ASTRI Mini-Array
Glossary

Prepared by:	Name:	*Nicolò Parmiggiani*	Signature:		Date:	Jun 18, 2021
Verified by:	Name:	*Gino Tosti*	Signature:		Date:	Jun 18, 2021
Approved by:	Name:	*Gino Tosti*	Signature:		Date:	Jun 18, 2021
Released by:	Name:	*Salvatore Scuderi*	Signature:		Date:	Jun 18, 2021

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Main Authors

Nicolò Parmiggiani, Andrea Bulgarelli, Joseph Schwarz, Gino Tosti, Fabrizio Lucarelli

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1. Introduction

The **ASTRI Mini-Array (MA)** is an INAF ground-based project to construct, deploy and operate a set of nine identical dual-mirror Cherenkov gamma-ray telescopes, and several other auxiliary equipment and infrastructures. The ASTRI Mini-Array scientific objective is to exploit the imaging atmospheric Cherenkov technique to measure the energy, direction and arrival time of gamma-ray photons arriving at the Earth from astrophysical sources. In the almost unexplored energy range 1-300 TeV this technique requires an array of optical telescopes (~ 4 m in diameter) at a site located at an altitude of > 2000m. The telescopes will have reflecting mirrors focusing the Cherenkov UV-optical light produced by atmospheric particle cascades (air-showers), initiated by the primary gamma-ray photons entering in the atmosphere, onto ultrafast (nanosecond timescale) cameras. Most of the collected data will come from the large number of charged primary cosmic-ray initiated air-showers, which will also be recorded, then appropriate data analysis methods will be employed to reduce the level of this background and allow an efficient detection of gamma-rays coming from astrophysical sources.
Besides the gamma-ray scientific program, the ASTRI Mini-Array will also perform:

- Stellar Hambury-Brown intensity interferometry: each of the telescopes of the ASTRI Mini-Array will be equipped with an intensity interferometry module. The Mini-Array layout with its very long baselines (hundreds of meters), will allow, in principle, to obtain angular resolutions down to 50 micro-arcsec. With this level of resolution, it will be possible to reveal details on the surface of bright stars and of their surrounding environment and to open new frontiers in some of the major topics in stellar astrophysics.
- Direct measurements of cosmic rays: 99% of the observable component of the Cherenkov light is hadronic in nature. Even if the main challenge in detecting gamma-rays is to distinguish them from the much higher background of hadronic Cosmic Rays, this background, recorded during normal gamma-ray observations, will be used to perform direct measurements and detailed studies of the Cosmic Rays themselves.

The ASTRI MA telescopes (including the Cherenkov Camera) are an updated version of the ASTRI-Horn Cherenkov Telescope operating at Serra La Nave (Catania, Italy) on Mount Etna.

The nine telescopes will be installed at the Teide Astronomical MA System, operated by the Instituto de Astrofisica de Canarias (IAC), on Mount Teide (~2400 m a.s.l.) in Tenerife (Canary Islands, Spain).

The ASTRI MA System will be operated by INAF on the basis of a host agreement with IAC.

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2. Related Documents

2.1. Applicable documents

[AD1] A. Bulgarelli, G. Tosti, et al., ASTRI MA Data Model, ASTRI-INAF-DES-2100-003, issue 2.5
[AD2] A. Bulgarelli, G. Tosti, et al., ASTRI MA Top Level Use Cases, ASTRI-INAF-SPE-2100-001, issue 2.5
[AD3] A. Bulgarelli, et al., ASTRI MA Top Level Software Architecture, ASTRI-INAF-DES-2100-001, issue 2.5
[AD4] ASTRI MA Software PBS, ASTRI-INAF-DES-2100-002, issue 2.5
[AD5] ASTRI MA Software Engineering Management Plan: ASTRI-INAF-PLA-2100-001, issue 1.0
[AD6] ASTRI Mini-Array Data & Documentation Management Plan, ASTRI-INAF-PLA-1000-003, issue 1.2

2.2. Reference documents

[RD1] J. Schwarz, G. Chiozzi, P. Grosbol, H. Sommer, A. Farris, D. Muders, ALMA Project Software Architecture, ALMA-70.15.00.00.001-H-GEN, Version J, 2007-08-13
[RD2] G, Tosti, Telescope Mechanical Structure Assembly Requirements Specifications,

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3. Abbreviated terms

1. ACS: Alma Common Software
2. ACALCS: Array Calibration Control System
3. ACCS: Atmosphere Characterisation Control System
4. ADAS: Array Data Acquisition System
5. ADC: Analogic-to-digital converter
6. AIT: Assembly Integration and Test
7. AIV: Assembly, Integration and Verification
8. ANSI: American National Standards Institute
9. AOC: Array Operating Center
10. AoD: Astronomer on Duty
11. AOS: Array Observing Site
12. API: Application Programming Interface
13. AS: Alarm System
14. ASC: All-Sky Camera
15. ASI: Italian Space Agency
16. ASTRI: Astrofisica con Specchi a Tecnologia Replicante Italiana
17. ACCS: Atmosphere Characterisation Control System
18. ATM: Atmosphere Characterisation
19. ATMDM: Atmosphere Characterisation Data Model
20. BDT: Boosted Decision Trees
21. BEE: Back End Electronics
22. BS: Boot system
23. CAL: Calibration
24. CAL0: Specific camera calibration data
25. CAL1: Calibration coefficients
26. CALDB: calibration database
27. CALDM: Calibration data model
28. CAMDM: Cherenkov Camera Data Model
29. CC: Central Control
30. CCD: Charge Coupled Device
31. CCTV: Closed-Circuit Television
32. CDP: Cherenkov Data Pipeline
33. CLCS: Cherenkov Camera Local Control Software
34. CoG: Center of Gravity
35. COTS: Commercial Off the Shelf
36. CS: Camera Server
37. DASU: Distributed Alarm System Unit
38. DBMS: DataBase Management System
39. DC: Data Capture
40. DL: Data Level
41. DL0: Raw data archived
42. DL4: final science product
43. DL5: high-level data
44. DM: Data Model
45. DNS: Domain Network System
46. DPT: Data Processing Time
47. DPS: Data Processing System

