Testing Plan

2.2 Reference documents

The following documents are referenced in this document. In the event of conflict between the contents of the referenced documents and this document, **this document** shall take precedence.

[RD1] SKA-TEL-SDP-0000115 SDP RAM Report
[RD2] SKA-TEL-SDP-0000013 SDP Architecture Documentation, Rev 07
[RD3] https://confluence.skatelescope.org/display/SE
[RD4] SKA-TEL-SDP-0000081 SDP Operations Plan, Rev 03
[RD5] SKA-TEL-SDP-0000046 SDP Costing Basis of Estimate

3 ILS Overview

3.1 Introduction

ILS phases, in the context of the SDP Construction and Verification plan [AD1], are shown in Table 1.

ILS Phase	Output artefacts	Construction Phase
Detailed design phase: During the detailed design phase the ILSP will be applied to develop and allocate criteria and specifications. The result of this phase will be an Allocated Baseline, ending in a Critical Design Review.	System Design Specifications; Logistic Support Definition; Logistic Support Analysis including PBS, Reliability Analysis, FMECA, Maintenance Task Identification; Maintainability and Testability/Verification Analysis; Initial Logistic Support Analysis Database.	SDP CDR
Industrialisation: The application of the ILSP during the Industrialisation phase is to control the design, development and qualification of the identified support items on system level. The result of this phase will be a CRR.	Identification of all support requirements; Review and refinement of the Logistic Support Analysis, PBS [AD7], Reliability Analysis, FMECA, Maintenance Task Identification, Maintainability & Testability analysis; A Detailed Task Analysis (DTA), identifying all the task resources (spare parts, support equipment and tools); Updated LSA Database.	SDP AA2
Production Construction, Integration and Verification: The ILSP will be applied to put the logistic support capability into operation during this phase. The result of this phase will be an interim Operational Baseline (iOBL).	The procedure for corrective action on any ILS deficiencies; The deployment of the logistic support system; Maintenance and operator manuals and publications; Maintenance and operator training packages; Initial Operating and Support Plan; Initial Maintenance Plan.	SDP AA3
Early Science: The ILSP will serve as a tool to manage and maintain the SDP during this phase. The result of this phase will be a commissioned Operational Baseline.	Detailed Operating Phase Support Plan to manage the support of the SDP; Detailed Maintenance Plan; Qualified Logistic Support; Operator and Maintainer Training. To provide for updating technical documentation and training programmes for the Operational Baseline - as such to apply the Early Science phase experience/red-lining of the initial technical data and training programme products delivered for SDP AA3. Include confirmation that SDP logistic planning will account for the element Early	SDP AA4

	Science logistic support outputs required in [AD6] para 3.3. (Consideration also of spares, personnel profile definitions, SLAs as relevant.)	

Table 1: Timeline for ILS Activities with respect to the Construction Plan. The second column lists the artefacts coming out of each phase.

3.2 SDP Overview

Because of the very large number of components in the SDP hardware and the nature of IT systems, it is expected that failure of individual components will be an everyday or even continuous event for which redundancy and spares will be necessary and consequently Support and Maintenance will be critical. This has led to an architectural representation of the system as defined by the System Level Module View [RD2] and SDP Operational System Component & Connector View [RD2] together with Platform Services Component and Connector View [RD2]. In particular the Platform Services provide Operational services such as Core Infrastructure Services for Compute or Service Provisioning, maintaining Configuration and Coordination information, and aggregating Logging and Health Information [SDP_REQ-825, SDP_REQ-823, SDP-REQ-821]. An understanding of the hardware failure modes and rates is therefore extremely important, as the impact of that will vary according to the particular services. As the design of the SDP hardware further matures in terms of implementation, a detailed level-of-repair-analysis will be maintained to establish appropriate remedial or fix or repair actions.

The rest of this document is structured by an assessment of the activities that will form part of the plan together with an assessment of the Logistics Support Analysis which will be provided in Section 4.

3.3 Updating Procedures

The Integrated Logistics Support process and plan will be updated based on the following recommendations from:

- Design Reviews;
- New project directives from the SKAO;
- System configuration changes in terms of PBS (See for Example [RD4]);
- RAM Analysis [RD1] - See Section 5.1 below.
- Logistics support changes;
- Construction Readiness Review (CRR);
- Construction Plan [AD1].

