The Monitoring Logging and Alarm System of the ASTRI Mini-Array gamma-ray air-Cherenkov experiment at the Observatorio del Teide AST

Federico Incardona (INAF – Osservatorio Astrofisico di Catania – federico.incardona@inaf.it), A. Costa, K. Munari, S. Gambadoro, S. Germani, P. Bruno, A. Bulgarelli, V. Conforti, F. Gianotti, A. Grillo, V. Pastore, F. Russo, J. Schwarz, G. Tosti, and S. Cavalieri, for the ASTRI Project (http://www.astri.inaf.it/en/library/)

INTRODUCTION

We present the Monitoring, Logging, and Alarm (MLA) software architecture currently under development for the ASTRI Mini-Array. The MLA System monitors the overall performance of the ASTRI Mini-Array [1] through the acquisition of environmental housekeeping data, log files, and alarms from instruments, and generates status reports or notifications to the operator via an Operator Human Machine Interface. The collected data are saved in the MLA Archives, which are databases optimized for real-time applications. The MLA Software is based on the ALMA Common Software [2] (ACS).

The Monitoring System functionality can be classified into three main areas: collection, persistence, and (limited) processing. **ALARM**

The Alarm System (Fig. 2) provides the service that gathers, filters, exposes, and persists all the relevant alarms raised by devices (such as telescopes) and software processes (e.g., Monitoring System, Logging System, Array Data Acquisition System, etc.). It also creates and filters new alarms based on a selection of the most critical