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48. DTT: Datta Taking Time
49. EGSE: Electrical Ground Support Equipment
50. ENV: Environmental
51. ENVDM: Environmental Data Model
52. EVT: Cherenkov camera event
53. EVT3: Gamma-like event list
54. E-Stop: Emergency Stop
55. ERR: Errors
56. FEE: Front End Electronics
57. FoV: Field of View
58. FP: Focal Plane
59. FPGA: Field Programmable Gate Array
60. FTP: File Transfer Protocol
61. GPL: General Public License
62. GRB: Gamma-Ray Burst
63. GSE: Ground Support Equipment
64. GPRS: General Packet Radio Service
65. GTI: Good Time Interval
66. HK: Housekeeping
67. HM: Health Monitoring
68. HMI: Human Machine Interface
69. HVAC: Heating, Ventilating and Air Conditioning
70. HW: Hardware
71. IAS: Integrated Alarm System
72. IAS-CDB: IAS Configuration Database
73. IASO: Integrated Alarm System Input Output
74. I/F: Interface
75. I/O: Input/Output
76. I&T: Integration and Test
77. IACT: Imaging Atmospheric (Air) Cherenkov Telescope (Technique)
78. ICD: Interface Control Document
79. ICT: Information and Communication Technology
80. ICTDM: ICT Data Model
81. IIMDP: Intensity Interferometry Data Pipeline
82. INAF: Italian National Institute of Astrophysics
83. IPS: Integrated Protection System
84. IPSDM: IPS Data Model
85. IRF: Instrumental-Response Function(s)
86. ISO: International Standards Organization
87. ISS: Integrated Safety System
88. IT: Information Technology
89. LCS: Local Control Software
90. LGPL: Lesser General Public License
91. LIDAR: Light Detection And Ranging
92. LNF: INFN- Laboratori Nazionali di Frascati
93. LOG: Logging or Logging System
94. LOGDM: Logging Data Model
95. LUT: Look-up-table
96. M1: Primary Mirror
97. M2: Secondary Mirror
98. MA: ASTRI Mini Array

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99. MC: Monte-Carlo
100. MLCS: Mount Local Control Software
101. MM: Multi-Messenger
102. MMI: Man Machine Interface
103. MoM (MOM): Minutes of Meeting
104. MON: Monitoring or Monitoring System
105. MONDM: Monitor Device Data Model
106. MWL: Multi-wavelength
107. NTP: Network Time Protocol
108. OAIS: Open Archival Information System
109. OCLCS: Optical Camera Local Control Software
110. OCU: Optics Control Unit
111. OOQS: Online Observation Quality System
112. OP: Observing Project
113. OPDM: Observing Project Data Model
114. PBS: Product Breakdown Structure
115. PDE: Photon Detection Efficiency
116. PDM: Photon Detection Module
117. PLC: Programmable Logic Controller
118. PMC: Pointing Monitoring Camera
119. PMCLCS: Pointing Monitoring Camera Local Control Software
120. PMII: Photon Detection Module for Intensity Interferometry
121. PPS: Pulse per second
122. PSF: Point Spread Function
123. PTP: Time Precision Protocol
124. QA: Quality Assurance
125. QL: Quick Look
126. R0: raw data stream
127. RAMS: Reliability, Availability, Maintainability, Safety
128. RF: Random Forest
129. RFD: Request For Deviation
130. RFW: Request For Waiver
131. RID: Review Item Disposition/Discrepancy
132. RIQ: Review Item Question
133. RTU: Remote Terminal Unit
134. RunID: Run identifier
135. S/S (SS): Sub System
136. S/W (SW): Software
137. SB: Scheduling Block
138. SC: Schwarzschild - Couder
139. SCADA: Supervisory Control and Data Acquisition
140. SCDB: System Configuration Database
141. SDM: Science Data Model
142. SEB: Stereo Event Builder
143. SI^3 or SI3: Stellar Intensity Interferometry Instrument
144. SI3LCS: Stellar Intensity Interferometry Instrument Local Control Software
145. SI3DM: Stellar Intensity Interferometry Instrument Data Model
146. SoW: Statement of Work
147. SPC: Single Photon Counting
148. SQM: Sky Quality Meter
149. SRDM: Science Results Data Mode

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150. SS: Startup System
151. SSDC: Space Science Data Center
152. SSDM: Science Simulated Data Model
153. SSH: Secure Shell
154. SSS: Science Support System
155. ST: Single telescope
156. SV: Science Verification
157. SVC: Service
158. SVP: Science Verification Plan
159. SU: Safety Unit
160. TBC: To Be Confirmed
161. TBD: To Be Defined
162. TBR: To Be Reviewed
163. TBS: To Be Specified
164. TBV: To Be Verified
165. TBW: To Be Written
166. TC: Telecommand
167. TCS: Telescope Control System
168. TCU: Telescope Control Unit
169. TELDM: Telescope Data Model
170. TF: Transfer Function
171. THCU: Telescope Health Control Unit
172. TMA: Telescope Mount Assembly
173. TMCDB: Telescope Monitoring and Configuration Database
174. ToO: Target of Opportunity
175. TOU: Telescope Operations Unit
176. UC: Use Case
177. UML: Unified Modeling Language
178. UPS: Uninterruptible Power Supply
179. UR: User Requirement
180. URD: Users Requirements Document
181. URL: Uniform Resource Locator
182. V&V (VV): Verification and Validation
183. VAR: Variance
184. VM: Virtual Machine
185. VO: Virtual Observatory
186. VOP: Validated Observing Project
187. WAN: Wide Area Network
188. WBS: Work Breakdown Structure
189. WiP: Work in Progress
190. WS: Web Server
191. ZA: Zenith Angle

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4. Terms and definitions

1. **Abnormal conditions**: refer to measurements to indicate ranges outside the normal operating limits and that requires an action
2. **Abnormal status**: a status that occurs in a process system when an operating variable (flow, pressure, temperature, etc.) ranges outside of its normal operating limits, i.e. when an abnormal condition occurs.
3. **Abnormal Status reporting**: is the action to report the status of components through colour coding, also taking into account special requirements of colour-blindness.
4. **AIV/AIT Software**: can be used for AIV/AIT activities and is connected with the Local Control Software via OPC-UA interface as a general rule.
5. **Alarm or Alarm Signal**: audible and/or visible means of indicating to the **Operator** an equipment malfunction, process deviation, or abnormal condition requiring a timely response (ISA/IEC definition). The Alarm Signal is appropriate to the urgency required based on the criticality of the condition.
6. **Alarm Archive**: the archive system that stores the alarms produced by all components and the monitoring data acquired by the Alarm System to generate alarms.
7. **Alarm Condition**: refers to measurements (perhaps put through some logic model) including also **Alarm Limits** to indicate where awareness and/or response by an **Operator** is required to mitigate (potential) hazards and reduce (or prevent) harm (e.g. vitals, but could also be device characteristics).
8. **Alarm System**: is a software system that provides the service that gathers, filters, exposes and persists all the relevant alarms raised by both assemblies and devices (such as telescopes) and SCADA processes under the supervision of the SCADA system. It also creates and filters new alarms based on a selection of the most critical monitoring points.
9. **All-Sky Camera (ASC):** a system that provides the monitoring of cloud coverage both during daylight and night time.
10. **All-Sky Camera LCS**: the local control software of the All-Sky Camera that evaluates the cloudiness around the pointing direction of the current ASTRI MA observation.
11. **Archive System**: provides a central repository for all persistent information of the MA system such as Observing Projects, observation plans, raw and reduced scientific data, device monitor data, MA system configuration data (past, present and planned), logs of all operations and schedules.
12. **Archive Manager**: an actor responsible for the quality and data integrity of the Archive system.
13. **Array and instrument response simulation:** simulation of the telescope response will be simulated with the sim_telarray package.
14. **Array Calibration System**: for Cherenkov data is the set of assemblies for the calibration of the Cherenkov cameras.
15. **Array Calibration Control System (ACALCS)**: a software system used to control, configure and manage the status of all assemblies of the Array Calibration System and is part of the SCADA system.
16. **Array Calibration Local Control System**: is a set of hw and Local Control Software to control the different assemblies of the Array Calibration System.
17. **Array Data Acquisition System (ADAS)**: a software system that acquires the data from the Cherenkov cameras and the SI[3] devices.