3.4 Training

Training will be an important consideration in terms of the ILS to ensure that relevant staff are available to ensure that the SDP meets its requirements through the construction and operational aspects as detailed in the SDP Operations Plan [RD4] and encompass, *inter alia*:

- User Interface Service for the Hardware and Software Monitoring and Logging;
- Processes relating to SAFe;
- Maintenance actions in respect of Spares and Critical Failures;
- Use of Observatory Support Tools;
- Facilities Environment;

- Safety Procedures;

where appropriate these are discussed further in the document.

4 Logistics Support Activities

The activities comprising the Integrated Logistics Support were introduced in section 1. Below we identify the key aspects /areas and considerations of the process, summarised in Figure 1.

4.1 Design Influence and Optimisation.

Design influence becomes an iterative process applied during all the design phases and in each of the project tasks. It will be performed by documenting results and providing recommendations emanating from system engineering. These recommendations will be evaluated by the design team for possible changes to the systems design and/or changes to the support system of the SDP. The logistics-related parameters titling the following subsections will be applied by the ILS analysis to the design.

4.1.1 Product Breakdown Structure (PBS)

A list of the components and their modularity will be defined together with their level of redundancy, impact and level of repair and how they will be replaced. The list of products is defined by the PBS (See for example the PBS breakdown in [RD4]). The RAM allocation, FMECA, level-of-repair and spares holding will vary depending on the severity levels associated with these top-level products. These are discussed in more detail in [RD1].

4.1.2 Reliability, Availability and Maintainability (RAM) Figures

An analysis of potential reliability improvements, through active-active and active-passive redundancy and failover will be performed. This will lead to potential maintainability improvements by focusing on accessibility, ease of removal, availability of dedicated support and test equipment. These are discussed in more detail in [RD1].

4.1.3 Failure Modes, Effects and Criticality Analysis (FMECA)

Given the inherent nature of the IT systems and the complexity of system and application software, hardware failure detection will be a fundamental aspect of Logistics Support. The analysis will focus on identification of single point failures, critical failures and untolerated failures. This will lead to the development of both automatic and operator-driven High Availability strategies.

4.2 Support Technical Documentation

A list of technical publications will be required in order to correctly and safely operate the SDP element, with minimum time loss. All technical information should be easily understood and followed by users, operators and maintainers and produced using appropriate SEI standards where appropriate. Such documentation will include [SDP_REQ-52, SDP_REQ-755, SDP_REQ_756]:

- Technical manuals;
- Technical whitepapers and supply bulletins;

- Technical and Safety Data Sheets including a Safety Plan covering AIV and Construction ;
- Spare parts list;
- Preventive (scheduled and unscheduled) maintenance instructions;
- Corrective maintenance instructions (FRACAS);
- Installation, test, commissioning, acceptance and change management procedures and reports;
- Drawings and part lists;
- Specifications;
- Guides for Application and System Software.

4.3 Hardware Maintenance Planning

The following processes and procedures will be developed to address the necessary hardware maintenance in order to ensure that Engineering and Science Operations [RD4] requirements [SDP_REQ-874, SDP_REQ-289, SDP_REQ-755] are satisfied:

- Define the actions and all the support aspects necessary to ensure that the SDP attains the specified system readiness objectives with minimum Life Cycle Cost;
- State specific maintenance tasks to be performed on the machine;
- Define levels of replacements, repair, task times, testability requirements, support equipment and automatic test equipment needs, training, personnel skills and facilities in line with SDP Operations Plan [RD4];
- Develop the preventive maintenance programme in accordance with observation periods and relevant L2 requirements and refine this from the experience gained. This is also discussed in the RAM Analysis [RD1];
- Analyse the proposed work environment on the health and safety of operations team, and define relevant qualifications and/or training requirements as well as safety equipment;
- Minimise the use of hazardous materials and take into account local regulations for disposal methods for hazardous, recyclable and non-recyclable waste.
- Obsolescence Management.

