Science and Technology in Italy

For the upgraded ALMA Observatory

- TECHNOLOGY DEVELOPMENT -

Band 2+3 integration product assurance requirement and procedures

Document code: iALMA-TEC-PLA-IAB-002

Version: 1

Status: DRAFT

Date: 30/08/2016

Prepared by		
Name	**Organization**	**Date**
Sara Ricciardi	INAF/IASF-Bologna	21/10/2016
Approved by		
Name	**Organization**	**Date**
Fabrizio Villa	INAF/IASF-Bologna	21/10/2016

Istituto di Astrofisica Spaziale e
Fisica Cosmica di Bologna

1 Change Record

Version	Date	Affected sections	Reason
0	21/10/2016	All	Draft version

2 Applicable and reference Documents

2.1 Applicable documents

AD-1.		iALMA-TEC-PLA-IAB-001	2015
AD-2.			
AD-3.			
AD-4.			
AD-5.			

2.2 Reference documents

REF1.	Alma Product Assurance Requirement	ALMA-80.11.00.00-001-D-GEN	2010
REF2.			
REF3.			
REF4.			

3 Table of content

1 Change Record 1
2 Applicable and reference Documents 1
2.1 Applicable documents 1
2.2 Reference documents 1
3 Table of content 2
4 Introduction and Scope 3
5 Dry Run Setup 4
6 First Dry Run data 6
7 Target Panel Dry Run Setup 9
8 Target Panel Dry Run data 10

4 Introduction and Scope

The goal of this document is to define the best practices and procedures in the integration and test phase of the prototype of the band 2+3 Cartridge for the ALMA system project. The purpose of these requirements is to ensure that all the components of the B2+3 cartridge and the facilities involved in the integration phase and in the verification phase are delivered with and maintained at consistent high level of quality in their design, fabrication, performance, reliability and documentation. This is essential to make sure this prototype will be useful in the context of the ALMA system.

The Alma B2+3 prototype is a unit identified by an agreement between ESO and a consortia lead by INAF-IASFBO that will be delivered as a test platform needed to facilitate the verification of requirements and performances of the band 2+3. This prototype is not handed over to the project so a formal PA is not due but because of the complexity of the cartridge itself, the complexity of the partners involved and the tight schedule agreed we decided to go for a simple but efficient set of procedures for configuration item management, project documentation, shipping, handling and storage that we will resume in this living document.

5 Project documentation and changes

The first step in the configuration management is to define the Configuration Item Data List (CIDL) of the B2+3 prototype. The current version of the CIDL and its organization in a Product Tree (PT) is defined in the section CITE SECTIONS. Any change either due to a difference between the design and the physical object or due to a modification of the design should be approved and recorded. The mechanism to do that is resumed in the following diagram.

When the item is received it should be inspected and evaluated. This will require different procedures and methods depending on the object. If some differences or non-conformity between the actual object (as built) and the expected designed object (as design) came up during the inspection and the evaluation it should be described and reported in the Non conformity report. A template of a non-conformity report to be used is attached to this document.

