Project management and main CDMR outcomes

NectarCAM remote meeting, Apr 6-7, 2021

Philippe GALDEMARD (CEA/Irfu)

Outline

- F2F meeting and Progress reports
- NectarCAM team update
- MST program
- QM status, schedule.
- ADP
- Production : MoU, schedule.
- CDMR review→ process and main outcomes

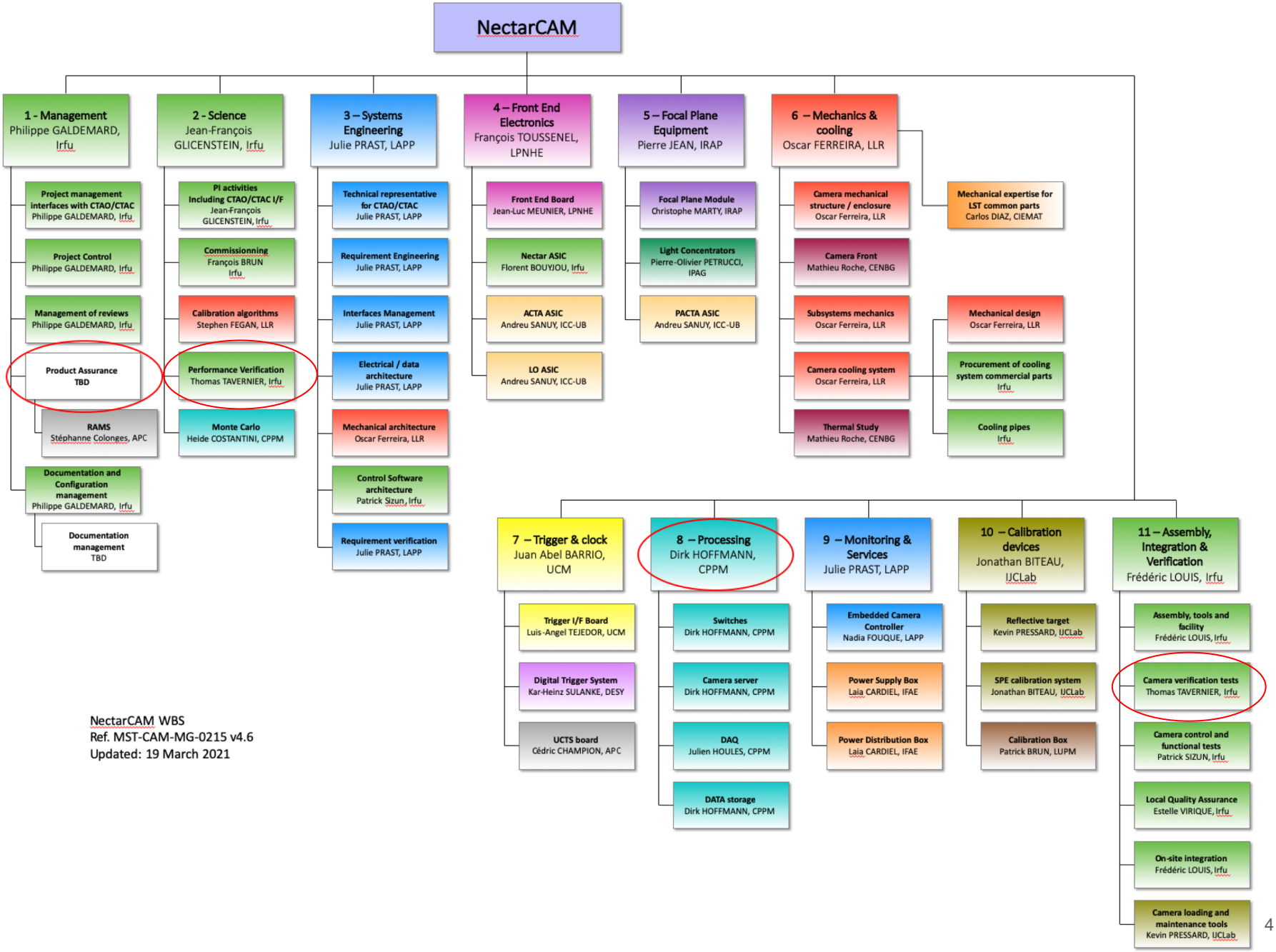
During the presentation at any time, do not hesitate interrupting me and asking questions !

F2F meetings and Progress reports

- The pandemic situation prevented us from organising F2F meetings. The last was supposed to be held in Bordeaux in summer 2020, but it had to be postponed.

- The last Progress report (issue 5) was issued in April 2020. The next issue will be released by the end of June 2021.

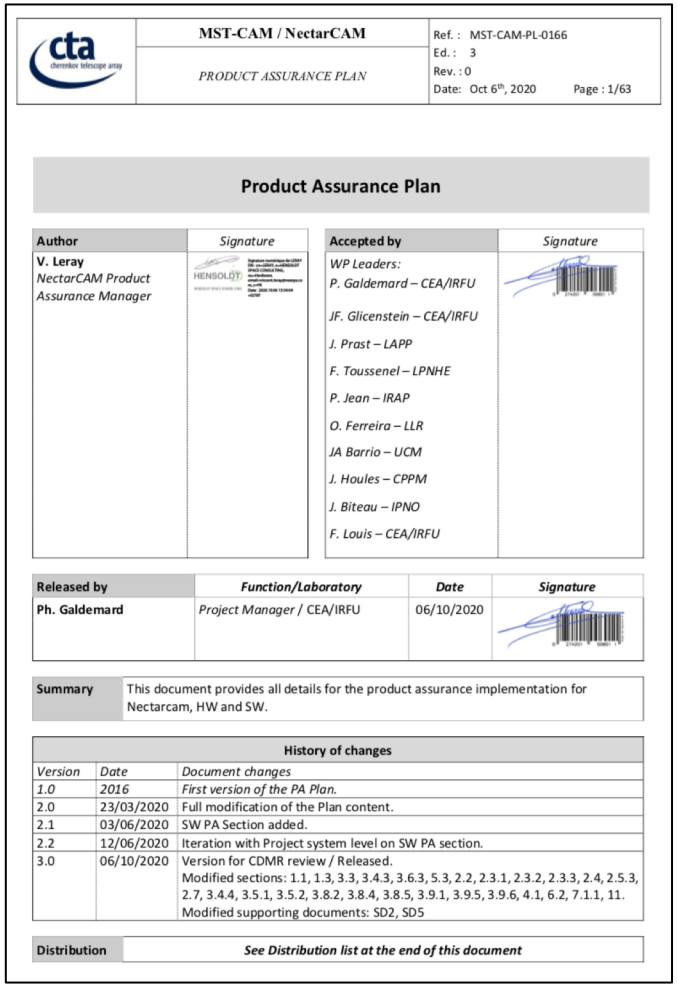
Updated WBS



NectarCAM WBS
Ref. MST-CAM-MG-0215 v4.6
Updated: 19 March 2021

Product Assurance contract

- The contract of CNRS/IN2P3 with Nexeya has ended in February 2021. The Product Assurance Manager Vincent Leray was 60% on NectarCAM since September 2018.
- For the Production, CEA/Irfu will set-up a new contract to hire a PAM:
  - Full time on NectarCAM
  - Mainly located at Irfu but able to visit all lab as necessary
  - Will help all labs to fulfil PA requirements
  - Will take the configuration control management
  - Will help with the documentation management
- IN2P3 will contract with Nexeya (around 20 days) in order to finish the software/firmware part of the PA plan, and close associated CDMR actions.