4.4 Software Support

Aspects related to software support are addressed in very great detail in the SDP architecture itself [RD2]. Additionally there will be the SKA-wide software engineering approach [RD3] will be documented in a single place for system CDR and SDP are committed to contributing to this system-level document. Further information on Software Management is covered in the SKA SKA Software Verification and Testing Plan [AD8].

4.5 Support Tools and Instrumentation

This encomposes the following items [SDP_REQ-757, SDP_REQ-756, SDP_REQ-763,SDP_REQ-764]:

- Automatic and Interactive performance measurement tools to assess individual components (e.g. power consumption, performance, reliability, tolerance) and sub-systems;
- Equipment for in-situ and ex-situ diagnosis and repair of SDP components (LRU and SRU);
- Safety Devices;
- Handling and Lifting Devices;
- Life-Cycle Costs of Support Tools.
- Support Tools as defined by the Deliver C&C View [RD2] for accessing Data Products

- A Deployable Benchmark Suite ([AD1],[RD4]) for system level performance assessment.

4.6 Support Personnel

As part of this activity it will be necessary to identify personnel with the qualifications and the skills required to operate, maintain and support a large IT facility. Staffing requirements are based on related ILS elements and other considerations. Human factors engineering (HFE) is applied to ensure a good human-machine-environment interface. In addition to on-site support staff, it will be necessary to provide suitable working areas for sub-contractors. Provision for on-site induction training will be covered. At this stage in the process it is assumed that this will be carried out by an third party organisation through an appropriate SLA.

4.7 Supply Support

Supply Support will define actions, procedures and techniques necessary to determine requirements to acquire, catalogue, receive, store, transfer, issue and dispose of spare and repair parts, consumables and supplies. This activity will ensure that the right spares, repairs and all classes of supplies are available in the right quantities, at the right place, at the right time and at the optimum cost. The process usually includes provisioning for initial, half-life and entire lifetime support.

During the supply support definition the quantity and location of spares will be determined from the Logistics Support Analysis (LSA) data, in particular from Mean-Time-Between Failure (MTBF) and Mean-Time-To-Repair (MTTR) and anticipated lifetime data [SDP_REQ-874]. A preliminary analysis will be run to estimate the necessary recovery actions for the system lifetime. The final spare parts quantity is defined during the LSA process also taking into account the experience on similar applications and on the basis of additional engineering evaluations and prototyping and including identification to high failure rate parts. The assessment also covers the corrective and preventive maintenance interventions. Early assessment of this will ensure that INFRA-SA and INFRA-AUS have timely access to this information for adequate storage of spares.

4.8 Package, Handling, Storage and Transportability (PHS&T)

The planning of packaging, handling, storage and transportability aspects of hardware, in particular, can have considerable impacts on cost and delivery time. Therefore, customs requirements, air, rail, sea and road transport requirements, container considerations, special movement precautions, mobility and transportation asset impact of the shipping mode will be assessed. In particular the following will be required [SDP_REQ-755, SDP_REQ-756]:

- system constraints (such as design specifications, item configuration and safety precautions for any hazardous material);
- use of packing materials that are adequate for the intended purpose of transporting;
- design and packaging all components, materials and equipment so that the loads incurred, vehicles and shipping containers used in transportation can negotiate the roads to the storage site;
- geographic and environmental restrictions;
- special security requirements;
- special handling equipment and procedures;
- proper and complete identification labelling of all packaging;
- anticipated timescales through customs, road, etc.

4.9 Facilities and Facilities Management

Support and Maintenance considerations with respect to facilities will be required [SDP_REQ-757, SDP_REQ-281, SDP_REQ-289]. In particular:

- loading bays and access;
- geographic and environmental restrictions;
- special security requirements;
- special handling equipment and procedures;
- seismic disturbances;
- weather impacts;
- protection against data loss;
- INFRA ICDs [AD2].

