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applied spatial intelligence

Virtual Reality for Interplanetary Spatial Exploration

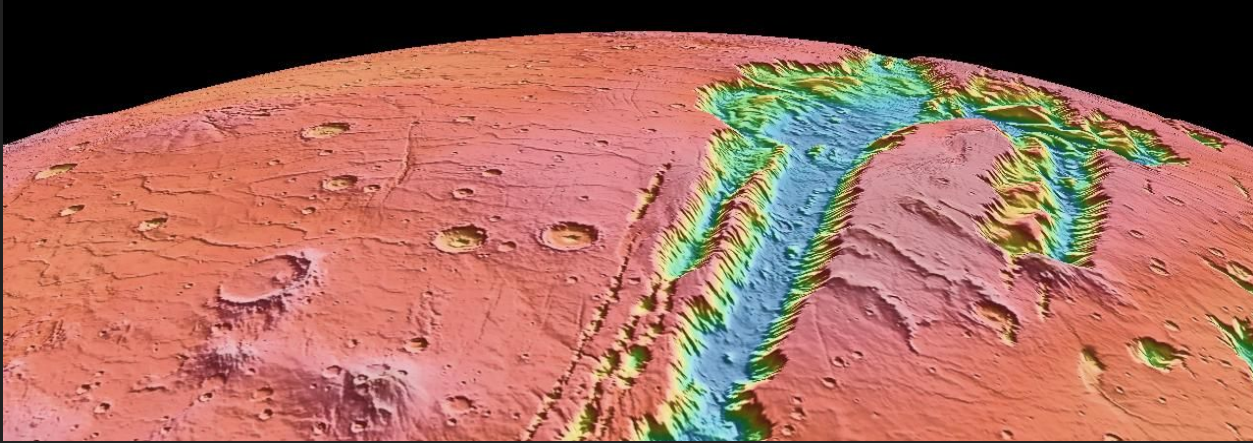
Human Factors Design for Planetary Science Data

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Conceptualizing Planetary Scales



“Given the width of the canyons [in Valles Marineris on Mars], though, from the foot of one great wall you might well not see to the other; if you did, it would just be as a doubling of the horizon.” -Oliver Morton, *Mapping Mars*