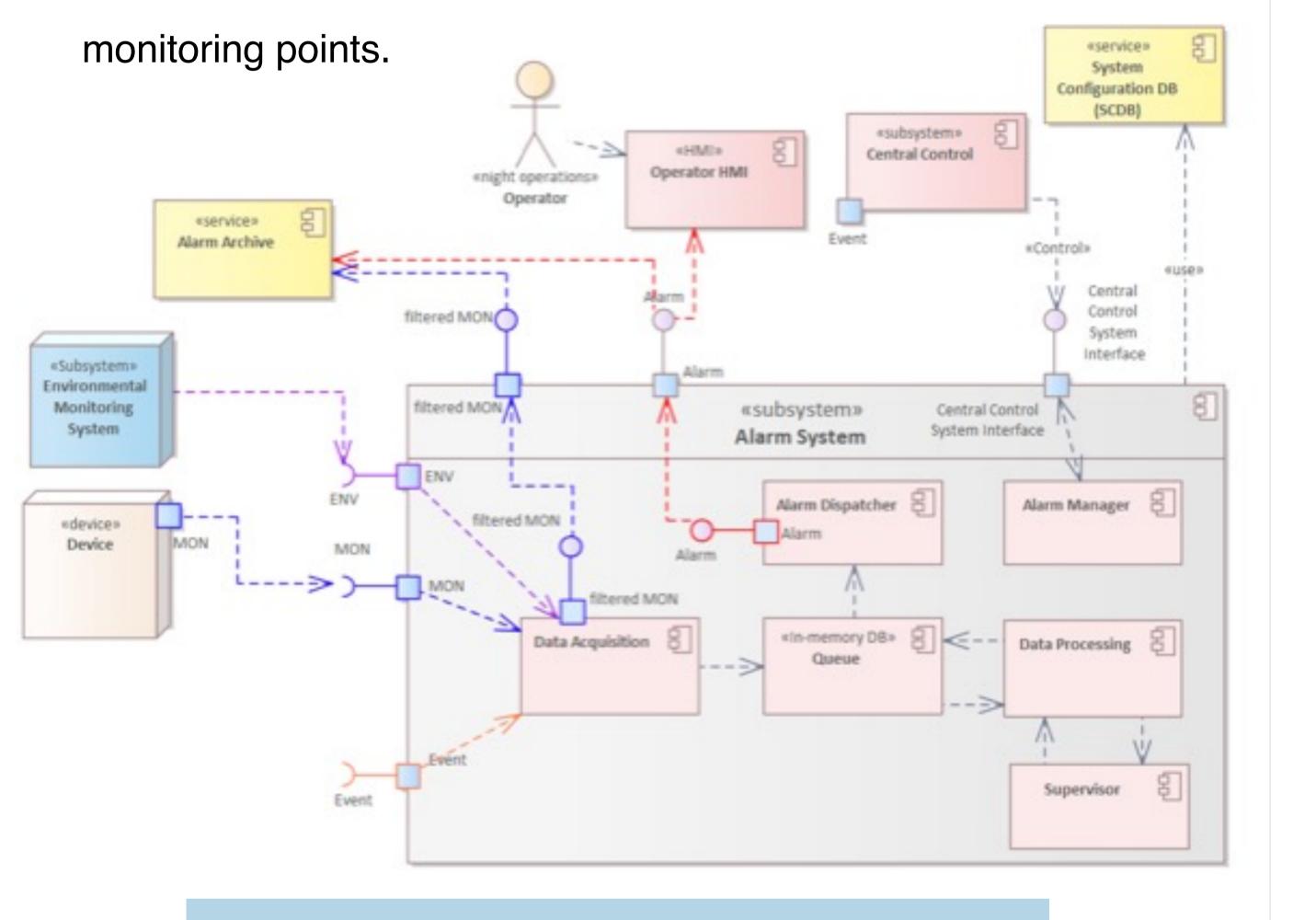
LOGGING

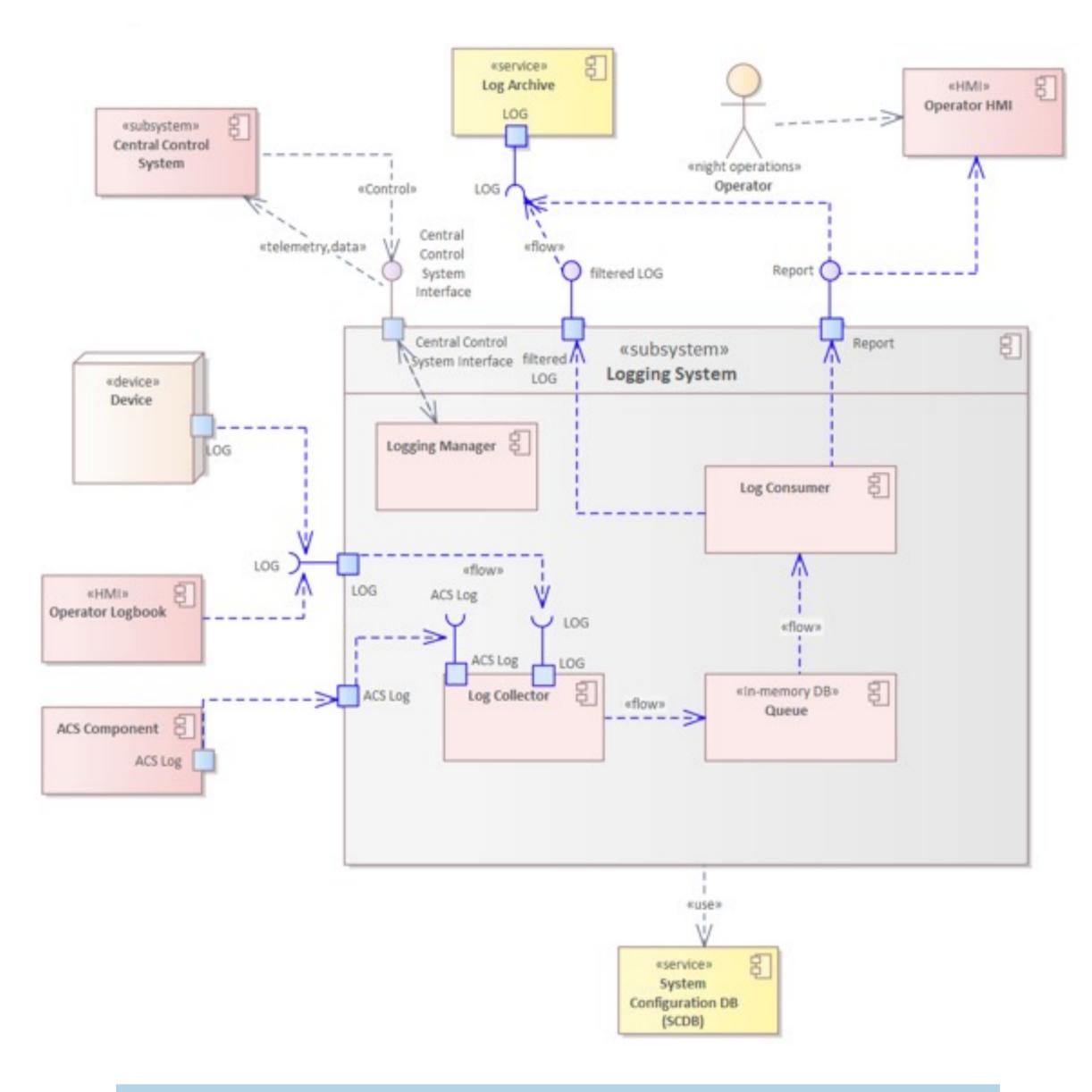
Mini-Array

The Logging System (LOUD [4], Fig. 4) gets logging information from relevant software and hardware **components.** The amount of log files is expected in the order of about 200 Mbps. Particular attention has been paid to enabling filtering of log events at the device level and at the level of the log collection. Such filtering capability is based on log priority. Logs will not only be useful to diagnose failures detected during operation but they will also be needed for long-term performance analysis.

MONITORING

The ASTRI Mini-Array system will generate about 20000 monitoring points sampled at 1 Hz, collecting information on the performance of a variety of critical and complex electrical and mechanical components. The Monitoring System (Fig. 1) provides the services that gather monitoring data from the telescopes, the Environmental Monitoring System,





and other instruments, and saves them in the Monitoring

Archive.