5 Logistics Support Analysis (LSA)

A Logistics Support Analysis programme (see for example [RD03]) will be developed to instruct maintenance plans providing input to technical publications, training and system installation and provisioning of the SDP element as required by [SDP_REQ-762, SDP_REQ-763, SDP_REQ-764, SDP_REQ-821]. Inputs to the LSA will be from the design team and system engineering team. These will include outputs of the form:

- System, sub-system and equipment data to define what will be analysed (design data);
- An expected support concept to define how the system could be supported [RD4];
- A definition of how the system is expected to be operated [RD4];
- Reliability, Availability and Maintainability (RAM) requirements [RD1].
- LSA data requirements to allow simulation and modelling of the support system;

The output of the LSA will be a consolidated definition of the system support requirements to provide the relevant support system. During the LSA process, technical and logistical issues will be fed-back to system engineering, and trade-offs will be determined to ensure that the SDP can be supported at the appropriate cost. This will include feedback in-line with the SDP Construction and Verification Plan [AD1]. The LSA activities to be performed will be:

- Life-Cycle Cost Analysis;
- Maintenance Test Analysis;
- Mean-time to Repair Analysis;
- Reliability, Availability and Maintainability Allocation;
- Apply SDP RAM Assessment as part of SDP design influence and as basis for allocating, scaling of SDP logistic support.
- Spare Parts Analysis;
- Safety Analysis (EMC, Power, etc.);
- Improved Failure Modes, Effects and Criticality Analysis (FMECA) as in Figure 1.

These will be updated with reference to the SKA ILSP [AD7]. The process to be conducted is described in the following diagram:

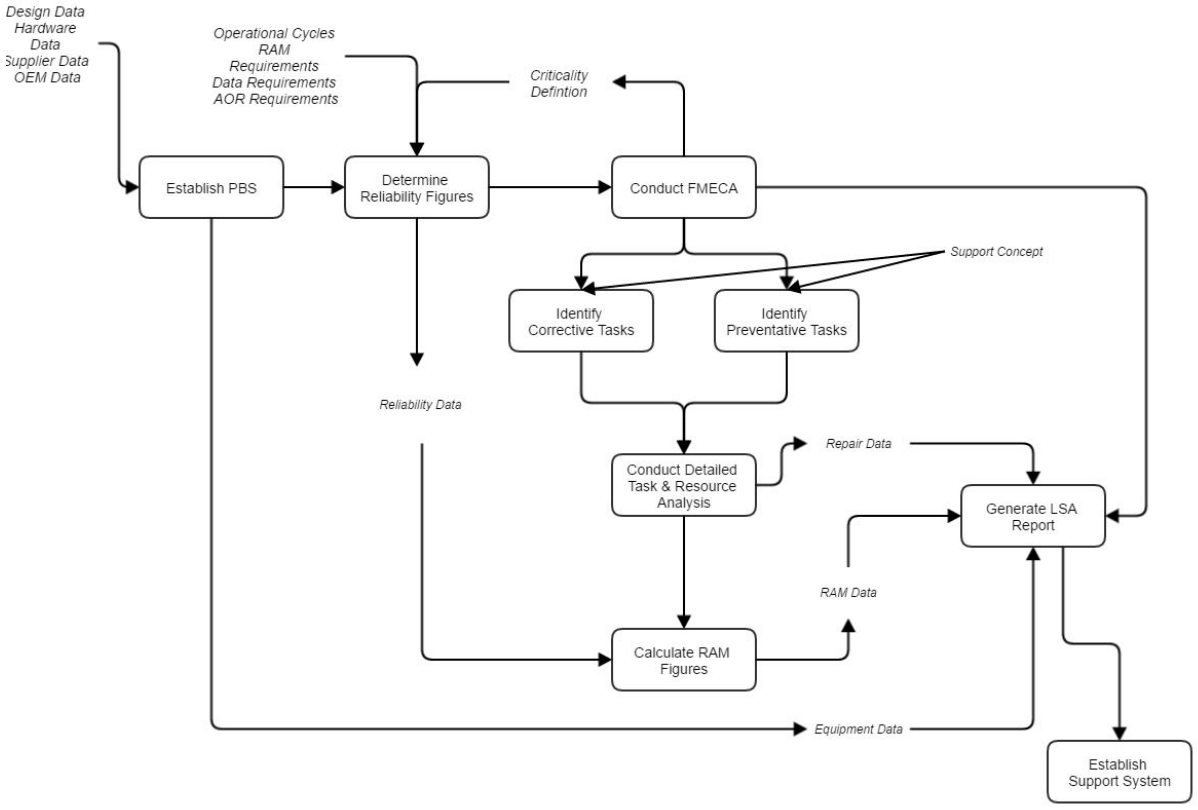

Figure 1: The LSA Process

The current SKA Support Concept [AD5] envisages that the SDP Support concept will be conducted at O-Level and be fulfilled by an external organisation, either an OEM or Systems Integrator (TBD), and be driven by an appropriate Service Level Agreement (SLA).