VR Transforms the Ontology of a GIS

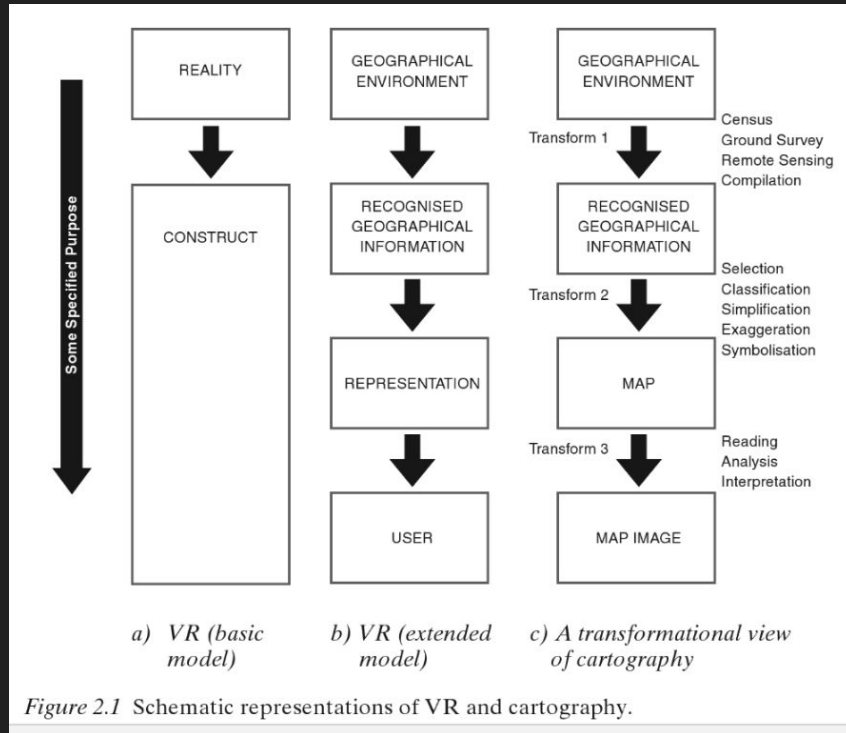
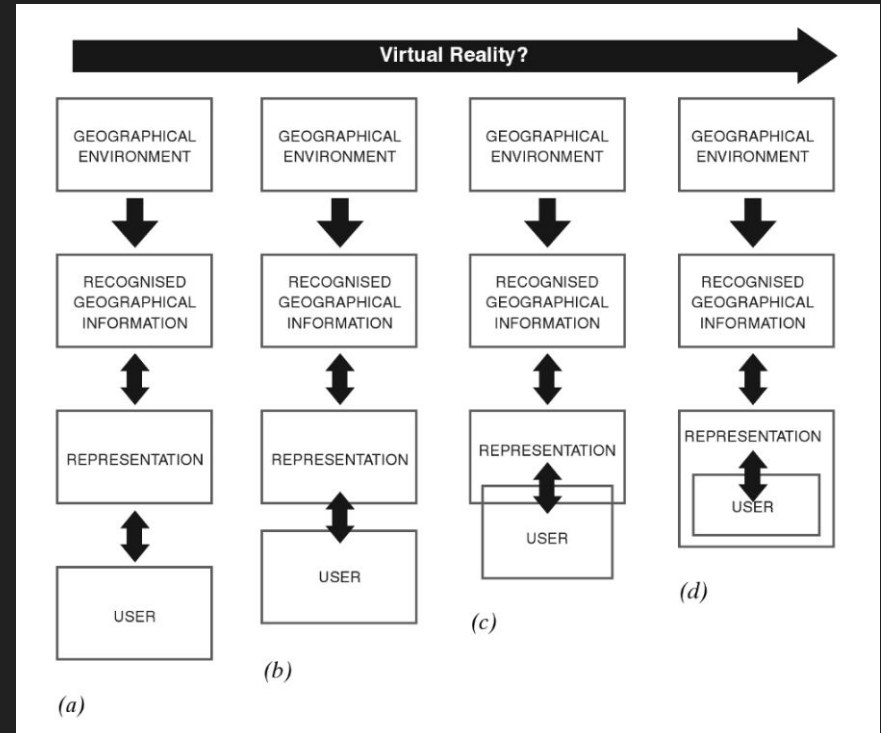


Figure 2.1 Schematic representations of VR and cartography.