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18. **Array Observing Site (AOS):** site at Teide where the telescopes and all Observing Site Subsystems are installed.
19. **Array Operation Centers (AOC)**: site in different locations with a Control Room where the Operator is present, responsible for supervising and carrying out scheduled observations and calibrations during the night, and the Astronomer on-duty to support and to supervise the observations.
20. **A-SciSoft**: software tools, developed in the context of the ASTRI-Horn data analysis, used for Cherenkov Data Processing and Data Analysis. *A-SciSoft* is organized in four distinct functional breakdown stages (Calibration, Reconstruction, Analysis, and Science).
21. **Assembly**: is used to indicate a hardware and software part of a subsystem.
22. **ASTRI Array Observing Site Data Center**: the data center located at the AOS where all the computing and networking resources used by the on-site software system will be installed.
23. **ASTRI MA Data Center**: a data center in Rome that hosts the long-term data Archive of the ASTRI MA and is designed to store and preserve all the data produced during the ASTRI MA operations.
24. **ASTRI Mini-Array or MA System**: an INAF project to construct and operate an experiment to study gamma-ray sources emitting at very high-energy in the TeV spectral band. The MA consists of an array of nine innovative Imaging Atmospheric Cherenkov Telescopes that are an evolution of the double-mirror ASTRI Horn telescope successfully tested since 2014 at the Serra La Nave Astronomical Station of the ASTRI MA System of Catania.
25. **ASTRI Mini-Array Software system**: manages observing projects, observation handling, array control and monitoring, data acquisition, archiving, processing and simulations of the Cherenkov and Intensity Interferometry observations, including science tools for the scientific exploitation of the ASTRI MA data.
26. **Astronomer on-duty**: a Science User that supports and supervises the observations.
27. **Atmosphere Characterisation**: characterisation of the atmosphere for astrophysical observation purposes.
28. **Atmosphere Characterisation System:** is a set of assemblies for the atmosphere
29. characterisation, and operates during the night observation period.
30. **Atmosphere Characterisation Control System (ACCS)**: a software system used to control, configure and get the status of all assemblies of the Atmosphere Characterisation System and is part of the SCADA system.
31. **Atmosphere Characterisation Local Control System**: a set of hw and Local Control Software to control the different assemblies of the Atmosphere Characterisation System. It provides an OPC-UA interface that is used by the Atmosphere Characterisation Control System.
32. **Atmosphere Characterisation Data Model**: is based on the acquisition and analysis of data from the Atmosphere Characterisation System acquired during the night and contemporary to the ASTRI MA observation runs.
33. **Automated mode**: a function performed without any manual intervention.
34. **Bulk Archive**: an archive that stores raw data from the Cherenkov camera, SI3 and other assemblies, acquired by the Array Data Acquisition System.
35. **CAL**: (calibration data): used for cameras, optics, and array calibrations.
36. **CAL0**: telescope-wise raw calibration data, triggered by calibration hardware.
37. **CAL1**: telescope-wise calibration coefficients/models to be applied to EVT0 data. Produced by the first stage of the data processing pipeline.

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38. **CALDB (calibration database)**: a dedicated calibration database, organized following HEASARC's CALDB format, that stores IRFs, LUTs, ML-MODELs, and other instrumental and pre-computed quantities available for being used throughout the entire scientific data reduction chain.
39. **Calibration**: the process that determines a set of constants needed to relate measured values and physical variables.
40. **Calibration data**: a set of constants needed to relate measured values and physical variables.
41. **Calibration Data Model (CALDM)**: describes Cherenkov calibrations reduced either in real-time or in post-processing by data processing operations.
42. **Camera event (EVT)**: information produced by the Cherenkov Camera with an associated timestamp. It contains data that changes for every triggered event, with typically a high rate, which may be more than one kilohertz at the R0 data level.
43. **Central Control System:** it coordinates the sequence of operations, coordinating the control systems and collectors, and sequences start, shutdown and configuration of the on-site MA Systems, checks the status of the assemblies, get the Scheduling Blocks and select the Observing Block; interprets the Observing Mode specified to command downstream to the telescopes and other subsystems; a Data Capture that save the information associated with the execution of an Observing Block necessary to perform the scientific data processing of the acquired data;
44. **Characterization**: a procedure to measure parameters of a system by dedicated hardware.
45. **Cherenkov Camera**: a system assembly that records the light and, following a trigger condition, send data to the data acquisition system.
46. **Cherenkov Camera Data Acquisition**: a software component that acquires the R0 (raw) data, as a bit stream packet by packet from the Cherenkov camera BEE via TCP/IP and generates the DL0 files in telemetry format, one for each telescope and for each Run, which are saved in a Local Bulk Repository.
47. **Cherenkov Camera Data Model**: it defines the collection of information generated during the Cherenkov data acquisition and data processing.
48. **Cherenkov Camera Data Quality Checker**: a software component that performs a data quality check at telescope level of the data products DL0.CAM.
49. **Cherenkov Camera Local Control Software (CLCS)**: a local control software that runs on the Back End Electronics (BEE) of the Cherenkov Camera. It is responsible for the management, in terms of control and monitoring operations, of all the hardware subsystems attached to the BEE which compose the Cherenkov Camera.
50. **Cherenkov Camera Pre-processing**: a software component that: (i) performs the translation from binary data to alphanumeric data (FITS), ready for the Stereo Event Builder and for the Data Processing System; (ii) splits the different CAM data sub-types contained into the R0 data level (EVT, CAL, HK, VAR) in different data streams and FITS files; (iii) performs the time reconstruction common to the Stereo Event Builder and the Data Processing System.
51. **Cherenkov Camera Supervisor**: the software component that controls and monitors the Camera LCS.
52. **Cherenkov Data Calibration and Reconstruction**: the Cherenkov Data Calibration and Reconstruction shall perform the following steps: (i) event calibration (from DL0 to DL1a), and (ii) reconstruction (from DL1a to DL2b).
53. **Cherenkov Data Pipeline**: a software component that: (i) generates short-term data products/processing results to give feedback to the Operator and Astronomer on-duty, and (ii) generates final Data Release Products/Processing data products. The same data reduction chain applies both for real (EVT) and simulated Monte Carlo (MC) data.