cta cherenkov telescope array

MST-CAM / NectarCAM

PRODUCT ASSURANCE PLAN

Ref. : MST-CAM-PL-0166
Ed. : 3
Rev. : 0
Date: Oct 6th, 2020 Page : 1/63

Product Assurance Plan

Author	Signature	Accepted by	Signature
V. Leray *NectarCAM Product Assurance Manager*		*WP Leaders:* *P. Galdemard – CEA/IRFU* *JF. Glicenstein – CEA/IRFU* *J. Prast – LAPP* *F. Toussenel – LPNHE* *P. Jean – IRAP* *O. Ferreira – LLR* *JA Barrio – UCM* *J. Houles – CPPM* *J. Biteau – IPNO* *F. Louis – CEA/IRFU*	

Released by	*Function/Laboratory*	*Date*	*Signature*
Ph. Galdemard	*Project Manager* / CEA/IRFU	06/10/2020	

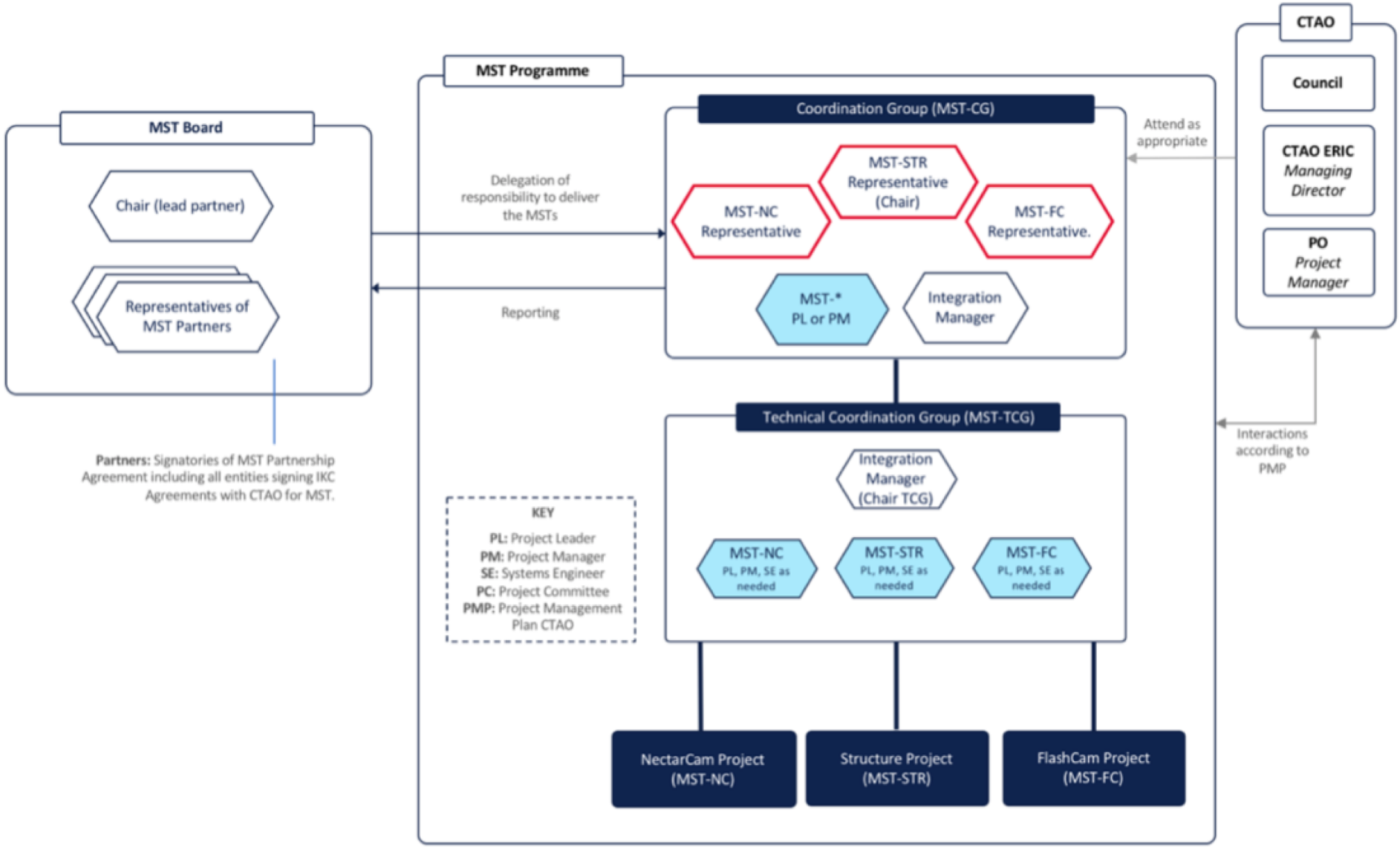
Summary	This document provides all details for the product assurance implementation for Nectarcam, HW and SW.

History of changes

Version	*Date*	*Document changes*
1.0	*2016*	*First version of the PA Plan.*
2.0	23/03/2020	Full modification of the Plan content.
2.1	03/06/2020	SW PA Section added.
2.2	12/06/2020	Iteration with Project system level on SW PA section.
3.0	06/10/2020	Version for CDMR review / Released. Modified sections: 1.1, 1.3, 3.3, 3.4.3, 3.6.3, 5.3, 2.2, 2.3.1, 2.3.2, 2.3.3, 2.4, 2.5.3, 2.7, 3.4.4, 3.5.1, 3.5.2, 3.8.2, 3.8.4, 3.8.5, 3.9.1, 3.9.5, 3.9.6, 4.1, 6.2, 7.1.1, 11. Modified supporting documents: SD2, SD5