VR Transforms the Ontology of a GIS

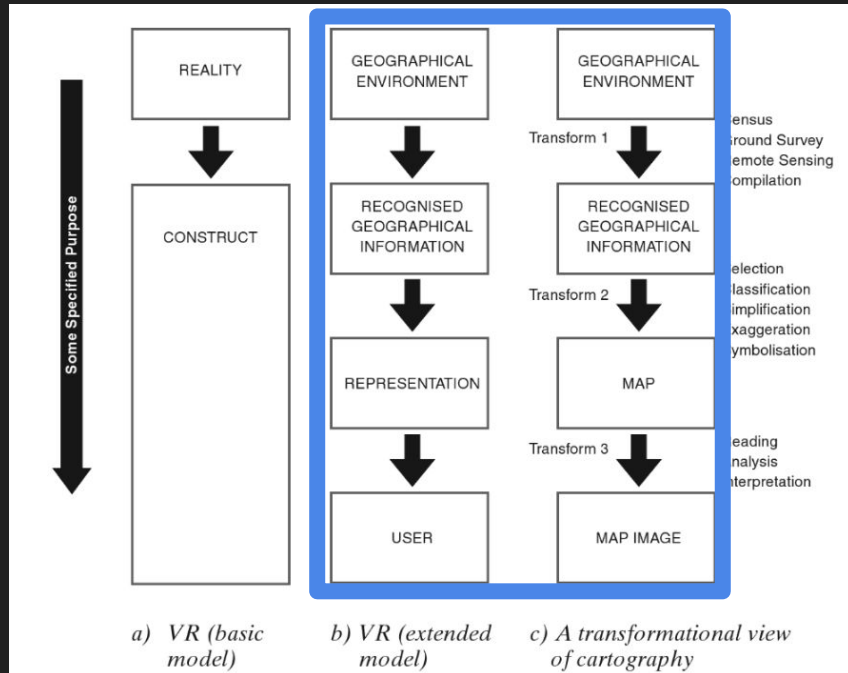
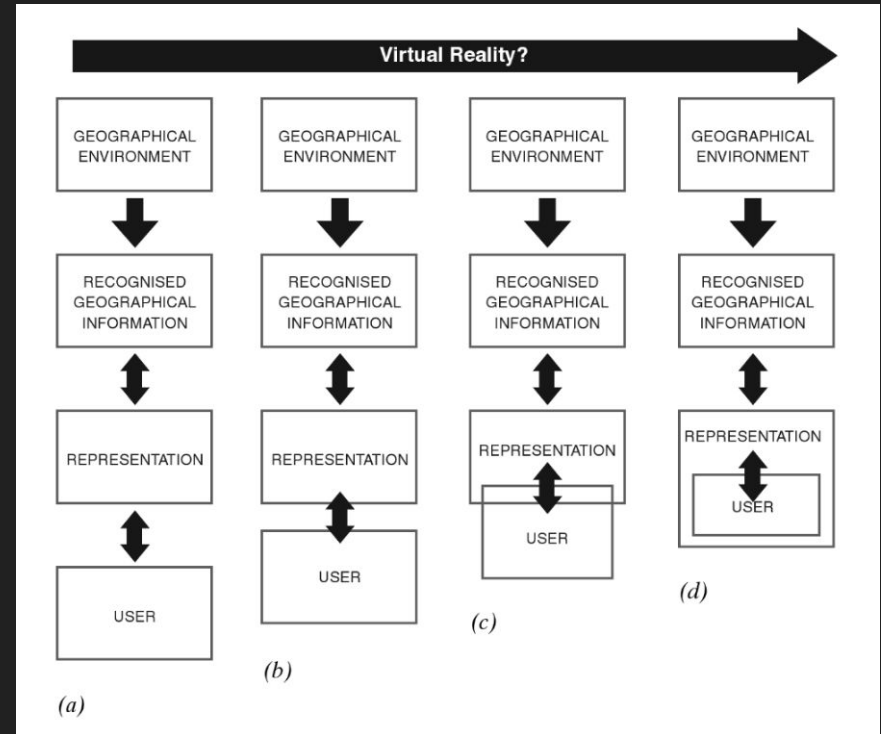
