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COLLABORATION ON ISS EXPERIMENT DATA AND KNOWLEDGE REPRESENTATION

Abstract

The USOCs (User Support and Operation Centres) are a network of collaborating centres. They have been established in various EU countries with the support of national space agencies and are engaged by the European Space Agency (ESA) to conduct the operations for European scientific experiments on board the International Space Station. The USOCs Knowledge Integration and dissemination for Space Science Experimentation (ULISSE) project aims at developing a platform and tools for improving preservation, valorisation and exploitation of data produced by European experimentation in space. ULISSE is a Seventh Framework project funded by the European Commission.

To be able to support and improve utilisation of the experiment data, metadata and knowledge about the experiments needs to be extracted, represented, archived and preserved, allowing access to the European community for further scientific uses. Corresponding to these needs, tools have been developed to exploit the use of the information for the broad range of disciplines being represented in the European Columbus experiment facilities on ISS. The tools have been implemented on a platform consistent with the distributed ground infrastructure architecture implemented for the European USOCs.

The tools are based on a number of formalisms to represent knowledge to be maintained and preserved. ScienceCast is a collaboration tool based on Topic Maps technology to structure knowledge about experiments for dissemination. Other dedicated tools for authoring metadata about datasets have been developed to enforce a standard. Knowledge about internal data formats guided a data valorisation framework based on experiment data integration. The Planning and Validation Tool (PVT) exploits a timeline representation to model possible temporal evolutions of scientific payload components and aims at supporting the automatic definition of on-board activity schedules for performing the associated scientific experiments. Moreover, it validates such schedules with respect to identified requirements and constraints. Immersive visualization techniques enable intuitive exploration of knowledge about the ULISSE data for better understanding the context. Virtual Reality and Augmented Reality design issues for ordinary end-users were analysed.

In the presentation, ULISSE project experience in knowledge representation will be addressed in support of the following objectives: improve preservation and valorisation of space data, representing intellectual ownership and data dissemination policies, stimulating data reuse and collaboration.