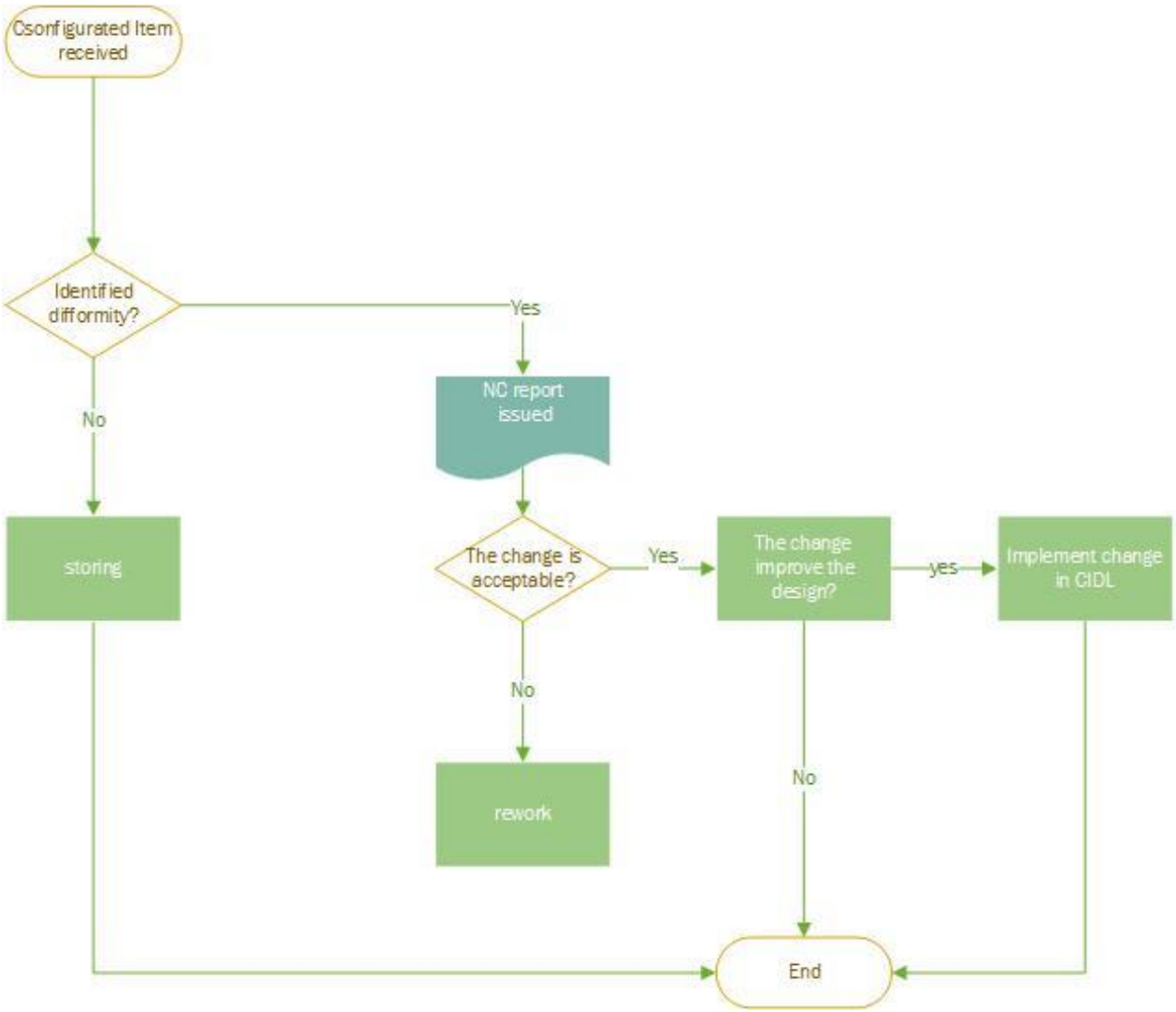


Figure 1 The change Management Process Overview.

6 CIDL

In this section we list the first version of the CIDL. The configuration number of this CIDL is