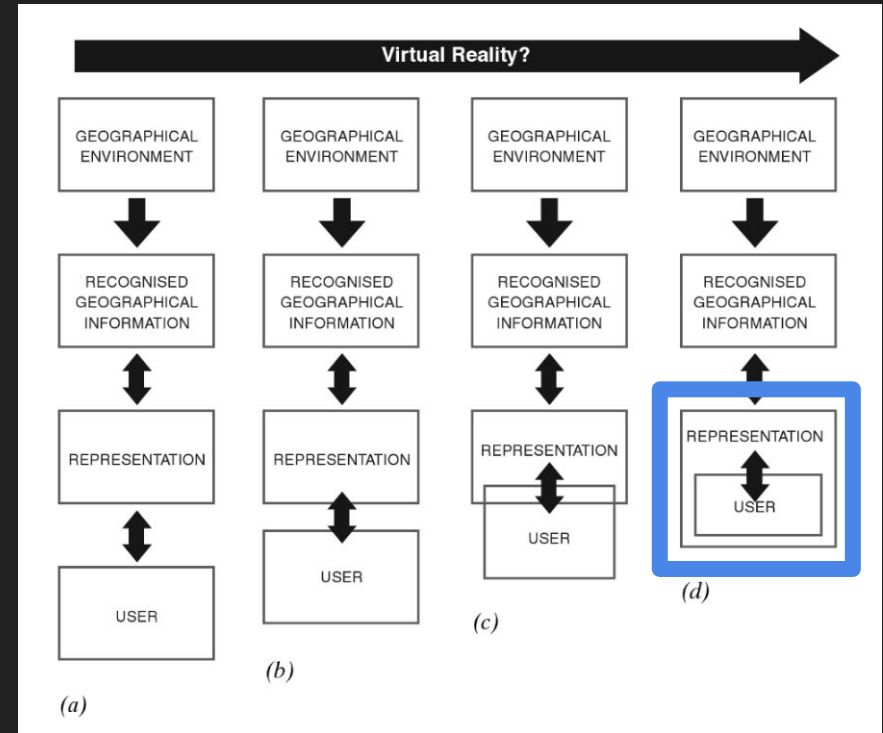
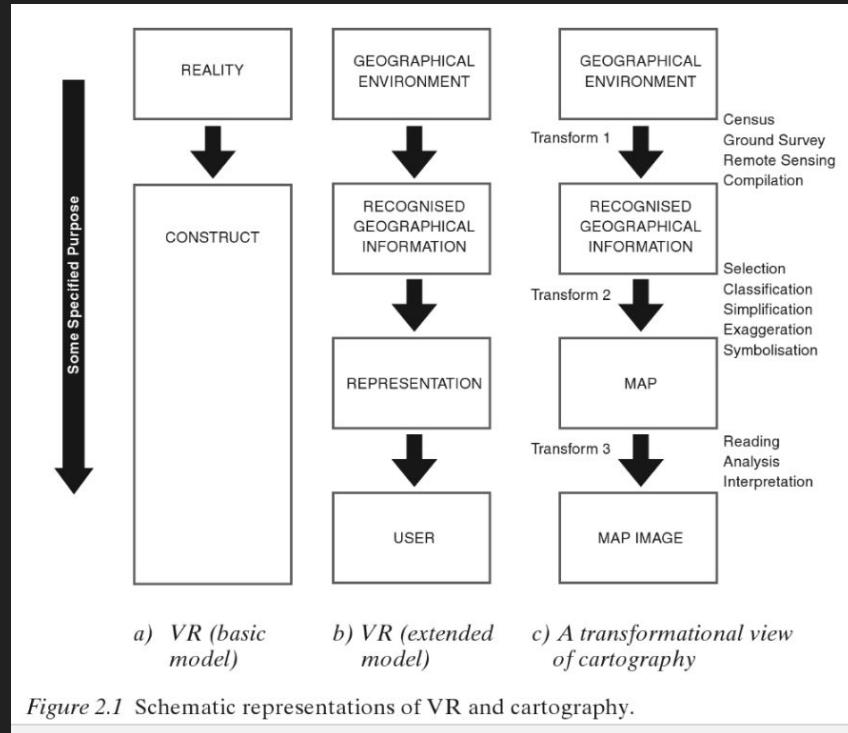