The basis of the SDP Level of Repair Allocations has led to the assignment of LRUs as defined in [AD6] and in particular

- The maintainability characteristics of LRUs requiring short-response replacement on site in order to meet SDP availability requirements (O-Level) for which spares are allocated.
- Where the SDP support concept assigns in-situ work to call-out contractors, any LRUs not suitable for replacement by assigned on-site personnel will be identified and further developed as the Product Breakdown Structure is refined.

Assignment of these in Table 4 of the SDP Operations Plan [RD4].

5.1 Reliability, Availability and Maintainability

The Reliability, Availability & Maintainability (RAM) Requirements [SDP_REQ-874] of the SDP are Architectural Drivers for the software and critical for the hardware selection for design reliability, but also an important input to capital and operational cost trade-offs.

To support this design process and ensure compliance to Telescope Level Availability Requirements work has been done to model and analyse the SDP availability problem to:

- continually evaluate compliance to requirements;
- identify further design drivers or derive lower level requirements, and

- ensure that the design emphasis in terms of Availability is correctly addressed.

The RAM Analysis is discussed in the SDP RAM Report [RD1] and in particular the Follow-up action and Recommendation in Section 5.6 of that report.

6 Requirements

6.1 L2 Requirement Traceability to L1

ID	Description (Short)	L1 Traceability
SDP_REQ_281	Protection against data loss	SKA1-SYS_REQ-2479
SDP_REQ_289	Science product preservation lifetime.	SKA1-SYS_REQ-2479
SDP_REQ_728	Master controller failover latency	SKA1-SYS_REQ-2716
SDP_REQ-52	Failsafe	SKA1-SYS_REQ-2788
SDP_REQ-755	Electronic equipment safety	SKA1-SYS_REQ-2437 SKA1-SYS_REQ-2438 SKA1-SYS_REQ-2788 SKA1-SYS_REQ-2579 SKA1-SYS_REQ-2580 SKA1-SYS_REQ-2818 SKA1-SYS_REQ-2820 SKA1-SYS_REQ-3257 SKA1-SYS_REQ-3258 SKA1-SYS_REQ-2465 SKA1-SYS_REQ-2448 SKA1-SYS_REQ-2446 SKA1-SYS_REQ-2445 SKA1-SYS_REQ-2460 SKA1-SYS_REQ-2466 SKA1-SYS_REQ-2464 SKA1-SYS_REQ-2467 SKA1-SYS_REQ-2484 SKA1-SYS_REQ-2525
SDP_REQ-756	SDP part identification	SKA1-SYS_REQ-2573 SKA1-SYS_REQ-2575 SKA1-SYS_REQ-2576 SKA1-SYS_REQ-2577 SKA1-SYS_REQ-2583 SKA1-SYS_REQ-2584

SDP_REQ-757	SDP equipment installation	SKA1-SYS_REQ-2595 SKA1-SYS_REQ-2599 SKA1-SYS_REQ-2602 SKA1-SYS_REQ-2603 SKA1-SYS_REQ-2604 SKA1-SYS_REQ-2605 SKA1-SYS_REQ-2606 SKA1-SYS_REQ-2650 SKA1-SYS_REQ-3238 SKA1-SYS_REQ-2501 SKA1-SYS_REQ-3298 SKA1-SYS_REQ-2801 SKA1-SYS_REQ-3071 SKA1-SYS_REQ-3239 SKA1-SYS_REQ-3240
SDP_REQ-762	SDP Inherent Availability (Ai)	SKA1-SYS_REQ-3245
SDP_REQ-763	SDP Critical failure identification	SKA1-SYS_REQ-3249
SDP_REQ-764	SDP Isolation of critical failures	SKA1-SYS_REQ-3249
SDP_REQ-821	Failure detection to Achieve Ai	SKA1-SYS_REQ-3245
SDP_REQ-874	SDP Maintenance Down Time	SKA1-SYS_REQ-2716

Table 2: SDP Level 2 Requirement Traceability.

