Designing and prototyping the control system for the Cherenkov Telescope Array

ABSTRACT
The Cherenkov Telescope Array (CTA) is the next-generation atmospheric Cherenkov gamma-ray observatory. The Observation Execution System (OES) team within the CTA project is designing and prototyping the software to execute the observations and to handle the acquisition of scientific data at GB/s rates. In this contribution we show the OES system as it is being designed using the UML and SysML formalisms. In addition, we present the status of the associated prototyping activities.

THE CTA ARRAY
CTA will consist of two facilities, one in the southern (Cerro Armazones Chile) and the other in the northern hemisphere (La Palma, Spain). The two sites will contain dozens of telescopes of different sizes, constituting one of the largest astronomical installations under development.

CTA OPERATIONS
CTA will implement simultaneous automatic operation of multiple sub-arrays. It will be capable of quick re-scheduling of observations (within a few seconds), in order to allow observations of elusive transient events. The operation, control, and monitoring of the distributed multi-telescope CTA arrays is inherently complex. As such, they pose new challenges in scientific instrumentation control systems and in particular in the context of ground-based gamma-ray astronomy.

MODEL DRIVEN APPROACH
The OES architecture (see Fig. 1) is designed using the Software Platform Embedded System (SPES) methodology [1]. The application of the architecture model includes, among others:

- Architecture drivers and design using the viewpoints defined in SPES (Fig. 2)
- Specification of architecture design, including interfaces and behavior
- Relationships (traces) from drivers to model elements, ensuring consistency
- Vision sharing and scoping (incl. interface definition), two important ingredients for collaborative software engineering

ACKNOWLEDGEMENTS
We gratefully acknowledge financial support from the agencies and organizations listed here:

www.cta-observatory.org/consortium_acknowledgments

REFERENCES