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54. **Cherenkov Data Scientific Analysis**: a software system used to analyze DL3 data to get, in an automated way, preliminary and final science products (DL4) from the Data Processing System, such as detection plots, spectra, sky-maps, and light-curves, starting from the fully reduced data (EVT3/IRF3).
55. **Cherenkov Data Selection**: a software component that performs the generation of the stereo event-list (from DL2b to DL3) and the IRF3 generation.
56. **Cherenkov Event**: a transient (<1 μs) illumination of one or more of the MA telescopes with UV-optical light, usually due to Cherenkov emission from an atmospheric cascade initiated by a cosmic photon, electron, proton or nucleus.
57. **Collector**: a SCADA software that interfaces all the functionalities of the Local Control Software via an OPC-UA interface. The Collector has only the responsibility to get the status, monitoring points and alarms of all parts of the system/assembly.
58. **Components (or parts):** make up a subsystem or a system. These parts are assemblies and devices that form a hierarchy.
59. **Conceptual Data Model**: a data model that establishes the basic concepts and semantics of a given domain and helps to communicate these to a wide audience of stakeholders. This data model defines WHAT the system contains. The purpose is to organize, scope and define system concepts and rules.
60. **CONFIG data**: configuration information for an instrument or software tool/algorithm.
61. **Configuration Manager**: an actor that keeps track of the configuration of all instruments, part replacements, etc.
62. **Control System:** same definition of the Control Software
63. **Control Room:** a room serving as a space where the MA system can be monitored and controlled.
64. **Control Software:** a SCADA software that interfaces with all the functionalities of a Local Control Software via an OPC-UA interface. The SCADA Control Software shall manage, at system/subsystem level startup and shutdown, command, configuration, the system/subsystem/assembly state machine, acquire <<telemetry>> info needed to perform the SCADA functionalities, generate warning or critical events, acquire <<data>> needed for SCADA functionalities.
65. **Critical Event**: an event that notifies abnormal conditions or faults.
66. **Critical Item**: an item whose failure or malfunction can cause degradation of the performance of any system or subsystem the repair of which would be costly or require undue time.
67. **Critical on-site systems**: a set of systems that shall be available before the start of the MA System: Power Management System, Environmental Monitoring System, Safety and Security System, On-Site ICT System.
68. **Data Association**: allows determining to which part of the MA instrument a data product is associated.
69. **Data Capture**: part of the Central Control System provides the bridge between the science and telescope domains. Data capture takes the instrument-centric, time-ordered stream of data, collects and extracts those items needed in the science domain, and re-organizes them to be useful in data processing. Practically, it is responsible for collecting the auxiliary data associated with the Observing Block execution (a Run).
70. **Data Format**: physical implementation of the data model.
71. **Data Level**: naming for the number of data transformations that have been applied to the data.
72. **Data Model**: describes the purpose, structural elements (the data type) and how data products relate to one another.
73. **Data Model Category**: a grouping of data models with a similar purpose.

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74. **Data Model Domain**: a separation of the data models in two domains, the telescope domain is instrument-centric, science domain is scientific observation-centric. Each data product is part of one of these domains. Each domain is a data model category.
75. **Data Modelling**: a process used to define and analyze data requirements needed to support the processes within the scope of corresponding information systems in organizations.
76. **Data Modelling Language**: the language that describes the data model.
77. **Data Processing Category**: a label for a data product that indicates the analysis pipeline.
78. **Data Processing Manager**: the actor responsible for the Data Processing operations.
79. **Data Processing System (DPS)**: a software system that calibrates, reduces and analyses the acquired data. This system is also used to check the quality of the final data products.
80. **Data Product**: data produced by devices or software algorithms.
81. **Data Quality Scientist**: the actor responsible for monitoring the quality of pipeline-produced data products. Discusses problems with Instrument Scientist and Maintenance Engineers
82. **Data Reduction**: processing of the event data to produce data products at multiple levels, up to and including the final fully-calibrated data products.
83. **Data Release Products/Processing (Level-C category)**: data products produced by the full high-quality data processing chain, off-site in MA data center.
84. **Data Transfer**: a node used to manage the data transfer off-site/on-site.
85. **Data type**: structural elements of a data product.
86. **Derived data**: a transformation of input data to another data type.
87. **Device**: is used to indicate a part of an assembly.
88. **DL0.CAM**: Cherenkov (raw data archived) raw data from the hardware/software data acquisition. This is the lowest level of data that is intended for long-term storage in the bulk archive. This includes all CAM data products.
89. **DL0.SI3**: Stellar Intensity Interferometry Instrument raw data acquired and saved on disk.
90. **DL1.CAM**: Cherenkov data generated to check the data quality.
91. **DL1.SI3**: Stellar Intensity Interferometry Instrument reconstructed event list.
92. **DL2.SI3**: Stellar Intensity Interferometry Instrument event list calibrated and referred to UTC.
93. **DL2a.SI3**: Stellar Intensity Interferometry Instrument cleaned event list.
94. **DL2b.SI3**: Stellar Intensity Interferometry Instrument segmented event list.
95. **DL3.SI3**: Stellar Intensity Interferometry Instrument time coincidences.
96. **DL4.SI3**: Stellar Intensity Interferometry Instrument diagram of the temporal correlation.
97. **DL5**: High-Level data.
98. **Element or Node:** Systems, subsystems, assemblies and devices.
99. **Engineering GUI**: a GUI provided by the telescope manager to interact with all TCS subsystems that shall be accessed remotely for troubleshooting and maintenance.
100. **Environmental Conditions**: the measured values of temperature, humidity, wind speed (mean and gusts across the full array) and direction, rainfall, precipitation (and lightning) probability, and barometric pressure, and other parameters.
101. **Environmental Data Model (ENVDM)**: it describes weather and environment monitoring data from the Environmental Monitoring System, that includes weather stations, rain sensors, humidity sensors, and all-sky cameras. Weather data includes pressure, humidity, and other weather information, timestamp, and also the station-ID of the originating data.
102. **Environmental Monitoring**: the monitoring of the environmental conditions
103. **Environmental Monitoring Local Control System**: is a set of hw and Local Control Software to control the different elements of the **Environmental Monitoring System**.