iALMA-TEC-CIDL-IAB-001

6.1 Cardridge

1	CB	1	NOVA058_B23	ALMA B5 300K Plate (Production)
2	CB	1	NOVA058_B24	110K stage flange (Modified B5 Pre-Production)
3	CB	1	NOVA058_B25	15K stage flange (Modified B5 Pre-Production)
4	CB	1	NOVA058_B26	Thermal isolation 300K-110K (B5 Pre-Production)
5	CB	1	NOVA058_B27	Thermal isolation 110K-15K (B5 Pre-Production)
6	WS	1	NOVA058_B28	DC-wires 110K heatsink Cover
7	WS	1	NOVA058_B29	Waveguide 110K heatsink fixture
8	WS	1	NOVA058_B30	Waveguide 110K heatsink Cover 1
9	WS	1	NOVA058_B31	Waveguide 110K heatsink Cover 2
10	WS	1	NOVA058_B32	Waveguide 110K heatsink Cover 3
11	WS	2	NOVA058_B33	Waveguide 110K heatsink Cover 4
12	WS	2	NOVA058_B34	Waveguide 110K heatsink Clamp, Part 1
13	WS	2	NOVA058_B35	Waveguide 110K heatsink Clamp, Part 2
14	WS	3	NOVA058_B36	110 K Heat sink foil for waveguides
15	CS	1	NOVA058_B37	15 K Cover and Heat sink mounting point
16	CS	6	NOVA058_B38	15 K Heat sink foil for waveguides
17	CS	1	NOVA058_B39	15 K Cover DC Cable Feedthrough
18	CS	1	NOVA058_B40	15 K DC 9-Pin Connectors Heat Sink 1
19	CS	1	NOVA058_B41	15 K DC 15-Pin Connectors Heat Sink 2
20	CS	1	NOVA058_B42	15 K Receiver Support, Part 1
21	CS	1	NOVA058_B43	15 K Receiver Support, Part 2
22	CS	1	NOVA058_B44	15 K Receiver Support, Part 3
23	CS	3	NOVA058_B45	Heat Sink U-Man AMP
24	CS	2	NOVA058_B46	Heat Sink INAF AMP
25	CS	1	NOVA058_B47	Horn UDC Load Bracket
26	CS	1	NOVA058_B48	Horn INAF Load Bracket
27	CS	1	NOVA058_B49	Assembly, Absorber + UdC Load Bracket
28	CS	1	NOVA058_B50	Assembly, Absorber + INAF Load Bracket
29	CS	1	NOVA058_B51	UdC Horn Adapter Bracket
30	HN	1	NOVA058_B52	DC Cable Guide 15K, Part 1
31	HN	1	NOVA058_B53	DC Cable Guide 15K, Part 2
32	HN	2	NOVA058_B54	DC Cable Heat Sink 110K, Part 1
33	HN	2	NOVA058_B55	DC Cable Heat Sink 110K, Part 2
34	CB	1	NOVA058_B56	ESD-protection boards, Band5 Production Unit
35	WG	2	NOVA058_B57	WAVEGUIDE OUTPUT (Common Waveguides 300K to 15K)
36	WG		NOVA058_B58	WR10 VARIANT1
37	WG		NOVA058_B59	WR10 VARIANT2
38	WG		NOVA058_B60	WR10 VARIANT3
39	WG		NOVA058_B61	WR10 VARIANT4
40	CB	2	NOVA058_B62	Waveguide Bulkhead Flange WR10
41	CB	2	NOVA058_B63	Feedthru Clamp Plate WR10
42	CB	2	NOVA058_B64	Mica Plate vacuum feedthrough
43	LNA	3	NOVA058_B65	U-Manchester Amplifier
44	LNA	2	NOVA058_B66	INAF Amplifiers
45	PC	1	NOVA058_B67	UdC Horn
46	PC	1	NOVA058_B68	INAF Horn
47	PC	1	NOVA058_B69	UdC OMT
48	PC	1	NOVA058_B70	INAF OMT
49	HN	1	NOVA058_B71	DC-wires 110K heatsink Cover Lid
50	CS	10	NOVA058_B72	15K Amplifier heatsink Clamp Plate

