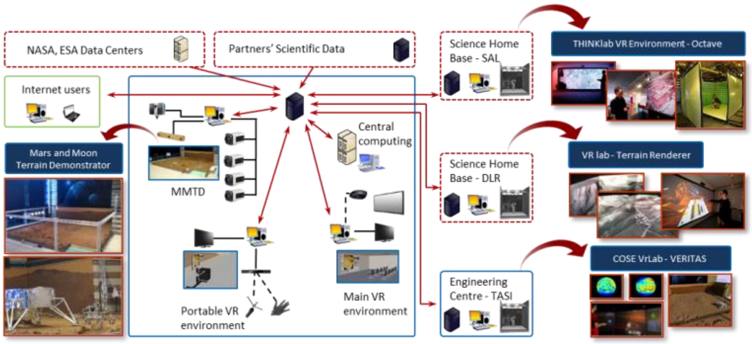
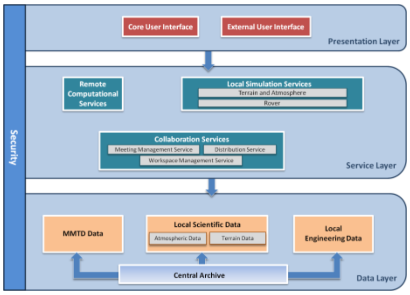
CROSS DRIVE

SEVENTH FRAMEWORK PROGRAMME

CROSS DRIVE: A Collaborative Virtual Reality Workplace for Space Science Data Exploitation and Rover Operations Engineering

The CrossDrive Project develops **Distributed** and **Collaborative Infrastructure** based on advanced **Immersive Virtual Reality** tools for the analysis and management of **Scientific Data** and **Operational Activities** of planetary spacecraft. The **Collaborative Workspace** encompasses advanced technological solutions for central storage processing, 3D visualisation and **Virtual Presence** in **Immersive Virtual Reality** environments, to support Space Data Analysis and **Space Operations**. Science objectives are share and correlate **Atmospheric** data, analysis and simulations based on the actual main Mars' satellites (MEX and MRO); compare and correlate data for **Geology** and **Geodesy**; benchmark satellite and ground based Mars atmospheric measurements.



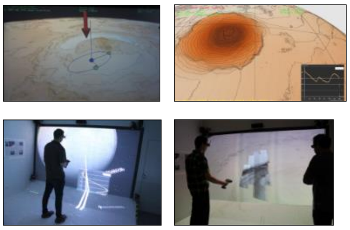


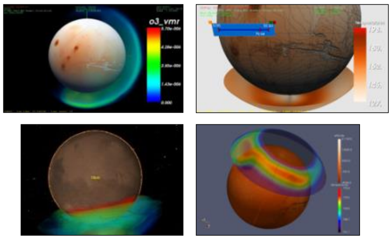
System Architecture Overview

The design of a collaborative platform is a complex task that requires effective system architecture to provide a modular and reconfigurable system to support collaboration. The proposed architecture follows a layer-based approach in which the functionalities are grouped into layers. The collaborative layer-based architecture can be treated both as a platform (the environment for hosting applications/services) and as a framework (providing reusable tools and services). The presentation layer provides two interfaces for supporting the different team members to conduct their tasks collaboratively: a core user and an external user interface. The service layer provides the services to be consumed by the presentation layer. They are grouped in three categories: local simulation services, remote computational services and collaboration services. The data layer provides the data access service for the service layer to store and retrieve different types of information

USE CASE 1: Landing Sites Characterization

This use case will visualise, analyse and present relevant aspects of research in landing site selection for Mars robotic missions. Science users will be able to analyse geologic features of selected areas of Mars, apply basic GIS functionality and a selection of real-time analysis tools, and analyse the surface and subsurface structure of the terrain. Relevant sample datasets will be visualised as 3D terrain model using the Mars Cartography Virtual Reality System.



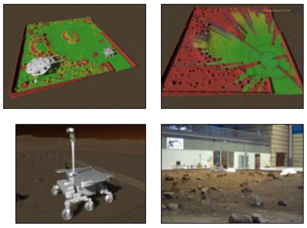


USE CASE 2: Mars Atmospheric Data Analysis and Benchmarking

Global views of Mars in order to analyse concepts related to the global circulation like geo-potential maps and time/spatial variations of selected variables will be considered. Tests will include comparisons among measured data and output of off-line complex models, among data from different payloads, and among data collected from different locations or time. Correlation and benchmarking between satellite and ground based measurements are also foreseen.

USE CASE 3: Rover Target Selection

This test addresses operation planning of planetary rovers and satellites by using the Collaborative Workspace. It will allow the analysis of geologic features of terrain as viewed by the on-board cameras of the rover, comparison among rover images/DTM and satellites' images/DTM, analysis of the morphology of the terrain in correlation with expected landing trajectories, provision of commands to satellites and rover, and review of the data coming from the rover after commands execution.



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