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104. **Environmental Monitoring System**: a set of devices for the evaluation of the environmental conditions.
105. **Environmental Monitoring System Collector**: a system that acquires monitoring points, alarms, errors, status and logs from the Environmental Monitoring System assemblies to check the assemblies status and reliability.
106. **Expert Science User**: a Science User that uses MA data at a lower level than the standard distributed data products. May submit technical Observing Projects.
107. **Event**: is a notification that a warning condition, abnormal condition or faults have happened.
108. **EVT0**: Cherenkov (raw data archived) DL0.EVT data type.
109. **EVT0.TRIG**: Cherenkov EVT0 after software stereo array trigger.
110. **EVT1:** (processed) Cherenkov telescope-wise calibrated and reconstructed EVT0 data.
111. **EVT1a:** Cherenkov telescope-wise calibrated data (calibrated image charge).
112. **EVT1b:** Cherenkov telescope-wise cleaned and parameterized data (Hillas parameters, and a usable telescope pattern) (telescope-wise image parameters).
113. **EVT1c:** Cherenkov telescope-wise fully reconstructed data (telescope-wise energy, arrival direction, particle identity discrimination, parameters per telescope).
114. **EVT2:** (reconstructed) Cherenkov array-wise reconstructed air-shower parameters such as energy, direction, particle ID, and related signal discrimination parameters.
115. **EVT2a:** Cherenkov array-wise merged data (array-wise event parameter).
116. **EVT2b:** Cherenkov array-wise fully reconstructed data (array-wise energy, arrival direction,
117. particle identity discrimination per event).
118. **EVT3 (gamma-like event-list)**: Sets of selected Cherenkov air-shower events obtained with a single final set of reconstruction and discrimination parameters.
119. **EVT Calibrated and Reconstructed**: Calibrated raw Cherenkov camera images (where the camera readout signals in ADC have been converted into photo-electrons [pe]), and Reconstructed Cherenkov images (where the calibrated images have been cleaned and the Hillas parametrization has been applied).
120. **EVT Science Data**: science-ready Cherenkov data product containing the final gamma-like event-list (EVT3) to be delivered to the Science Users for scientific analysis.
121. **Fault** or **equipment malfunction**: any change in the state of an item which is considered anomalous and may warrant some type of corrective action.
122. **Failure**: is the inability of a system or component to perform its required functions within specified performance requirements
123. **Gamma-like event-list**: see EVT3 definition.
124. **Generic assembly state machine**: the state machine of a generic assembly.
125. **Generic system/subsystem state machine**: the state machine of a generic system/subsystem.
126. **Good Time Interval (GTI)**: continuous time intervals where science-ready data can be considered acceptable for the final scientific analysis.
127. **Hazard**: A condition that poses a threat of injury or damage to life, health, equipment, or the environment. Each hazard has at least one cause, which in turn can lead to a number of effects (e.g., damage, illness, failure).
128. **Housekeeping (HK)**: data for the monitoring of the Cherenkov camera status.
129. **Humidity Sensors**: each telescope service cabinet is equipped with an external humidity sensor.
130. **Humidity Sensor's LCS**: it is the local control software of the Humidity Sensor.

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131. **ICT Monitoring System**: autonomous set of systems that monitors the status of the On-Site ICT System.
132. **Illuminator**: a portable ground-based device, remotely controlled, designed to uniformly illuminate the ASTRI-MA telescope's aperture with a pulsed or continuous reference photon flux whose absolute intensity is monitored by a NIST-calibrated photodiode.
133. **Illuminator LCS**: it is the local control software of the Illuminator.
134. **Information event:** to inform the **Operator** of some not warning or critical event;
135. **Instrument Response Function (IRF)**: set of data and methods needed to convert quantities measured by the array, or by any part of it, into physical quantities. For all the scientific use cases related to gamma-ray astronomy, the required IRFs typically include: a) effective areas vs true and reconstructed energy; b) energy dispersion matrix; c) gamma-ray point-spread function vs energy; d) a model for the distribution of background events vs reconstructed energy and direction. IRFs are required for the transformation of MA data products (e.g. array-wise event-lists, and instrument, environmental and atmosphere characterisation information) to MA science products (e.g. sky maps, light curves, spectral distributions).
136. **Instrument scientist**: an instrument expert, capable of diagnosing problems and devising corrective actions based on recorded data. Supports operations and maintenance.
137. **Integrated Safety System (ISS)**: a PLC based system not depending on any other site installed system other than power. This system shall implement different operation modes to allow science observing operation, maintenance and fault and interlock recovery.
138. **Integrated Security System**: a system intended to protect life, property and environment. It provides an intruder alarm system, closed-circuit television used for security and surveillance (CCTV), access control system, fire detection and fire alarm systems, environmental alarm systems, power alarm system.
139. **Intensity Interferometry Data Pipeline**: a software component that is devoted to the data reconstruction and scientific analysis of the Intensity Interferometry data.
140. **Intensity Interferometry Data Reconstruction**: a software component that determines the time tags of each event from the raw data acquired with the Time-to-Digital-Converter (where the signal of the SI^3 is sent). This is done independently for each telescope.
141. **Intensity Interferometry Data Scientific Analysis**: a software component that implements all algorithms needed to perform the calculation of the diagram of the temporal correlation per each pair of telescopes. This is done independently for all pairs of telescopes (36 baselines).
142. **IRF2**: global IRFs covering all of the instrumental phase-space.
143. **IRF3**: reduced observation-related IRFs generated by filtering the IRF2 over several parameters, weighted by the observation configuration parameters of a particular event dataset.
144. **Legacy products**: high-level (DL5) "legacy" data products, compliant with the Virtual Observatory (VO) standards and tools, such as ASTRI MA survey sky-maps, diffuse gamma-ray background models, and/or ASTRI MA source catalogues.
145. **LIDAR**: (LIght Detection And Ranging) allows the study of the atmospheric composition, structure, clouds and aerosol through the measurement of the atmospheric extinction profile.
146. **LIDAR LCS**: the local control software of the LIDAR.
147. **Local Bulk Repository**: on-site temporary storage of the data acquired by the Array Data Acquisition system.
148. **Local Control System**: a hw/sw system used to switch-on/switch-off, control, configure and get the status, monitoring points and alarms of all parts of the system/assembly.
149. **Local Control Software**: the software part of a **Local Control System**.
150. **Local Engineering HMI**: the HMI of a LCS.
151. **Logical Data Model**: a data model that adds further detail to conceptual model elements and refines the structure of the domain. Defines HOW the data is structured regardless of the

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implementation (the description of the content of a data product). The purpose is to develop a technical map of rules and data structures. The logical model is a translation of a conceptual model in a data modelling language ready for implementation.