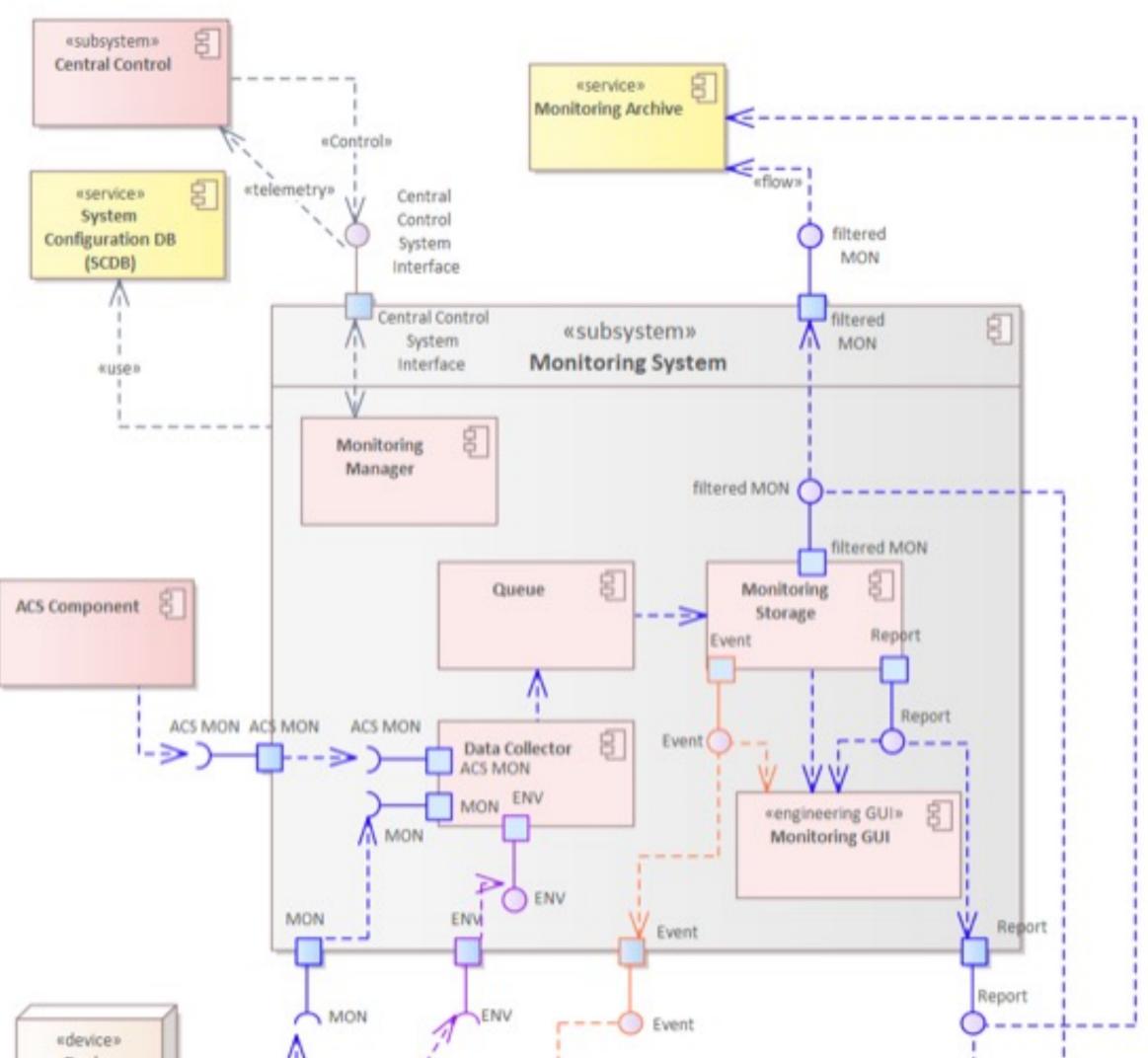


Fig 2: Alarm System Architecture

current implementation of the alarm system is a The customization of the **Integrated Alarm System** (IAS [3], Fig. 3), which is able to combine monitoring values and calculate corresponding alarms based on a set of pre-defined rules.

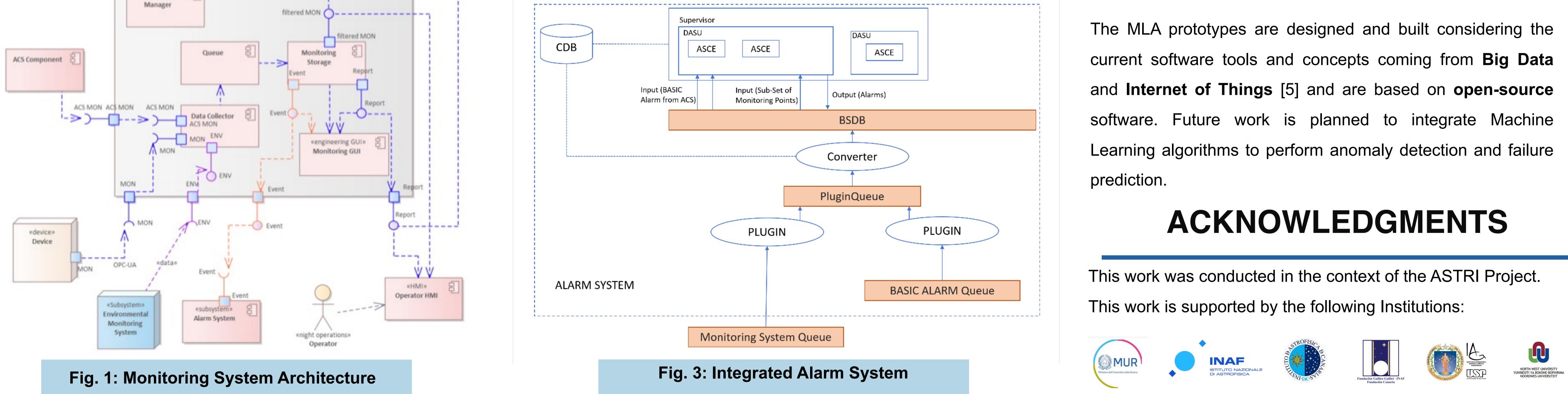


Fig. 4: Logging System Architecture

References

- 1. Pareschi, G., et al., "The ASTRI SST-2M prototype and mini-array for the Cherenkov Telescope Array (CTA)", 2016. 2. Chiozzi, G., et al., "The ALMA common software: a developer-friendly corba-based framework"
- 3. Caproni, A. and Schmid, E., "The Integrated Alarm System for the ALMA observatory", 2017.
- 4. Incardona, F., et al. "LOgging UnifieD for ASTRI Mini Array", 2021.
- 5. Costa, A. et al., "Big Data Architectures for Logging and Monitoring Large Scale Telescope Arrays", 2020.