THE ICE TEST BED CONTROL AND DATA ACQUISITION SYSTEM: FINAL ARCHITECTURE AND NEW ITER-RELEVANT ISSUES

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The Insulation and Cooling Experiment (ICE) is a test bed developed at Consorzio RFX [1]. Its purpose is to investigate important technological aspects related to SPIDER (Source for the Production of Ions of Deuterium Extracted from Rf plasma) and MITICA (Megavolt ITer Injector and Concept Advancement), the two test beds that will address the main issues of the ITER Heating Neutral Beam Injectors.
Differently from SPIDER, the MITICA Control And Data Acquisition System (CODAS) is required to be ITER-compliant. However, our recent decision to adopt the choice of the ITER CODAC (COntrol, Data Access and Communication) group, i.e. EPICS (Experimental Physics and Industrial Control System), as software infrastructure also for SPIDER caused the need of testing this package as soon as possible. The original plan for the ICE CODAS [2] foresaw the employment of a commercial SCADA (Supervisory Control And Data Acquisition) package. In order to take into account the most recent requirements and, in particular, the need to get acquainted with the use of EPICS, which is available in the CODAC Core System [3], it was decided to develop another architecture, based on EPICS. The commercial-SCADA-based architecture will be the main one, since most of the control system was already developed according to it. The EPICS-based architecture will be used for testing purposes and it will be possible to switch from it to the commercial-SCADA one and *vice versa*.
The ICE CODAS can be subdivided into four units (Automation & Monitoring, Supervision, Data Handling and Communication), which are characterized by different software and hardware specifications. Five layers (Plant Floor layer, Control layer, Data Handling layer, Supervisory layer, Set-up layer) differentiate the ICE CODAS structure from a functional point of view.
This paper describes the commercial-SCADA and EPICS architectures of the ICE CODAS, comparing them and highlighting the new issues related to EPICS. The software and hardware specifications are addressed as well as important topics concerning, among others, communication, data handling and basic control-system requirements.

[1] F. Fantini et al., "An experimental test bed for thermo-electrical and thermo-fluid dynamics investigations", Proceedings of the 9th International Symposium on Fusion Nuclear Technology, October 11-16 2009, Dalian, China
[2] O. Barana et al., "Analysis of the Control System of ICE, the Insulation and Cooling Test Facility for the Development of the ITER Neutral Beam Injector", Proceedings of the 12th International Conference on Accelerator and Large Experimental Physics Control Systems, October 12-16 2009, Kobe, Japan
[3] ITER CODAC Core System website:
https://www.iter.org/org/team/chd/cid/codac/Pages/CoreSystem.aspx