152. **Long-term observation plan**: the yearly plan of observations of the MA, that consists of a list of Scheduling Blocks (SB) to schedule the observations during each night.
153. **Log Archive**: the archive system that stores the logs produced by all components and acquired by the Logging System.
154. **Logging Data Model**: it describes log records, i.e. either events that occur in the system or actions between humans operators and the system itself.
155. **Logging System (LOG)**: the software system that gets logging information from relevant software and hardware components that generate logs and stores them.
156. **Look-up-tables (LUT)**: low-level data needed by various algorithms or hardware components.
157. **LUT1**: look-up-tables/models used by telescope-wise discrimination and reconstruction algorithms to estimate energy, arrival direction, and particle identity discrimination parameters of the air-shower events.
158. **LUT2**: look-up-tables/models used by array-wise discrimination and reconstruction algorithms to estimate energy, arrival direction, and particle identity discrimination parameters of the stereo event.
159. **Maintenance Engineer**: manages and executes maintenance activities and conducts on-site preventive and corrective maintenance tasks.
160. **Maintenance Perspective**: one of the Observing Cycle perspectives, the prime interest is to ensure that optimum levels of availability and overall performance of the system are achieved.
161. **Manual mode**: a function performed with human intervention, or the function is performed by humans.
162. **MA Science Team**: the scientific ASTRI experiment collaboration. All actors present in this document are part of the MA Science Team.
163. **MA System:** see ASTRI Mini-Array
164. **MA Software**: see “ASTRI Mini-Array Software System” definition.
165. **MC0, MC1, MC1a, MC1b, MC1c, MC2, MC2a, MC2b**: analogous to EVTn, but including extra MC information.
166. **MC calibration events production**: the simulation for calibration purpose of events due to muon-tracks in the atmosphere or pulsed light sources.
167. **MC/LUT IRF generator**: a software tool that generates LUTs and low-level IRFs for Cherenkov data reconstruction and scientific analysis.
168. **MC particle and gamma production**: a software component that performs the simulation of atmospheric showers using the *CORSIKA* code.
169. **ML-MODEL**: pre-trained machine learning model, in a common format for long-term archiving.
170. **Monitor Assembly Data Model**: a data model that contains time-series data used to monitor the status or quality of hardware devices, software components, or other data products.
171. **Monitoring archive**: an archive system that stores all the Monitoring Data Model subtypes (e.g. monitor device, environmental data) acquired by the Monitoring System.
172. **Monitoring point:** a quantity sampled and collected for the purpose of detecting the status of the behaviour of a physical quantity or the status of a device or software component.
173. **Monitoring System (MON)**: a system that provides the services that gather monitoring (about 20000 monitoring points as time series data at typically ~1 Hz rates) from all assemblies and devices of the ASTRI MA System, including the Environmental Monitoring

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System and saves them in the Monitoring Archive. It provides a post facto framework for the evaluation and analysis of abnormal situations.

174. **Monte Carlo Simulations**: simulation of physical processes and of the telescope systems.
175. **Mount Local Control Software (Mount LCS)**: it is responsible for the control of the motion of the mechanical structure (including the kinematic chains and the drives). This system runs on the Telescope Control Unit (TCU).
176. **Mount Supervisor**: the software component that controls and monitors the mount LCS and other auxiliaries.
177. **Observation**: the process of observing an astrophysical target. Observations are organised in Observing Projects.
178. **Observation Execution DM**: describes the observing process as executed by the Central Control.
179. **Observation Perspective**: one of the Observing Cycle perspectives, (who manages the Observing Projects), where the prime interest is to optimize the efficiency of the observations.
180. **Observation Scheduler**: the software tools (Visibility Checker and a Sensitivity Calculator, collectively called Observation Scheduler) used, to check the visibility of the proposed target and, giving the expected IRFs produced using the MC simulated data, to provide an estimate of the observation time needed to reach the scientific goal of the proposal.
181. **Observing Block**: a unit of a Scheduling Block with planned start time and stop time (*i.e.*, a continuous observation), characterised by a unique ID, a single Sky Position, a step of a given Observing Mode.
182. **Observing Cycle**: the control and data workflow to handle the information and operations required to conduct all tasks from the time a Science User creates an Observing Project until the resulting data are returned. It includes observation preparation, observation execution, data processing and dissemination.
183. **Observing data**: data produced by a Cherenkov camera or Stellar Intensity Interferometry Instrument; this represents the bulk of the data volume (Cherenkov Camera DM and Stellar Intensity Interferometry Instrument DM).
184. **Observing mode**: describes how the choice of the pointing positions allows reaching the scientific goals (through Targets) relative to scientific aspects and analysis constraints (statistics and systematic errors).
185. **Observing Project (OP)**: a description of a scientific project to observe a target/a set of targets, including a description of the Observing Strategies and associated Observing Modes, as well as the scientific or technical justification. An Observing Project may span different nights. An Observing Project has a unique identifier.
186. **Observing Project Handler**: a software component that allows ASTRI Science Users to submit Observing Projects finalized to perform scientific, technical, calibration and intensity interferometry observations with the ASTRI MA.
187. **Observing Strategy**: defines the configuration of the array, the observing mode and constraints for the observation of a Target.
188. **Off-site Archive System**: the archive system at the MA Data Center.
189. **Off-line mode**: a function performed after the end of the observation.
190. **OOQS Manager**: an ACS component that is interfaced with the **Central Control System** and manages the internal components of the OOQS.
191. **On-line mode**: a function performed during the observation.
192. **Online Observation Quality System**: a software system that provides quick-look results of the Cherenkov and Intensity Interferometry observation during the data acquisition to give feedback to the Operator.
193. **On-Site ICT Local Control System**: an hw/sw system used to control, configure and get the status of all assemblies/devices of the On-Site ICT System.

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194. **On-Site ICT System Collector**: a system that read monitoring points, alarms, errors, status, and log information of the ICT system.
195. **On-site Startup System:** It manages the sequence of the startup and shutdown of the critical on-site systems.
196. **Operator:** actor responsible for supervising and carrying out scheduled observations and calibrations during the night.
197. **Operator Human Machine Interface**: a web client connected to the SCADA web server. It is an easily accessible, all-in-one-place near-real-time overview of the Mini-Array status that can be used for night and day operations for the main control and monitoring of the MA.
198. **Operator Logbook**: is a part of the Operator HMI that saves the Operator logs of the observations during the night.
199. **Optical Alignment System**: system for the alignment of the mirrors.
200. **Optical Assembly**: a modified dual-mirror Schwarzschild – Couder (SC) configuration to produce an aplanatic Field of View (FoV) of more than 10 degrees. Eighteen aspheric hexagonal segments, produced with the cold slumping technology, compose the primary mirror (M1) with three different radii of curvature in three coronas.
201. **Optical Camera**: a CCD/CMOS camera used for the optical alignment of the telescope mirrors during AIV and maintenance operations.
202. **Optical Camera Local Control Software (OCLCS)**: the local control software of the Optical Camera.
203. **Optical System**: a telescope system assembly that defines the optical design of the telescopes.
204. **Optics Control Unit (OCU)**: the industrial PC that runs the Optics LCS.
205. **Optics LCS**: is responsible for the control of the M2 mirror (focusing) and of the special mechanism that will be used to align the M1 segments during the telescope commissioning and maintenance.
206. **Optics Supervisor**: the software component that controls and monitors the Optics LCS and the Optical Camera LCS.
207. **Physical Data Model**: This data model describes HOW the system is implemented, i.e. the data format, using a specific DBMS system, file format, memory structure, etc.
208. **Pointing**: the procedure to update the conversion between camera and sky coordinates in the Cherenkov data. It may make use of dedicated hardware.
209. **Pointing Monitoring Camera (PMC)**: a system installed on the rear of the M2 support structure to obtain astrometric calibrated FoV of the region pointed to by the telescope.
210. **Pointing Monitoring Camera Local Control Software (PMCLCS)**: the local control software of the Pointing Monitoring Camera.
211. **Pointing Table**: stores both the commanded pointing direction and the pointing direction reported by the telescope.
212. **Port**: a software interface of the nodes.
213. **Power Management System**: a system that controls the power management, that is divided into Telescope Power Management System including centralized UPS system, and Information Communication Technology, including UPS system
214. **Power Management System Collector**: a system that read monitoring points, alarms, errors, status, and log information of the Power Management system.
215. **Power Management Local Control System**: an hw/sw system used to control, configure and get the status of all subsystems of the Power Supply System.
216. **Process deviations**: one part of a process or of a subsystem/assembly affects the functioning of the whole system.