51	CB	1	NOVA058_B73	ALMA 2x51 pin GlenAir DC Feedthrough
52	CS	5	NOVA058_B74	Heat sink cooling braid for AMP
53	CB	4	NOVA058_B75	SMA Feedthrough or blank
54	HW	16	NOVA058_B76	Hexagon Socket Head Cap Screw
55	HW	76	NOVA058_B77	Hexagon Socket Head Cap Screw
56	HW	2	NOVA058_B78	Broached Hexagon Socket Flat Countersunk Head Cap Screws - Metric
57	HW	112	NOVA058_B79	Hexagon Socket Head Cap Screw - Metric M2 x 8
58	HW	208	NOVA058_B80	Crinkle washers for general engineering purposes metric series
59	HW	6	NOVA058_B81	Crinkle washers for general engineering purposes metric series
60	HW	6	NOVA058_B82	Hexagon Socket Head Cap Screws Shallow Head with Pilot Recess for Wre
61	HW	4	NOVA058_B83	Fasteners - Spring lock washers for screws with cylindrical heads - Specific
62	HW	63	NOVA058_B84	Fasteners - Spring lock washers for screws with cylindrical heads - Specific
63	HW	8	NOVA058_B85	Fasteners - Spring lock washers for screws with cylindrical heads - Specific
64	HW	4	NOVA058_B86	Hexagon Socket Head Cap Screw
65	HW	87	NOVA058_B87	Hexagon Socket Head Cap Screw
66	HW	92	NOVA058_B88	Hexagon Socket Head Cap Screw
67	HW	64	NOVA058_B89	Silver plated Vented Screw, Supplied with Cartridge
68	HW	8	NOVA058_B90	Hexagon Socket Head Cap Screw
69	HW	6	NOVA058_B91	Hexagon Socket Head Cap Screw
70	HW	10	NOVA058_B92	Hexagon Socket Head Cap Screw
71	HW	3	NOVA058_B93	Hexagon Socket Head Cap Screw
72	HW	9	NOVA058_B94	Hexagon Socket Head Cap Screw
73	HW	4	NOVA058_B95	Plain washers - Normal series - Product grade A
74	HW	63	NOVA058_B96	Plain washers - Normal series - Product grade A
75	HW	8	NOVA058_B97	Plain washers - Normal series - Product grade A
76	HW	8	NOVA058_B98	Plain washers-Small series-Product grade A
77	HW	8	NOVA058_B99	Parallel pins of hardened steel and martensitic stainless steel (Dowel pins)
78	HW	4	NOVA058_B100	Parallel pins of hardened steel and martensitic stainless steel (Dowel pins)
79	HW	8	NOVA058_B101	
80	WG	4	NOVA058_B102	WR10 to WR15 transition, Part 1 (Part of WAVEGUIDE OUTPUT, WR-1-ass
81	WG	4	NOVA058_B103	WR10 to WR15 transition, Part 2 (Part of WAVEGUIDE OUTPUT, WR-1-ass
82	HN		NOVA058_B104	DC-cables 300K-15K
83	HN		NOVA058_B105	DC cables 15K-LNA
84	HN		NOVA058_B106	DC cables 15K- temperature sensors
85	WG	2	NOVA058_B107	90Degree Twists
86	CRYO	2	NOVA058_B108	O-ring 300K flange
87	CRYO	3	NOVA058_B109	Temperature Sensors for the Cartridge
88	CRYO	TBD	NOVA058_B110	Additional temperature Sensors

