Contribution ID: **64** Type: **Poster presentation**

Test-driven software upgrade of the LHC beam-based feedback systems

Friday 10 June 2016 10:30 (1h 35m)

The beam-based feedback system is essential for the operation of the LHC. It comprises two C++ servers: a FESA (framework for real-time systems developed at CERN)-based acquisition and configuration proxy, and a non FESA-based controller which sanitizes the acquisition data and feeds it to multiple real-time feedback algorithms (orbit control, radial-loop control and tune control) ensuring a stable orbit of the LHC's beams. Responsibility for the further development and maintenance of the servers was recently transferred to a new team, who have made considerable efforts to document the existing system as well as improve its operational reliability, performance, maintainability and compliance with CERN's software and operational standards. Software changes are accompanied by rigorous unit-testing with future releases tested outside the operational environment, thus minimizing the potential for beam downtime. This approach has proven very effective during re-commissioning for LHC's run 2, where the systems underwent significant changes.

In a bid to homogenize operational procedures for configuring LHC systems, a demand to improve the real-time configuration of the system's feedback references and optics was identified. To replace the existing ad-hoc method of real-time configuration, a new waveform-based server, pre-configured with sequences of N-dimensional values versus time, autonomously ensures that the system is re-configured at precisely the correct time.
This paper describes the design choices, testing, integration, commissioning and preliminary results of the new waveform-based server. In particular, effort was put into reducing the impact of changing already established and tested behavior. The paper will mainly focus on how the code for the core functionality was developed outside the FESA environment (crucial for making it more unit-testable), and on the generic interfaces developed for its integration within CERN's control infrastructure.

Author: LOURO ALVES, Diogo Miguel (CERN)

Co-authors: WENNINGER, Jorg (CERN); FUCHSBERGER, Kajetan (CERN); JACKSON, Stephen (CERN)

Presenter: LOURO ALVES, Diogo Miguel (CERN)

Session Classification: Poster Session 2

Track Classification: Control, Monitoring,Test and Real Time Diagnostics Systems