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217. **Prompt Data Products/Processing (Level-A category)**: prompt data products produced and distributed during the run.
218. **Quality Archive**: an archive system that stores the Cherenkov and Intensity Interferometry observations data quality results produced by the Online Observation Quality System.
219. **R0.CAM**: (raw data stream) on-site streamed raw data. R0 content and format is internal to the Cherenkov camera and is the raw data transmitted from the camera to the camera data acquisition. R0 also includes timestamps.
220. **Rain Sensor(s)**: each ASTRI MA telescope service cabinet is equipped with one rain sensor for prompt detection of rain; further rain sensors are located in the weather stations but they are not counted here.
221. **Rain Sensors LCS**: it is the local control software of the Rain Sensors.
222. **Raw data**: data produced by devices or scientific instruments (R0 or DL0).
223. **Raw data archived**: (DL0) raw archived data from the hardware/software data acquisition. This is the lowest level of data that is intended for long-term storage in the bulk archive and could contain some metadata.
224. **Raw data stream**: (R0) on-site streamed raw data. R0 content and format is internal to each device / controllable system, such as raw data transmitted from the physical device/system to its respective server in the on-site Data Center.
225. **Reading points**: A reading point can be a monitoring point or the data acquired from assemblies. This definition covers in an uniform manner many data models.
226. **Remote mode**: the function works without a human operator physically located at the site where the MA is installed.
227. **Run**: an executed Observing Block with a runID, a start-time and end-time.
228. **RunID**, or **run identifier**: a unique identifier used to identify unequivocally the acquired data and the operations carried out for the execution of an Observing Block.
229. **Safe State**: if dangerous conditions are present, the assembly goes into a configuration where the object is considered exposed to “normal” risk for damage or loss. This state depends on the element/system. The telescope is in safe state when it is in parking positions with the camera lids closed and the scientific instruments switched off.
230. **Safety and Security Local Control System**: a set of hw and Local Control Software to control the different assemblies of the Safety And Security System.
231. **Safety and Security System Collector:** a system that reads monitoring points, alarms, errors, status and log information of the Safety and Security System.
232. **Safety LCS**: see Telescope Health and Safety LCS definition.
233. **Scheduling Block (SB)**: the smallest sequence of observing instructions that can be scheduled. A Scheduling block is further divided into a set of Observing Blocks.
234. **Science Alert**: a Science Alert is a communication from/to the astrophysical community that a transient phenomenon is occurring in the sky.
235. **Science Archive**: an archive system that stores data products of the following data models: (i) Observing Projects DM; (ii) Science DM and connected DMs; (iii) High-level (DL3) scientific data and data products (i.e., event lists and IRFs).
236. **Science Data Model (SDM)**: an abstract identification of the data types, and the internal relationships among such data, that make up a complete astronomical measurement. It defines the collection of information recorded during an observation that is needed for scientific analysis. It allows establishing the relationship between acquired data and Observing Projects, to trace all deduced astronomical properties back to raw instrumental data.
237. **Science Domain**: a domain oriented towards carrying out the scientific intent of Observing Projects (observation-centric).

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238. **Science Gateway**: a software system that provides a web interface used to access high-level science-ready data and data products (event lists and IRFs) produced by the Data Processing System and to download Science Tools.
239. **Science products**: preliminary and final scientific data products (DL4) in physical units, on a target-basis, such as detection plots, spectra, sky-maps, and light-curves, generated in an automated way by the Cherenkov Data Scientific Analysis subsystem. These products, if needed, can be further processed and merged to get high-level observatory (legacy) data.
240. **Science Results Data Model (SRDM)**: is an abstract identification of the types of data, data products and metadata produced by a data pipeline.
241. **Science Simulated Data Model (SSDM)**: is an abstract identification of the types of data, data products and metadata used and generated by the Simulation System software The Science Simulated Data Model defines the collection of information generated through MC simulations, used for the characterization of the Cherenkov events and the definition of the expected array performances through the instrument response functions (IRFs) needed for scientific analysis.
242. **Science Support System (SSS)**: the main interface for Science User to the MA system and provides them with easy-to-use HMI for the detailed specification of observations. The main products generated by this system are the Scheduling Blocks. The Science Support System also contains the Science Gateway, a web interface that shall be used to access high-level science-ready data and data products produced by the Data Processing System.
243. **Science Tools**: software tools used to analyze the DL3 data to get final scientific products (DL4).
244. **Science User**: a member of the MA Science Team that will interact with the system to perform observations related to the Observing Projects and that will analyze science data after the completion of the observations. The Science User uses the science data and tools to perform scientific analysis of the results of the observations.
245. **Science User Perspective**: one of the Observing Cycle perspectives, i.e. the Science User (who submits the Observing Project), where the prime interest is to optimize the scientific return of the ASTRI MA System.
246. **Scientific data**: all data acquired by the ASTRI MA for scientific exploitation purposes.
247. **Science-ready data**: high-level data and data products (DL3) produced by the Data Processing System (i.e., event lists and IRFs) ready to be analyzed by the Science Tools.
248. **Science products**: preliminary and final scientific data products (DL4) in physical units, on a target-basis, such as detection plots, spectra, sky-maps, and light-curves, generated in an automated way by the Cherenkov Data Scientific Analysis subsystem. These products, if needed, can be further processed and merged to get high-level observatory (legacy) data.
249. **Service data**: supporting data that act as a service to an observation, hardware or software component.
250. **Short-term Data Products/Processing (Level-B category)**: data products (up to preliminary scientific products) produced at the end of a run (after some off-line processing) or at maximum by the next observation day.
251. **Short-term observation plan:** list of Scheduling Blocks for the next night of observation, selected from the long-term observation plan previously prepared.
252. **SI3**: data produced by the SI3.
253. **SI3 Data Acquisition**: it acquires the DL0 files (raw) data from the SI3 Back End Electronics via FTP for each telescope and for each Run.
254. **SI3 Data Quality Checker**: a software component that shall perform a data quality check at telescope level of the DL0.SI3 and DL1.SI3 data products.