Distribution	***See Distribution list at the end of this document***

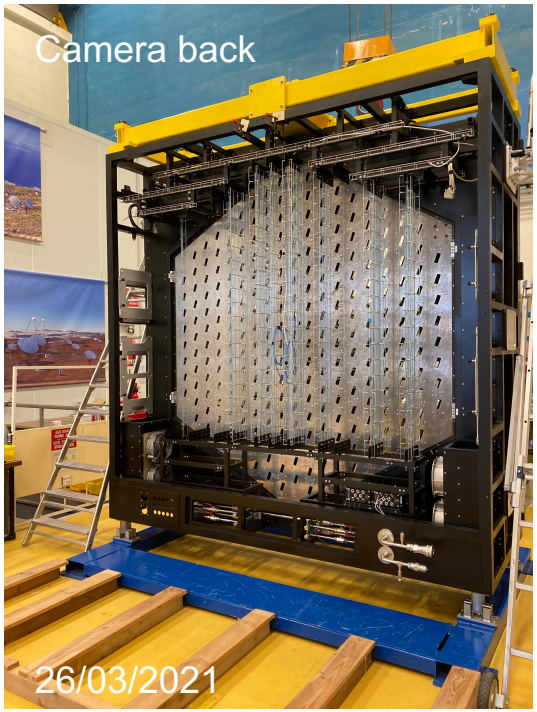
MST Programme: started in may 2020

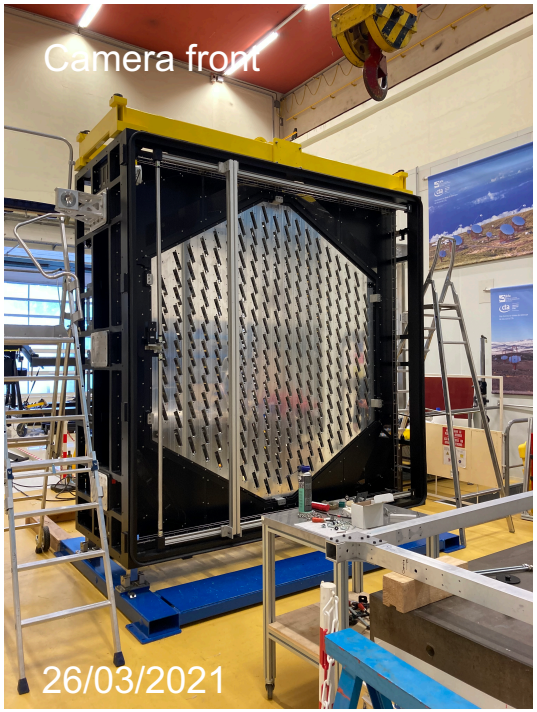


Groups of the MST programme

- Two groups including members from NectarCAM, FlashCam and the MST structure meet regularly:
  - MST-CG (coordination group): meets every 2 weeks
    - D. Berge, M. Garczarczyk (structure), J. Hinton, G. Hermann (FlashCam), J.F. Glicenstein, P. Galdemard (NectarCAM).
    - Mainly political discussions like MST MoU, the repartition of MSTs on northern and southern sites, the location of MSTs at la Palma; preparation of reports for the MST board. Ex: Submission of the pathfinder strategy to decide the implementation of 5 MSTs at la Palma before the ERIC creation.
  - MST-TCG (Technical coordination, group) : meets every monday
    - A. Steiner, M. Garczarczyk (structure), M. Barcelo, G. Hermann (FlashCam), J. Prast, Ph. Galdemard (NectarCAM) + technical experts from the teams as required
    - Technical discussions. ex: Chiller specifications, camera weight, wind protection system, camera maintenance structure, interlocks, …
- MST board: Higher level group taking decisions.
  - Chaired by C. Stegmann.
  - Patricia Roussel Chomaz, CEA; Anne-Isabelle Etienvre permanently invited ; Berrie Giebels, CNRS
  - Christian Stegmann, DESY, Rafael Rebolo, IAC
  - Filippo Zerbi, INAF, Werner Hofmann, MPG
  - Olaf Reimer, U of Innsbruck
  - Vitor de Souza, U of São Paulo
  - Petr Travnicek, IoP / CAS, Michal Rybinski, MSHE or Jacek Niemiec, INP PAS

QM status

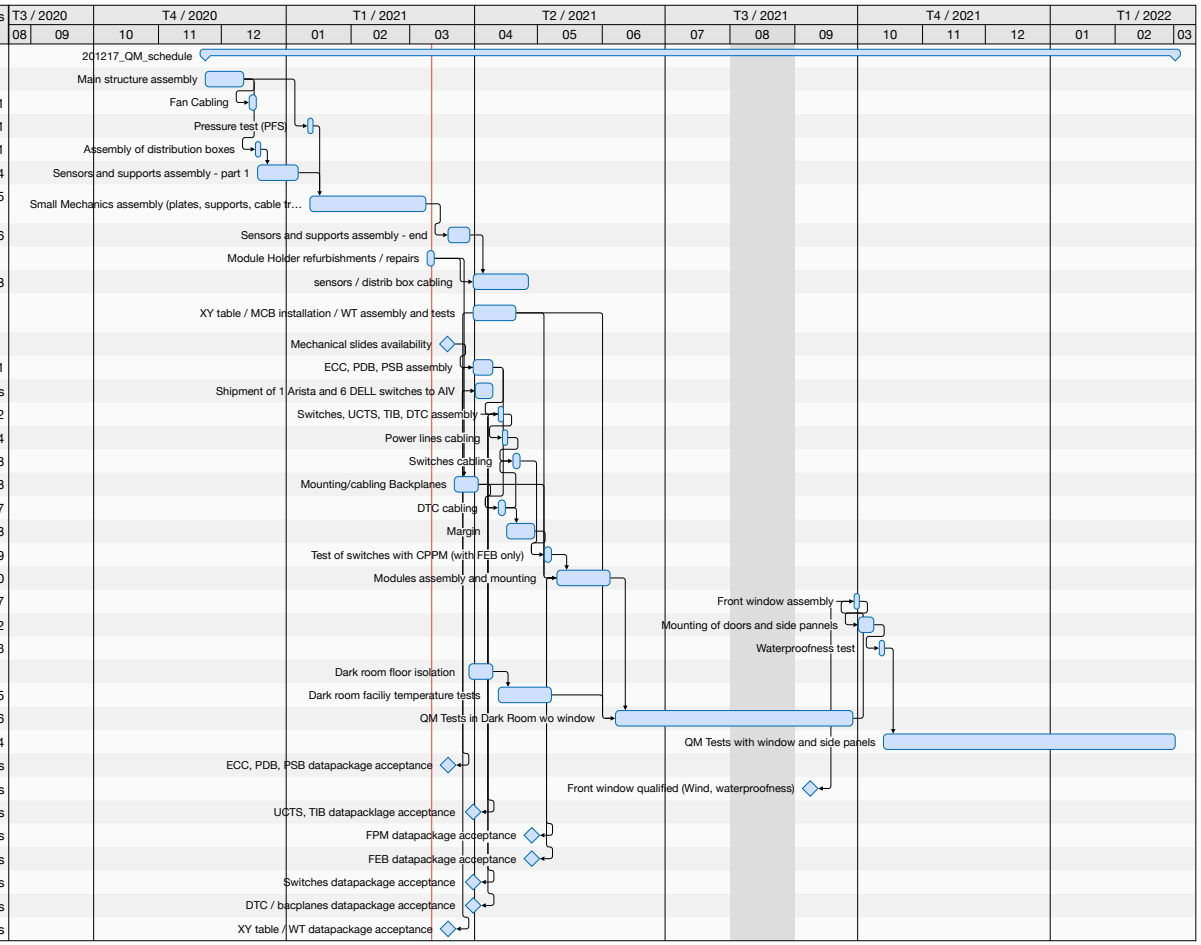




- Mechanical assembly completed
- Electronics installation (DTBs, DTC, cabinets, …) and associated cabling will start soon
- Test of switches with 265 FEBs planned for early May
- Mounting of modules by the end of May
- Tests of the complete camera without front window and side panels from June 2021 until the end of September 2021.
- Test of the camera with the front window and side panels starting by mid-October 2021 (→ including thermal tests)