6.2 L1 Requirements and Section Reference

ID	Description (Short)	Section
SKA1-SYS_REQ-2437	Design for hazard elimination.	Maintenance Planning
SKA1-SYS_REQ-2438	Fail safe design.	Maintenance Planning
SKA1-SYS_REQ-2445	Electrical circuit interlocks.	Support Tools and Instrumentation
SKA1-SYS_REQ-2446	Electrical safety	PHS&T/Facilities
SKA1-SYS_REQ-2448	Stand-off and handles.	Maintenance Planning
SKA1-SYS_REQ-2460	Occupational health legislation and regulations.	Support Personnel
SKA1-SYS_REQ-2464	Electromagnetic Compatibility Standards	Maintenance Planning
SKA1-SYS_REQ-2465	Electricity network Electromagnetic Compatibility	LSA
SKA1-SYS_REQ-2466	EMC compatibility marking.	Maintenance Planning

SKA1-SYS_REQ-2467	Electromagnetic susceptibility.	Maintenance Planning
SKA1-SYS_REQ-2479	Archive security	Facilities
SKA1-SYS_REQ-2484	SKA1_Mid environmental legislation and regulations	Maintenance Planning
SKA1-SYS_REQ-2501	Storage and transport Humidity.	PHS&T/Facilities
SKA1-SYS_REQ-2525	Fail safe provisions.	Maintenance Planning
SKA1-SYS_REQ-2573	Serial and part numbers	Maintenance Planning
SKA1-SYS_REQ-2575	Marking method.	Technical Documentation
SKA1-SYS_REQ-2576	Electronically readable or scannable ID	Maintenance Planning
SKA1-SYS_REQ-2577	Package part number marking.	PHS&T
SKA1-SYS_REQ-2579	Hazard warning marking.	Maintenance Planning
SKA1-SYS_REQ-2580	LRU electrostatic warnings	Maintenance Planning
SKA1-SYS_REQ-2583	Cable identification.	Maintenance Planning
SKA1-SYS_REQ-2584	Connector plates. All connector plates shall carry identification labels for connectors	Technical Documentation
SKA1-SYS_REQ-2595	Maintenance provisions.	Maintenance Planning
SKA1-SYS_REQ-2599	Component removal.	Maintenance Planning
SKA1-SYS_REQ-2602	Mounting preclusion.	Maintenance Planning
SKA1-SYS_REQ-2603	Mounting guides.	Maintenance Planning
SKA1-SYS_REQ-2604	Module labelling.	Maintenance Planning
SKA1-SYS_REQ-2605	Label robustness.	Maintenance Planning
SKA1-SYS_REQ-2606	Disposable LRU labelling.	Maintenance Planning
SKA1-SYS_REQ-2650	Seismic resilience	Facilities
SKA1-SYS_REQ-2716	Telescope availability	LSA
SKA1-SYS_REQ-2788	Non-propagation of failures	LSA
SKA1-SYS_REQ-2788	Non-propagation of failures	LSA
SKA1-SYS_REQ-2801	Storage of equipment	PHS&T/Facilities
SKA1-SYS_REQ-2818	Marking of machinery - safety	Maintenance Planning
SKA1-SYS_REQ-2820	Safety of equipment with rated voltage not exceeding 600V	Maintenance Planning
SKA1-SYS_REQ-3071	Storage of SKA1_Low equipment.	PHS&T/Facilities

SKA1-SYS_REQ-3238	Fail safe state	LSA
SKA1-SYS_REQ-3239	Fail safe warnings	LSA
SKA1-SYS_REQ-3240	Fail safe recovery	LSA
SKA1-SYS_REQ-3257	SKA1_Low environmental legislation and regulations.	Facility
SKA1-SYS_REQ-3258	SKA1_Low Occupational health legislation and regulations.	Facility

Table 3: SDP Level 1 Requirements.