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255. **SI3 Supervisor**: the software component that provides an interface to the SI^3 LCS.
256. **Simulation Archive**: an archive system that contains all the Monte Carlo simulation events simulated by the Simulation System for the different MA configurations.
257. **Simulation System**: a system that provides simulated scientific data for the development of reconstruction algorithms and for the characterisation of real observations.
258. **Simulation Processing**: data products produced by simulations (e.g. Monte Carlo).
259. **Site Archive System**: the archive system located at Teide.
260. **Site System** or **Site Infrastructure System:** the substems installed at the observing site.
261. **SQM (Sky Quality Meter)**: a system that performs a quick evaluation of the sky quality during observations and measures the brightness of the night sky in magnitudes per square arcsecond with a 10% precision.
262. **SQM LCS**: the local control software of the SQM.
263. **Startup System**: see **On-Site Startup System**.
264. **Startup System GUI:** the GUI of the Startup System;
265. **Stellar Intensity Interferometry Instrument (SI^3)**: a dedicated optical photon detection module for performing intensity interferometry observations with the ASTRI telescope.
266. **Stellar Intensity Interferometry Instrument Local Control Software (SI3LCS)**: the local control software of the SI^3.
267. **Stereo Event Builder**: a software system that performs the off-line software stereo array trigger of Cherenkov data.
268. **Subsystem**: is a system in its own right, except it normally will not provide a useful function on its own, it must be integrated with other subsystems (or systems) to make a system.
269. **Subsystem Manager**: an ACS software component that provides an interface of a SCADA subsystem with the rest of the SCADA system and manages the lifecycle of the SCADA software subsystem, in particular it manages the software component state machine.
270. **Supervisor**: a software component of the SCADA system that interfaces with the hardware elements and manages the composition of the assembly state machine. A Supervisor could be part of a SCADA Control System or SCADA Collector.
271. **Supervisory Control and Data Acquisition (SCADA)**: a software system that controls all the operations carried out at the MA site. SCADA has a Central Control System which interfaces and communicates with all assemblies and dedicated software installed at the site. It is responsible for the execution of the Scheduling Blocks to perform observations.
272. **Support Astronomer**: actor that prepares the long-term scheduling.
273. **SVC (service)**: it contains data that act as a service to an observation, hardware or software component.
274. **System**: is an arrangement of parts that together exhibit behaviour or meaning that the individual constituents do not (INCOSE definition).
275. **System Configuration Database (SCDB)**: an archive system to store the configurations described by the System Configuration Data Model.
276. **System Configuration Data Model**: describes configuration of MA.
277. **Target**: a location to be observed, either celestial or terrestrial, specified by coordinates in the appropriate reference system (*e.g.*, RA & Dec, galactic, ephemeric, geocentric).
278. **Telescope Condition Monitoring**: a system that consists of accelerometers and temperature sensors mounted on the telescope drive system. The output signals of these sensors are read by dedicated Beckhoff modules connected to the Telescope Control Unit and managed by the Mount LCS.
279. **Telescope Control System (TCS)**: a software system responsible for coordinating all Telescope assemblies, starting up, configure, and shutting down the assemblies of the Telescope, supervising optical system control, telescope mount control and instrument control (Cherenkov Camera, Optical Camera and SI^3).

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280. **Telescope Control Unit (TCU)**: the industrial PC running the software which is in the charge of the monitoring and control of the elevation and azimuth axes motion
281. **Telescope Data Model (TELDM)**: it describes the primary pointing position of each telescope that is stored in the pointing table.
282. **Telescope domain**: domain of data ordered in time and related to specific instruments or groups of instruments (instrument-centric).
283. **Telescope Local Control System**: it is a set of Local Control Software and hardware to control the different assemblies of the telescope.
284. **Telescope Health Control Unit (THCU)**: the industrial PC running the software and safety logic which are in charge of the interlock chain and power management of the telescope and of the monitoring of the health of all telescope assemblies
285. **Telescope Health and Safety LCS**: responsible for monitoring the status of all telescope subsystems and for the startup and shutdown of all the assemblies mounted on the telescope, including the instruments and the commissioning and maintenance mechanisms that will be temporarily mounted on the Mount Assembly. This system runs on a Telescope Health Control Unit (THCU) and shall be able to receive triggers from the telescope Safety Unit in case of any hazards requiring the telescope to reset to safe state.
286. **Telescope Manager**: the software component responsible for coordinating all TCS subsystems and starting up and shutting down the system.
287. **Telescope Mount or Mount**: Alt-Az mount to support and point the optical assembly and the scientific instrumentation at any target in the part of the sky accessible from the site. It uses a very compact mechanical configuration because the distance between the primary and secondary mirror is just 3 m. The mount is part of the Mechanical Structure Assembly and includes the azimuth and altitude kinematic chains and drive systems, the stow-pin system and all sensors, actuators and controllers needed [RD2]. Details on Mount State Machine are reported in [RD2].
288. **Telescope Protection System**: a system that is part of the Safety and Security System and guarantees the safety of the telescope and of the people during operation and maintenance activities. It includes a fire protection system [RD2].
289. **Time Synchronization and Distribution System**: a system that distributes the timestamp to camera servers.
290. **Tracking**: the procedure to ensure that the optical axis of the telescope points as close as possible to a given position in the sky. Any correction is done online.
291. **UVSiPM**: a light detector that measures the intensity of electromagnetic radiation in the 300–900 nm wavelength range.
292. **UVSiPM LCS**: the local control software of the UVSiPM.
293. **Validated Observing Project (VOP)**: an OP technically and scientifically evaluated and validated.
294. **Variance (VAR)**: maps of the focal plane periodically produced by the Cherenkov Camera, used also to monitor the temporal variations of the NSB flux.
295. **Warning event**: an event that notifies warning conditions.
296. **Weather Station(s)**: a device that collects data related to the weather and the site environment using many different sensors.
297. **Weather Station LCS**: it is the local control software of the Weather Stations.

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5. Stereotypes

In the UML diagrams some stereotypes are used.

All ASTRI MA **elements** controlled and monitored by SCADA have the <<assembly>>, <<subsystem>> or <<device>> stereotype.

The types of **interconnection** are dashed lines and marked with the following stereotypes:

- The <<telemetry>> stereotype represents all monitoring points (MON), alarms, errors (ERR), logs (LOG), and status information
- The <<control>> stereotype represents the control flow, i.e. startup/shutdown, command and configuration
- The <<data>> stereotype represents the data flow between the MA subsystems and the SCADA system. The data categories that can be acquired by the SCADA system are described in [AD2] and are:
    - Cherenkov Camera Data
    - Stellar Intensity Interferometry Instrument Data
    - Atmosphere Characterisation data
    - Environmental Monitoring Data
    - Calibration Data

The generic <<flow>> stereotype indicates an exchange of information between components and can be <<telemetry>> or <<data>>.

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