QM schedule

N°	Traits	Titre	Travail donné	Début planifié	Fin prévue	Prédécesseurs
0		**201217_QM_schedule**		**23 nov. 2020**	**1 mars 2022**	
1		Main structure assembly	15j	23 nov. 2020	11 déc. 2020	
2		Fan Cabling	4j	14 déc. 2020	17 déc. 2020	1
3		Pressure test (PFS)	1 jour	11 janv. 2021	11 janv. 2021	1
4		Assembly of distribution boxes	1j?	17 déc. 2020	17 déc. 2020	1
5		Sensors and supports assembly - part 1	4j	18 déc. 2020	6 janv. 2021	4
6		Small Mechanics assembly (plates, supports, cable trays, ...)	1j?	12 janv. 2021	8 mars 2021	3; 5
7		Sensors and supports assembly - end	7j	19/03/2021	29/03/2021	6
8		Module Holder refurbishments / repairs	4j	9 mars 2021	12/03/2021	
9		sensors / distrib box cabling	19j	31/03/2021	26 avril 2021	7; 8
10		XY table / MCB installation / WT assembly and tests	15j	31/03/2021	20 avril 2021	
11		Mechanical slides availability		19/03/2021	19/03/2021	
12		ECC, PDB, PSB assembly	8j	31/03/2021	9 avril 2021	11
13		Shipment of 1 Arista and 6 DELL switches to AIV	7j	1 avril 2021	9 avril 2021	14DD-7 jours
14		Switches, UCTS, TIB, DTC assembly	2j	12 avril 2021	13 avril 2021	12
15		Power lines cabling	3j	14 avril 2021	16 avril 2021	14
16		Switches cabling	4j	19 avril 2021	22 avril 2021	15; 18
17		Mounting/cabling Backplanes	10j	22/03/2021	2 avril 2021	8
18		DTC cabling	4j	12 avril 2021	15 avril 2021	12; 17
19		Margin	10j	16 avril 2021	29 avril 2021	18
20		Test of switches with CPPM (with FEB only)	4j	4 mai 2021	7 mai 2021	16; 19
21		Modules assembly and mounting	20j	10 mai 2021	4 juin 2021	10; 17; 20
22		Front window assembly	2j	29/09/2021	30/09/2021	27
23		Mounting of doors and side pannels	6j	1 oct. 2021	8 oct. 2021	22
24		Waterproofness test	2j	11 oct. 2021	12 oct. 2021	23
25		Dark room floor isolation	10j	29/03/2021	9 avril 2021	
26		Dark room faciliy temperature tests	20j	12 avril 2021	7 mai 2021	25
27		QM Tests in Dark Room wo window	3m	7 juin 2021	28/09/2021	10; 21; 26
28		QM Tests with window and side panels	5m	13 oct. 2021	1 mars 2022	24
29		ECC, PDB, PSB datapackage acceptance		19/03/2021	19/03/2021	12DF-8 jours
30		Front window qualified (Wind, waterproofness)		8 sept. 2021	8 sept. 2021	22DF-15 jours
31		UCTS, TIB datapacklage acceptance		31/03/2021	31/03/2021	14DF-8 jours
32		FPM datapackage acceptance		28 avril 2021	28 avril 2021	21DF-8 jours
33		FEB datapackage acceptance		28 avril 2021	28 avril 2021	21DF-8 jours
34		Switches datapackage acceptance		31/03/2021	31/03/2021	14DF-8 jours
35		DTC / bacplanes datapackage acceptance		31/03/2021	31/03/2021	14DF-8 jours
36		XY table / WT datapackage acceptance		19/03/2021	19/03/2021	10DF-8 jours



Acceptance Data Package (ADP)

For the QM deliverables, we started to work with ADPs.

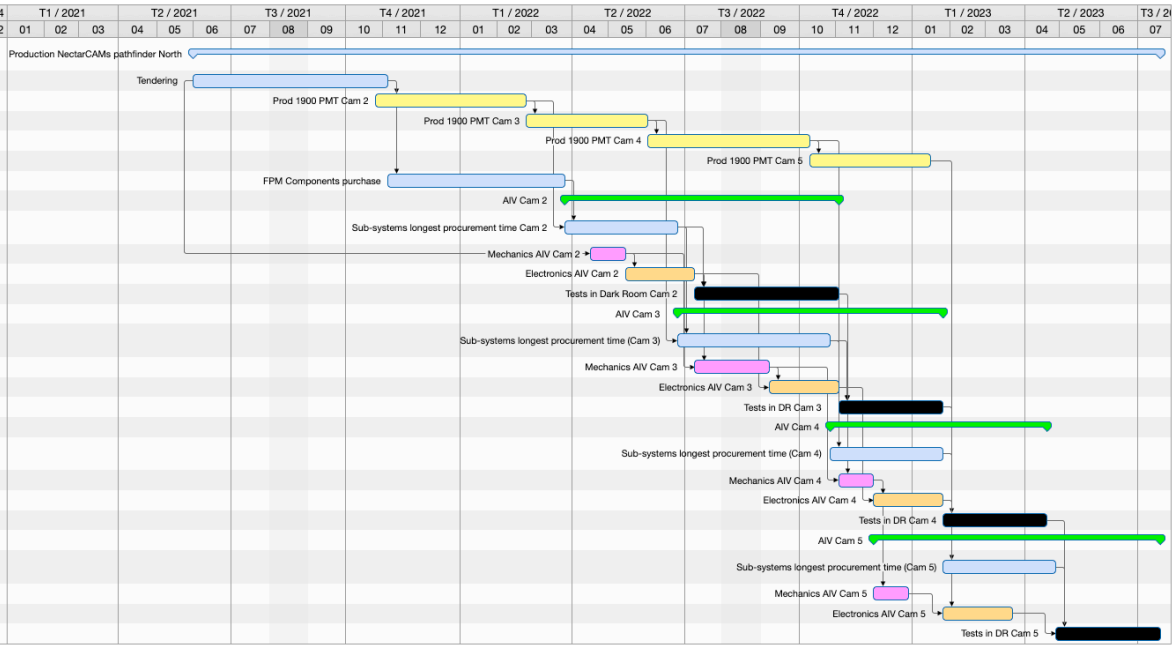
The ADP is a set of documentation that is submitted before sending the deliverable hardware. It is described in detail in the PA plan.

The ADP includes:

- The certificate of conformity stating that the hardware was successfully tested according to a referenced test plan
- REACh certificates
- CIDL / ABCL including SW and FW configurations
- Non-conformance reports
- Test reports, user manuals
- Parameters for the camera database

Production schedule

N°	Traits	Titre	Travail donné	Début prévu	Ressources	Coûts planifiés pour les pièces jointes	Prédécesseurs
0		**Production NectarCAMs pathfinder North**		**1 juin 2021**			
1		Tendering	4,5 mois	1 juin 2021			
2		Prod 1900 PMT Cam 2		26 oct. 2021			1FD-7 jours
3		Prod 1900 PMT Cam 3		24 févr. 2022			2
4		Prod 1900 PMT Cam 4	1 jour ?	2 juin 2022			3
5		Prod 1900 PMT Cam 5	4 mois	11 oct. 2022			4
6		FPM Components purchase	19 semaines	4 nov. 2021			1
7		**AIV Cam 2**		**28/03/2022**			
8		Sub-systems longest procurement time Cam 2	13 semaines	28/03/2022			2; 6
9		Mechanics AIV Cam 2	1 mois	18 avril 2022			1DD+10 mois
10		Electronics AIV Cam 2	2 mois	16 mai 2022			9
11		Tests in Dark Room Cam 2	1 jour ?	11 juil. 2022			8; 10
12		**AIV Cam 3**		**27 juin 2022**			
13		Sub-systems longest procurement time (Cam 3)	13 semaines	27 juin 2022			3; 8
14		Mechanics AIV Cam 3	1 mois	11 juil. 2022			9; 10
15		Electronics AIV Cam 3	2 mois	8 sept. 2022			10; 14
16		Tests in DR Cam 3	3 mois	3 nov. 2022			11; 13; 15
17		**AIV Cam 4**		**27 oct. 2022**			
18		Sub-systems longest procurement time (Cam 4)	13 semaines	27 oct. 2022			4; 13
19		Mechanics AIV Cam 4	1 mois	3 nov. 2022			14; 15
20		Electronics AIV Cam 4	2 mois	1 déc. 2022			15; 19
21		Tests in DR Cam 4	3 mois	26 janv. 2023			16; 18; 20
22		**AIV Cam 5**		**1 déc. 2022**			
23		Sub-systems longest procurement time (Cam 5)	13 semaines	26 janv. 2023			5; 18
24		Mechanics AIV Cam 5	1 mois	1 déc. 2022			19
25		Electronics AIV Cam 5	2 mois	26 janv. 2023			20; 24
26		Tests in DR Cam 5	3 mois	27 avril 2023			21; 23; 25