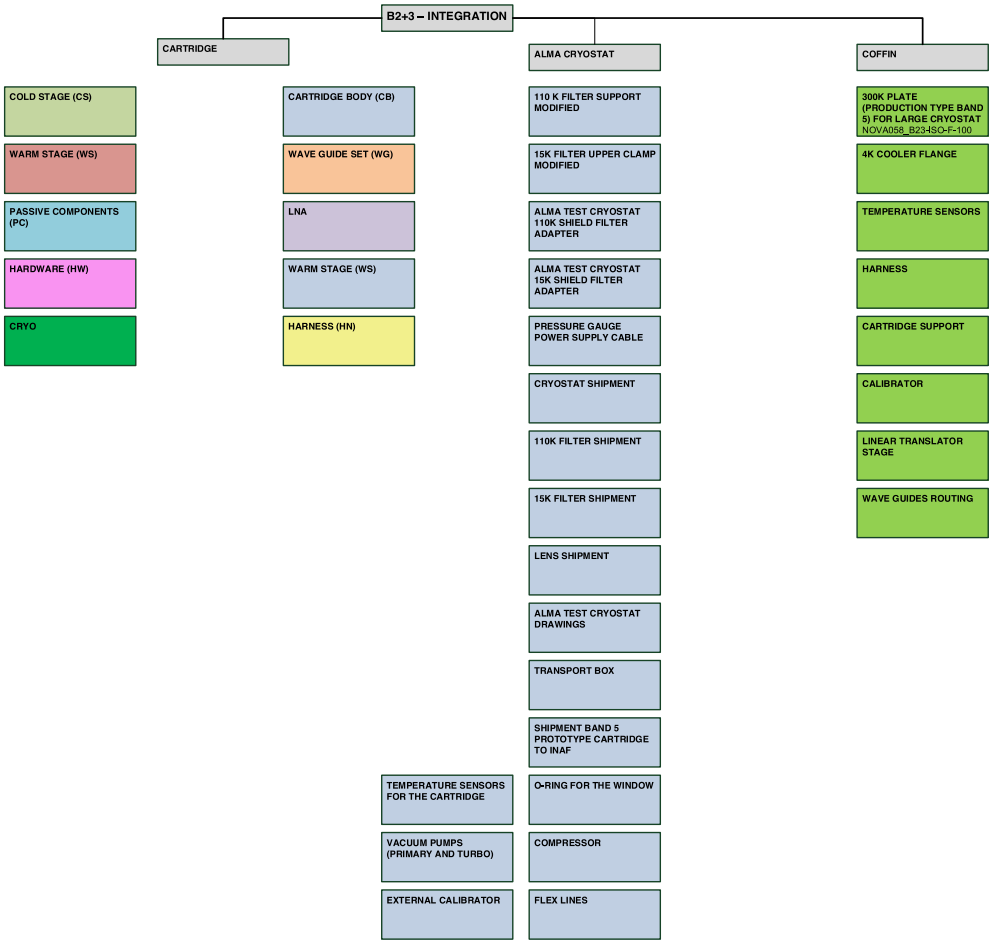
6.2 Cryostat

1		1		110 K filter support modified
2		1		15K filter upper clamp modified
3		1		ALMA test Cryostat 110K shield filter adapter
4		1		ALMA test Cryostat 15K shield filter adapter
5		1		Pressure Gauge power supply cable
		1		cryostat shipment
		1		110K Filter shipment
		1		15K filter shipment
		1		Lens shipment
6		1		ALMA test cryostat Drawings
7		1		Transport BOX
8				Ship Band 5 prototype cartridge to INAF
12		1		O-ring for the window
13		1		Compressor
14		2		Flex Lines
15				Temperature Sensors for the Cartridge
		2		Vacuum pumps (primary and turbo)
		1		External Calibrator

