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Accelerator Fault Tracking for CERN's LHC

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CERN's new Accelerator Fault Tracking (AFT) system aims to facilitate answering questions like: "Why are we not doing Physics when we should be?"and "What can we do to increase machine availability?"

People have tracked faults for many years, using numerous diverse, distributed and un-related systems. As a result, and despite a lot of effort, it has been difficult to get a clear and consistent overview of what is going on, where the problems are, how long they last for, and what is the impact. This is particularly true for the LHC, where faults may induce long recovery times after being fixed.

The AFT project was launched at the end of February 2014, by the Controls group in the Beams department, together with stakeholders from the Operations teams.

The project has been divided into 3 phases, with the 1st phase completed on time, ahead of the LHC restart and delivering the means to achieve consistent and coherent data capture for LHC, from an operational perspective. Phase 2 of the project is foreseen to focus on detailed fault capture for equipment groups, and Phase 3 for extended integration with other systems such as asset management intervention tracking to be able to facilitate predictive failure analyses and plan preventive maintenance operations.

AFT is already helping various teams from around CERN to analyse faults impacting LHC operations during the beam commissioning and first physics runs. It usually features in the regular coordination and machine status meetings.

The AFT system has been designed to be non-LHC specific, and therefore is able to cater for fault tracking for other CERN accelerators and their sub-systems if so desired.

The technologies involved are an Oracle database, a Java server with APIs for data exchange with the Operations teams Logbooks, and data extraction and visualization via a Web application.

Despite the utility of the current AFT system, we are just seeing the tip of the iceberg in terms of the potential value that the system can bring (e.g. time saving to discover what is going on, and being able to quickly identify problems or patterns within the vast amount of data). By making further investment in the development of the software infrastructure, we will surely unlock the currently hidden potential.

This presentation, will introduce the AFT project, the operational experience gained so far after completion of Phase 1, and the plans for the future.

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