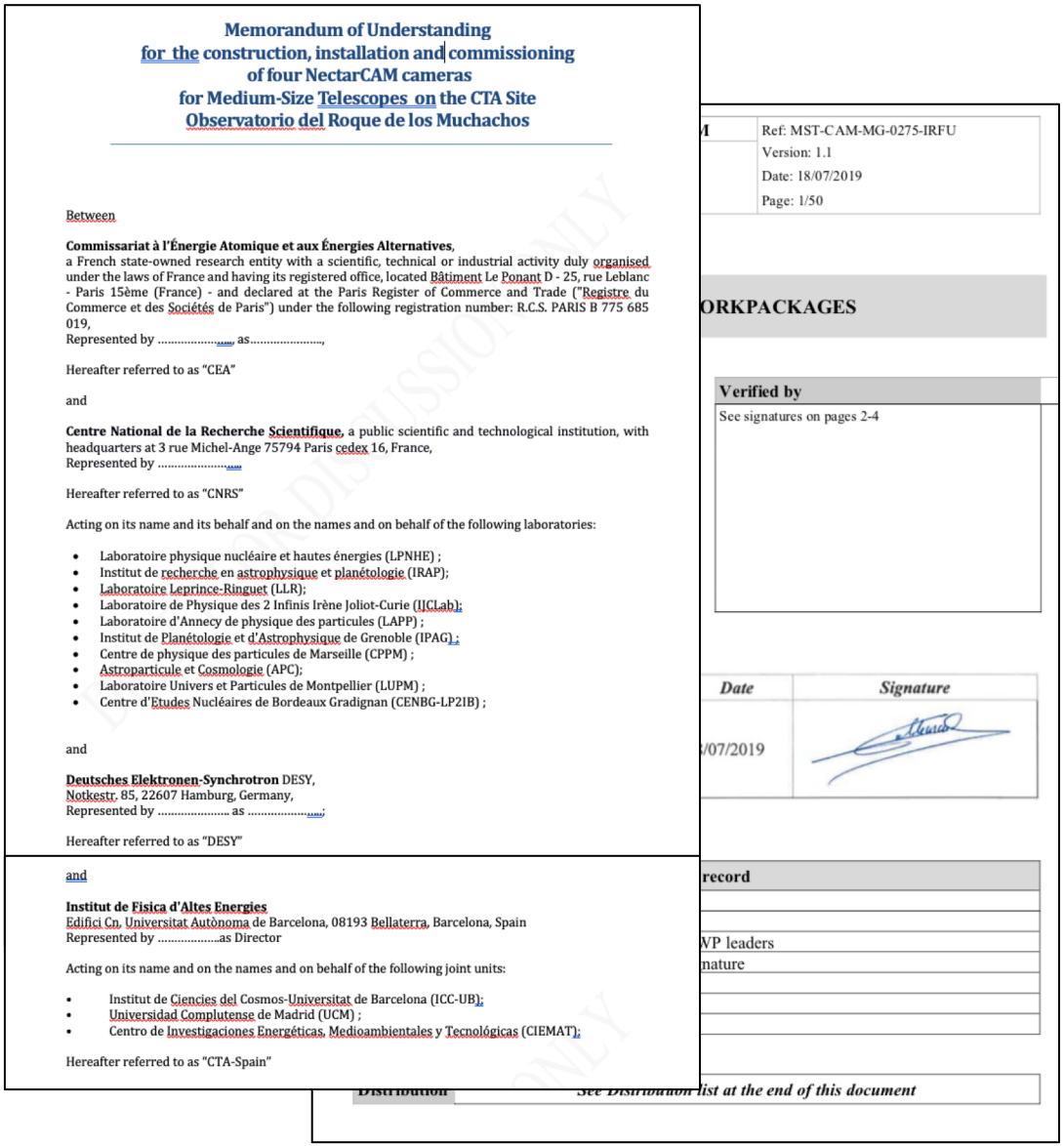
In accordance with present plans for CTA-N (5 MSTs installed before the end of 2023)

<u>Suggestion:</u> contracts for the procurement of 4 camera elements, including commercial options for additional cameras, when the financial amounts allow (the PMT contract could not include these options). The main mechanics tender should be issued in June 2021 in order to fulfil the above schedule.

NectarCAM MoU for the production of the next 4 cameras

- A draft MoU has been prepared by CEA in November 2020. It involves the production of the next 4 cameras.
- It is being reviewed by CNRS
- As soon as the feed-back of CNRS is given and their comments included, a new version will be circulated within German and Spanish labs.

- The Workpackages document will be an annex of the MoU. It will be checked and could be updated as needed.



Memorandum of Understanding
for the construction, installation and commissioning
of four NectarCAM cameras
for Medium-Size Telescopes on the CTA Site
Observatorio del Roque de los Muchachos

Between

Commissariat à l'Énergie Atomique et aux Énergies Alternatives,
a French state-owned research entity with a scientific, technical or industrial activity duly organised under the laws of France and having its registered office, located Bâtiment Le Ponant D - 25, rue Leblanc - Paris 15ème (France) - and declared at the Paris Register of Commerce and Trade ("Registre du Commerce et des Sociétés de Paris") under the following registration number: R.C.S. PARIS B 775 685 019,
Represented by ....., as.....,

Hereafter referred to as "CEA"

and

Centre National de la Recherche Scientifique, a public scientific and technological institution, with headquarters at 3 rue Michel-Ange 75794 Paris cedex 16, France,
Represented by .....

Hereafter referred to as "CNRS"

Acting on its name and its behalf and on the names and on behalf of the following laboratories:

- Laboratoire physique nucléaire et hautes énergies (LPNHE) ;
- Institut de recherche en astrophysique et planétologie (IRAP);
- Laboratoire Leprince-Ringuet (LLR);
- Laboratoire de Physique des 2 Infinis Irène Joliot-Curie (IJCLab);
- Laboratoire d'Annecy de physique des particules (LAPP) ;
- Institut de Planétologie et d'Astrophysique de Grenoble (IPAG) ;
- Centre de physique des particules de Marseille (CPPM) ;
- Astroparticule et Cosmologie (APC);
- Laboratoire Univers et Particules de Montpellier (LUPM) ;
- Centre d'Etudes Nucléaires de Bordeaux Gradignan (CENBG-LP2IB) ;

and

Deutsches Elektronen-Synchrotron DESY,
Notkestr. 85, 22607 Hamburg, Germany,
Represented by ..... as .....;

Hereafter referred to as "DESY"

and

Institut de Fisica d'Altes Energies
Edifici Cn, Universitat Autònoma de Barcelona, 08193 Bellaterra, Barcelona, Spain
Represented by .....as Director