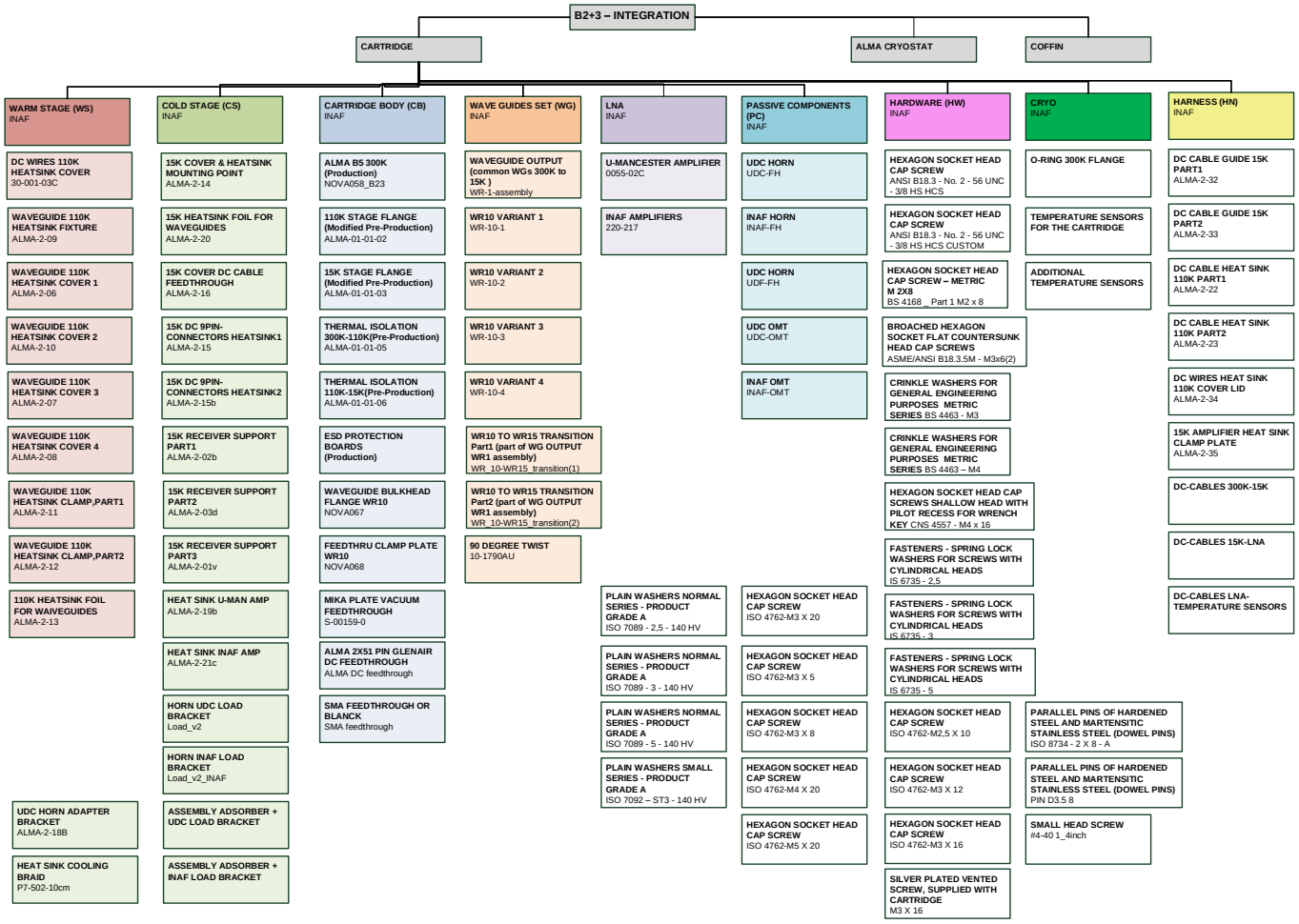
6.3 Coffin

16	CL: COLD L0	1	NOVA058_B23-ISO-F-100	300K Plate (Production type Band 5) for large cryostat
				4K cooler flange
				Temperature Sensors
				harness
				cartridge support
	CL			calibrator
	CL			linear translator stage
				Wave guides routing

7 Band 2+3 Integration Product Tree (overall)



8 Band 2+3 Integration Product Tree (Cartridge)



9 Non conformity report

The Change Request Submission Form (CRE-SF) and the field description are provided hereafter.

	NON CONFORMITY REPORT **BAND 2+3 INTEGRATION**	**REFERENCE:** **DATE:** **ISSUE** **PAGE:**

TITLE:	
PT BRANCH:	**PART NUMBER**
DESCRIPTION OF THE NON CONFORMITY/CHANGE AND REASON:	
ITEMS AFFECTED BY NC	
DOCUMENT ATTACHED:	
IMPACT ESTIMATED ON PERFORMANCES:	
IMPACT ESTIMATED ON SCHEDULE:	
IMPACT ESTIMATED ON BUDGET:	

BAND 2+3 INTEGRATION BOARD	☐ **ACCEPTED**	☐ **REJECTED**	☐ **WITHDRAWN**
OBSERVATION			

REFERENCE: the CRE Number as from ???

NC title: a one-line description of the change.

Affected Configuration Item(s): the list of items that this NC intends to change. For each item, its current identification number and a short description.

Affected Document(s) / Drawing(s) / Requirement(s): the document(s) / drawing(s) / requirement(s) affected by the NC.

Description of the change: The description of the change (the necessary modifications of the contractual documents (e.g. SPE, SOW, ICD, etc.) shall be clearly indicated by quoting the old and proposed new versions of the text or the drawing).

Reason for the change/Expected benefits: why this change is considered necessary and/or why the non-conformity occurred. If this is provided by attached document(s), make a reference and provide a minimum summary of 3- 4 lines here.

Expected Impacts: Expected impact on costs (giving detailed information on the manpower, material, cost etc., and reflecting the differential cost for changes in work packages). Expected impact on schedule of key milestones (including detailed schedule of the change implication). Expected impact on safety of the system. Expected impact on the technical feasibility, function, performance, reliability, maintainability of the contracted system and impact on its interfacing systems. Expected impact on user personnel (e.g. the working conditions of operators and technicians). This is not mandatory if ESO is the initiator.

Additional document(s): Any additional document that is needed to technically evaluate this CRE. If needed, additional pages may be added to the CRE-SF with technical explanations. In case of many pages, it is recommended to have a separate document (Technical Report)