Acting on its name and on the names and on behalf of the following joint units:

- Institut de Ciencies del Cosmos-Universitat de Barcelona (ICC-UB);
- Universidad Complutense de Madrid (UCM) ;
- Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT);

Hereafter referred to as "CTA-Spain"

M | Ref: MST-CAM-MG-0275-IRFU
Version: 1.1
Date: 18/07/2019
Page: 1/50

ORKPACKAGES

Verified by
See signatures on pages 2-4

Date | Signature
/07/2019

record

VP leaders
nature

Distribution | See Distribution list at the end of this document

NectarCAM CDMR Process

- CDMR stands for ‘Critical Design and Manufacturing readiness Review”. This review was the combination of two reviews : CDR and MRR, due to CTA-N tight schedule
- The CDR part is conducted:
  - to verify that the detailed design of NectarCAM satisfy specified requirements;
  - to review preliminary hardware product specifications;
  - to assess risk areas for each configuration item;
  - to evaluate preliminary test planning;
  - to evaluate the adequacy of preliminary operation and support documents.
- The MRR part is conducted to assess the overall production readiness


CTA-PLA-MST-306000-0001
Issue 1, Rev. B, 2020-10-21
Page 1 of 10

MST NectarCAM CDMR Plan

Prepared by
Digitally signed by member: E037291C-F55D-4EEE-8A00-A26A4F77473F FDCA10C0-B659-4663-8BAC-E62E8FB41839
Date: 2020.10.23 13:33:21 +02'00'
N. Whyborn, CTA Lead Systems Engineer

Approved by
2020-10-23
P. Galdemard, NectarCAM Project Manager

Released by
Wolfgang Wild
Digitally signed by Wolfgang Wild
Date: 2020.10.23 17:41:23 +02'00'
W. Wild, CTA Project Manager

- Details in the review plan CTA-PLA-MST-306000-0001 dated 21/10/2020

Review members

NectarCAM review Team:

WP leaders + PAM + RAMS manager

Name	Affiliation & position
François Toussenel	CNRS/IN2P3/LPNHE, Front End Electronics WP leader
Frédéric Louis	CEA/Irfu, AIV WP leader
Jean-François Glicenstein	CEA/Irfu, Principal Investigator
Jonathan Biteau	CNRS/IN2P3/IJCLab, Calibrations Devices WP leader
Juan Abel Barrio	UCM, Trigger & Clocks WP leader
Julie Prast	CNRS/IN2P3/LAPP, systems engineer and Monitoring & Service WP leader
Julien Houles	CNRS/IN2P3/CPPM, Processing WP leader
Oscar Ferreira	CNRS/IN2P3/LLR, Mechanics & cooling WP leader and Mechanics architect
Patrick Sizun	CEA/Irfu, software architect and Camera Control Software leader
Philippe Galdemard	CEA/Irfu, Project Manager
Pierre Jean	CNRS/INSU/IRAP, Focal Plane Equipment WP leader
Stéphane Colonges	CNRS/IN2P3/APC, RAMS responsible
Vincent Leray	Nexeya, Product Assurance Manager

Review Panel:

Name	Affiliation & role
Andrea Bulgarelli	INAF, ACADA SAG Pipeline
Carlos Delgado	CIEMAT, LST Camera
Chiara Montanari	CTAO, Interface Coordinator
Elisa Antolini	CTAO, ACADA Systems Engineer
Francesco Dazzi	CTAO, Senior Systems Engineer
George Pruteanu	CTAO, RAM Engineer
German Hermann	MPP Munich, MST FlashCam
Gianluca Giavitto	DESY, SST Cam Systems Engineer
Karl Tegel	CTAO, System Safety Engineer
Markus Garczarczyk	DESY, MST STR Coordinator
Nick Whyborn (Chairperson)	CTAO, Lead Systems Engineer
Olivier Schnurr	CTAO, Requirement Management
Pascal Vincent	LPNHE Paris, external reviewer
Razmik Mirzoyan	MPP Munich, external reviewer
Roberta Zanin	CTAO, Project Scientist
Vanessa Montes	CTAO, Systems Engineer
Volker Heinz	CTAO, CTA-S Site Manager

NectarCAM CDMR Process

- The document package was made available on Nov. 5, 2020

213 documents were delivered

- 22 system level
- 191 workpackage level

NectarCAM CDMR documentation list — Update: 05/11/2020
Document Number : MST-CAM-LI-0430-IRFU — rev. 2.1

DD#	Group	Category	Title	Document reference	issue	SP Link (optional)	Detailed contents	Maturity status at CDMR	Book captain	Remarks
System level and Management documents										
DD0001	System level and Management	Management	NectarCAM Management Plan	MST-CAM-MG-0329-IRFU	1.1	MST-CAM-MG-0329-IRFU	- Project organisation - Roles and responsibilities, - WBS - Ressources and finances management	1	P. GALDEMARD	
DD0002	System level and Management	Management	NectarCAM Workpackages	MST-CAM-MG-0275-IRFU	1.1	MST-CAM-MG-0275-IRFU	- Detailed description of the share of tasks between NectarCAM partners	1	P. GALDEMARD	
DD0003	System level and Management	Management	NectarCAM Product Assurance plan	MST-CAM-PL-0166	3.0	MST-CAM-PL-0166	- Rules applied to products production - Definition of acceptance data packages - Non conformance management - Traceability - Legal issues	1	V.LERAY	
DD0004	System level and Management	Management	NectarCAM Configuration management plan	MST-CAM-PL-0325-IRFU	1.0	MST-CAM-PL-0325-IRFU	- Configuration management - Change management processes and authorities	F	V.LERAY	
DD0005	System level and Management	Management	Risk register	MST-CAM-LI-0441-IRFU	10.0	MST-CAM-LI-0441-IRFU	- List of remaining project risks (obsolete risks have been removed)	1	P. GALDEMARD	
DD0006	System level and Management	Management	CIDL	MST-CAM-LI-0440-LIR	1.0	MST-CAM-LI-0440-LIR	- List of technical specifications, ICDs, reports, drawings, procedures, user manual, firmares or softwares version,...	1	V. LERAY	
DD0007	System level and Management	RAMS	NectarCAM Maintenance plan	MST-CAM-RP-0235-APC	5.4	MST-CAM-RP-0235-APC	- Maintenance strategy - Delivered spares - Recommended number of spares - The maintenance procedures are NOT included in this plan	D	S. COLONGES	
DD0008	System level and Management	RAMS	NectarCAM RAMS Report	MST-CAM-RP-0088-APC	4.6	MST-CAM-RP-0088-APC	- Methodology - Prediction of reliability and availability - Identification of technical risks that have impact on Safety	1	S. COLONGES	
DD0009	System level and Management	RAMS	NectarCAM Safety Report	MST-CAM-0411-IRFU	1.0	MST-CAM-0411-IRFU	- Mitigation strategy - Safety conformance assessment in accordance with the CE applicable Directives	D	P. GALDEMARD	
DD0010	System level and Management	Systems engineering	NectarCAM Interface Management Plan	MST-CAM-PL-0075-LAPP	2	MST-CAM-PL-0075-LAPP		F	Julie PRAST	
DD0011	System level and Management	Systems engineering	NectarCAM verification matrix	MST-CAM-SP-0257-LAPP	1.4	MST-CAM-SP-0257-LAPP	- Applicable requirement and status of conformance	1	Julie PRAST	
DD0012	System level and Management	Systems engineering	NectarCAM PBS	MST-CAM-TN-0004-CEA	4.2	MST-CAM-TN-0004-CEA	- NectarCAM Product Breakdown Structure	1	Julie PRAST	
DD0013	System level and Management	Systems engineering	Camera-Structure Interface Control Document	MST-CAM-ICD-2336-DESY	0.9.1	MST-CAM-ICD-2336-DESY	- MST interface control document	1	M. GARCZARCZYK	
DD0014	System level and Management	Systems engineering	NectarCAM interface matrix	MST-CAM-ICD-0722-LAPP	3.5	MST-CAM-ICD-0722-LAPP	- Description of all NectaCAM internal sub-system interfaces	1	Julie PRAST	
DD0015	System level and Management	Systems level description / design	NectarCAM architecture and system level Design	MST-CAM-SN-0446-IRFU	1.0	MST-CAM-SN-0446-IRFU	- Flow down of requirements : Interpretation of requirements, allocation of budgets to sub-systems - Internal requirements not deduced from CTA requirements - System overview - Architecture (sub-systems decomposition) - Mass budget, power budget,...	1	J.F. GUCENSTEIN	
DD0016	System level and Management	Systems level description / design	NectarCAM sub-systems identification & location	MST-CAM-TN-0388-IRFU	1.0	MST-CAM-TN-0388-IRFU	- Sensors, cables & subsystems localisation	1	Estelle VIRIQUE	
DD0017	System level and Management	Systems level description / design	NectarCAM cabling	MST-CAM-TN-0442-IRFU	1.1	MST-CAM-TN-0442-IRFU	- Overview of all internal harnesses	1	Estelle VIRIQUE	
DD0018	System level and Management	Systems level description / design	NectarCAM Camera Control Software Design	MST-CAM-TN-0068-IRFU	2.2	MST-CAM-TN-0068-IRFU		D	Patrick SIZUN	
DD0019	System level and Management	Systems level description / design	NectarCAM User manual at camera level	MST-CAM-UM-0433-IRFU	1.0	MST-CAM-UM-0433-IRFU	- Instruction to handle, use the harware and the software - Auto-diagnostics, operating conditions monitoring - Troubleshooting	D	F. BRUN	
DD0020	System level and Management	Scientific	Verification of scientific requirements	MST-CAM-TR-0448-IRFU	1.2.2	MST-CAM-TR-0448-IRFU		1	J.F. GUCENSTEIN	
DD0021	System level and Management	Scientific	Calibration strategy of NectarCAM	MST-CAM-SN-0447-IRFU	1.0	MST-CAM-SN-0447-IRFU		D	J.F. GUCENSTEIN	
DD0022	System level and Management	Scientific	NectarCAM Commissionning Plan	MST-CAM-PL-0431-IRFU	1.1	MST-CAM-PL-0431-IRFU	- Exhaustive list of on-site verifications performed with the camera on the telescope, including functional and performance verifications - indicates a time allocation for each of these	D	F. BRUN	
Sub-system/workpackage level documents										
DD0023	Front End Electronics	Requirement specification and design	NectarCAM FEE design report	MST-CAM-TN-0315-LPNHE	2.2	MST-CAM-TN-0315-LPNHE	Design choices including design analysis, software, firmware doc	1	F. TOUSSENEL	
DD0024	Front End Electronics	Requirement specification and design	Front-End electronics requirements	MST-CAM-SP-0305-LPNHE	2.1	MST-CAM-SP-0305-LPNHE	FEE Sub-system specific requirements	1	F. TOUSSENEL	
DD0025	Front End Electronics	Requirement specification and design	NCAM FEB API	MST-CAM-TN-0436-LPNHE	0.9			1	V. VOISIN	
DD0026	Front End Electronics	External ICD	FrontEnd – Backplane Interface for CTA cameras	LMST-CAM-ICD-0238	10.0	LMST-CAM-ICD-0238	FEB/BP interface definition	F	J. PRAST	Identical to DD081
DD0027	Front End Electronics	External ICD	NectarCAM module controller ICD	MST-CAM-ICD-0389-LPNHE	0.9			1	V. VOISIN	
DD0028	Front End Electronics	Internal ICD	FEB mechanics ICD	MST-CAM-ICD-0313-LPNHE	1.3	MST-CAM-ICD-0313-LPNHE	Mechanics/FEB interface definition	1	J. PRAST	
DD0029	Front End Electronics	Change Request	Change request from FEB V5.1 (used in QM) to FEB V6 (to be used for production)	MST-LI-0322-LPNHE	1.0		Details mandatory changes for the FEB production version	1	F. TOUSSENEL	
DD0030	Front End Electronics	Manufacturing specifications, files and drawings	FEB_Manufacturing_documents_V5_1.zip	MST-CAM-ZIP-0314-LPNHE	2.0	MST-CAM-ZIP-0314-LPNHE	Zip file containing subdirectories and all manufacturing files	1	J.L. MEUNIER	Zip folder
DD0031	Front End Electronics	Manufacturing documents readme file	FEB_Manufacturing_readme.docx	MST-CAM-DF-0316-LPNHE	1.2	MST-CAM-DF-0316-LPNHE	Manufacturing documents readme file	1	F. TOUSSENEL	
DD0032	Front End Electronics	Test plan and verification of specifications	Requirements verification matrix for FEE	MST-CAM-IF-0306-LPNHE	2.0	MST-CAM-IF-0306-LPNHE	Verification matrix for NCAM FEE	1	F. TOUSSENEL	
DD0033	Front End Electronics	Test plan and verification of specifications	Front-End board V5.1 performance verification	MST-CAM-IF-0304-LPNHE	2.2	MST-CAM-IF-0304-LPNHE	Performances verification document	1	F. TOUSSENEL	
DD0034	Front End Electronics	Handling instructions, user manual	NectarCAM FEB User Manual	MST-CAM-TN-0252-LPNHE	1.0	MST-CAM-TN-0252-LPNHE to be	adding handling procedure, package and shipment procedure, ...	1	JL MEUNIER	
DD0035	Front End Electronics	Handling instructions, user manual	NCAM Module Controller (NMC) users manual	MST-CAM-TN-0437-LPNHE	0.9			1	V. VOISIN	
DD0036	Front End Electronics	CIDL	FEB configuration file	MST-CAM-DF-0307-LPNHE	2.0	MST-CAM-DF-0307-LPNHE	List all files and docs to manufacture and operate FEB	1	F. TOUSSENEL	
DD0037	Focal plane Equipment	Requirement specification and design	FPM_specification	MST-CAM-SP-0404-IRAP	2.0	tree 7.2	FPM requirement	1	Pierre JEAN	
DD0038	Focal plane Equipment	Requirement specification and design	HVPA_Board_Definition_File	MST-CAM-DF-0110-IRAP	1.2	tree 7.2.3	Definition of HVPA	1	Christian JARNOT	
DD0039	Focal plane Equipment	Requirement specification and design	IB_Board_Definition_File	MST-CAM-DF-0142-IRAP	1.2	tree 7.2.6	Definition of IB	1	Christian JARNOT	
DD0040	Focal plane Equipment	Requirement specification and design	Focal_Plane_Instrumentation_Description	MST-CAM-RP-0096-NectarCAM	2.1	tree 7.2	FPI description	1	Pierre JEAN	
DD0041	Focal plane Equipment	External ICD	Interface Board/ Front End Board ICD	MST-CAM-ICD-0081	1.7	tree 7.2.6	FEB/IB interface definition	F	Julie PRAST	
DD0042	Focal plane Equipment	Internal ICD	IB_Electrical_ICD	MST-CAM-ICD-0018-IRAP	2.3	tree 7.2.6	DU/IB interface definition	1	Christian JARNOT	
DD0043	Focal plane Equipment	Internal ICD	HVPA Electrical ICD	MST-CAM-ICD-0054-IRAP	1.1	tree 7.2.3	HVPA interface definition	1	Christian JARNOT	
DD0044	Focal plane Equipment	Manufacturing specifications, files and drawings	Manufacturing files of HVPAs V5 zip	MST-CAM-ZIP-0374-IRAP	5.0	tree 7.2.3	Zip file containing all manufacturing files for HVPA	1	Christian JARNOT	Zip folder
DD0045	Focal plane Equipment	Manufacturing specifications, files and drawings	Manufacturing files of IB V5 zip	MST-CAM-ZIP-0375-IRAP	5.0	tree 7.2.6	Zip file containing all manufacturing files for IB	1	Christian JARNOT	Zip folder
DD0046	Focal plane Equipment	Manufacturing specifications, files and drawings	Manufacturing files of Mechanical elements zip	MST-CAM-ZIP-0403-IRAP	1.0	tree 7.2.8	Zip file containing all manufacturing files for mechanics of FPM	1	Christophe MARTY	Zip folder
DD0047	Focal plane Equipment	Manufacturing specifications, files and drawings	CCTP_Modules_production_de_masse	MST-CAM-SP-0370-IRAP	1.0	tree 7.2	CCTP for tender process	1	Christophe MARTY	
DD0048	Focal plane Equipment	Test plan and verification of specifications	FPM_Tests_plan	MST-CAM-TP-0371-IRAP	1.0	doc tree 7.2	Tests plan	1	Pierre JEAN	
DD0049	Focal plane Equipment	Test plan and verification of specifications	FPM_Validation_Matrix	MST-CAM-IF-0369-IRAP	1.2	doc tree 7.2	Validation matrix	1	Pierre JEAN	
DD0050	Focal plane Equipment	Test plan and verification of specifications	Performance of the over-current protection system	MST-CAM-TR-0101-IRAP	1.1	tree 7.2.8	Verification of C-MST-CAM-NC-0259 (Avoid PMT damages in case of continuous illumination)	1	Pierre JEAN	
DD0051	Focal plane Equipment	Test plan and verification of specifications	Report-B-MST-1670 verification	MST-CAM-TR-0287-IRAP	2.2	tree 7.2.8	Verification of B-MST-1670 (Maximum Routine Illumination Recovery Time)	1	Pierre JEAN	
DD0052	Focal plane Equipment	Test plan and verification of specifications	Performance of the FPM v2 prototype of the NectarCAM mo	MST-CAM-IF-0372-IRAP	2.0	tree 7.2	Preliminary measurements with a prototype of Focal Plane Instrument	1	Pierre JEAN	
DD0053	Focal plane Equipment	Handling instructions, user manual	FPM user manual	MST-CAM-UM-0373-IRAP	1.0	tree 7.2.8	user manual for the Focal Plane Module	D	Adellain TSIAHINA	
DD0054	Focal plane Equipment	Requirement specification and design	Design Report of the light collectors	MST-CAM-RP-0418-IPAG	1.0	tree 7.2.7		1	L. JOCOU	

NectarCAM CDMR Process

- 342 RIXes were raised by the panel by Nov. 26, 2020. (RIX stands for Review Item Comment, Question or Discrepancy) using the Redmine platform.
- All RIXes were answered by the team by dec. 23, 2020.
- 288 RIXes were processed and a disposition agreed before the review meeting
- The review meeting was held on Feb. 16-17, 2021. NectarCAM team gave presentations requested by the panel on the following topics:
  - Open Design work and completion schedule
  - Requirements
  - Interfaces
  - Verification
  - RAMS
- The review report was received on March 26, 2021

NectarCAM CDMR main outcomes

(the WP leaders were asked to present WP specific items in their presentation)

- 16 high priority actions to be completed before the CDMR can be officially closed
- 142 lower priority actions to be completed before the acceptance review of the first camera.

- Nota Bene: The closure of the CDMR is the official green light to start production. We cannot sign production contracts before (but we can prepare the tenders). An exception was made for the PMT contract because there is no alternative
  - → All 16 high priority actions must be closed as soon as possible if we want to be able to fulfil the CTA-N pathfinder schedule (5 equipped MSTs before the end of 2023)
  - → The WP leaders were asked to present today and tomorrow the main actions associated with their WP, as well as a draft schedule for the production of their sub-systems

High priority actions

#	Subject	Assigned To	Action
42329	Missing camera safety system	GALDEMARD Philippe	Complete the work needed to demonstrate conformance with applicable EU Directives with the support of the CTAO Product Safety engineer
42335	Camera component controllers association	Prast Julie	Demonstrate that there is negligible technical risk in the proposal to proceed with hardware procurement before the development of the control software has been fully defined
42357	Ambiguity in the terminology	Glicenstein Jean-Francois	Correct inconsistent terminology in DD015
42380	DD013_MST-CAM-ICD-236-DESY: external ICD is incomplete and has inconsistencies	Prast Julie	Complete DD013 MST-CAM-ICD-236-DESY: external ICD with MST structure
42402	Incomplete architecture	Glicenstein Jean-Francois	Update DD015 NectarCAM architecture design
42403	Wrong scope of the architecture	Glicenstein Jean-Francois	Update DD015 NectarCAM architecture design
42451	DD003 - NectarCAM Product Assurance plan	Leray Vincent	Provide: - Software Development Plan - Software Maintenance Plan - Software requirements verification - mention Use Cases and/or SRS as deliverables
42452	Comments on DD015 NectarCAM-architecture-design	Glicenstein Jean-Francois	Update MST-CAM-TN-0360-CPPM and MST-CAM-DM-0050-D130
42556	IP level of the enclosure	Biteau Jonathan	AI NectarCAM provide demonstration of design compliance for V04. By spring 2021 and remove references to V03. AI CTAO decide if Power-surge / Lightning protection improvements to be mandated.
42596	Unclear document application	Toussenel Francois	Provide evidence of design verification for FEB V6.
42646	Qualification model	Prast Julie	NectarCAM to provide a preliminary list of design verification tests that will be performed on QM.
42745	DD011_MST-CAM-SP-0257_NCAM_Validation_MatrixV1.4-2: compliance status confusing; verification method missing; other missing content	Prast Julie	NectarCAM to work with CTAO to address the issues raised regarding DD011 (verification plan & report)
43138	Generalization of issue #42336: NectarCAM to improve consistency of terminology	Dazzi Francesco	NectarCAM to improve consistency of terminology used across its documentation.
42337	Definition of camera high wind protection	Pruteanu George	CTAO to oversee resolution of shutter wind resistance.
42738	Unclear document classification	Whyborn Nick	CTAO to clarify the meaning of commissioning, verification, validation, acceptance, plan, manual, and procedure
42850	DD200_MST-CAM-PL-0406-IRFU_NectarCAM_AIV_Plan_for_production_V2.1: role of QM unclear, lack of verification plan	Montes Vanessa	AI CTAO will provide a verification plan template and support NectarCAM to complete it.

I wish us a very
fruitful meeting !