Figure 2.1 Schematic representations of VR and cartography.



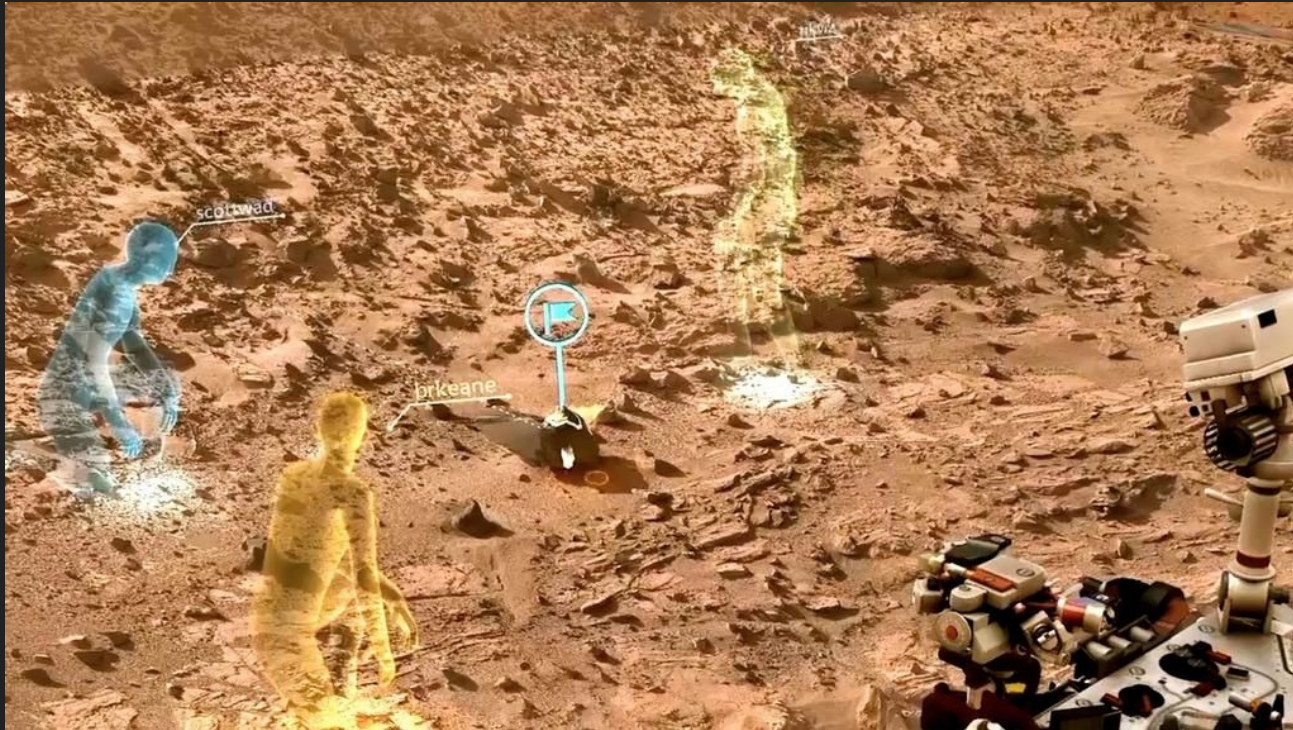
VR Transforms the Ontology of a GIS



Objective:

Create navigable virtual reality environments of planetary data, specifically from Martian geospatial data, for human interaction and spatial contextualization.

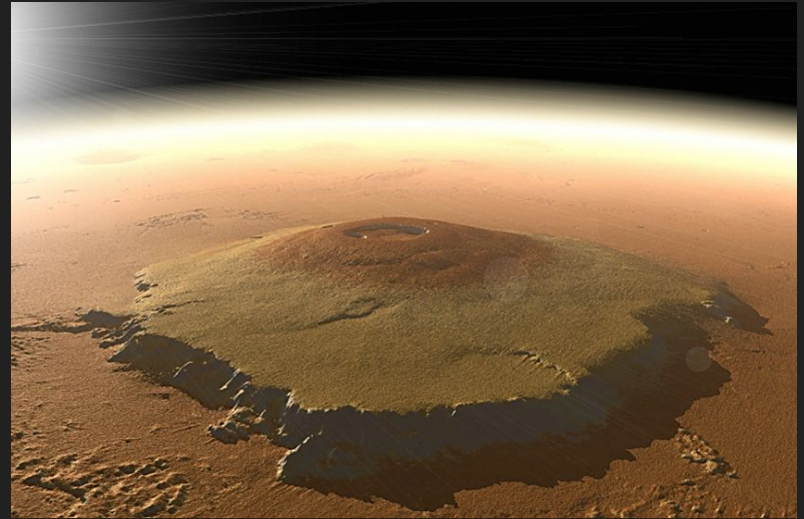
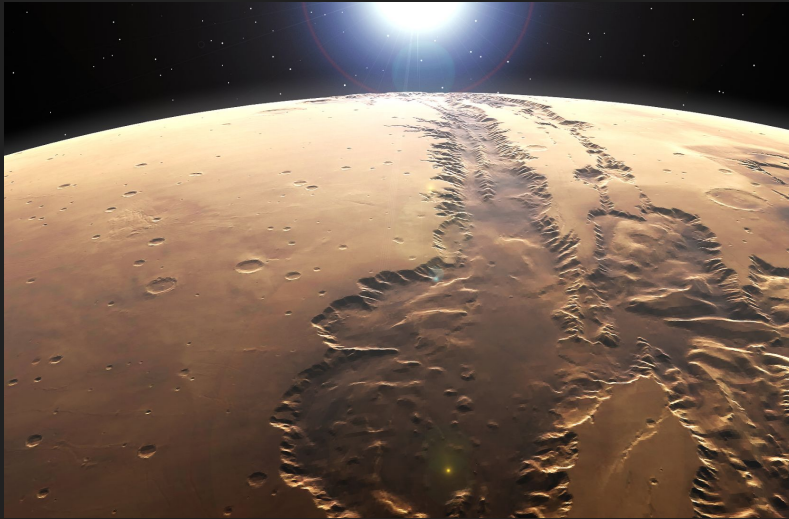
VR for Planetary Geospatial Applications



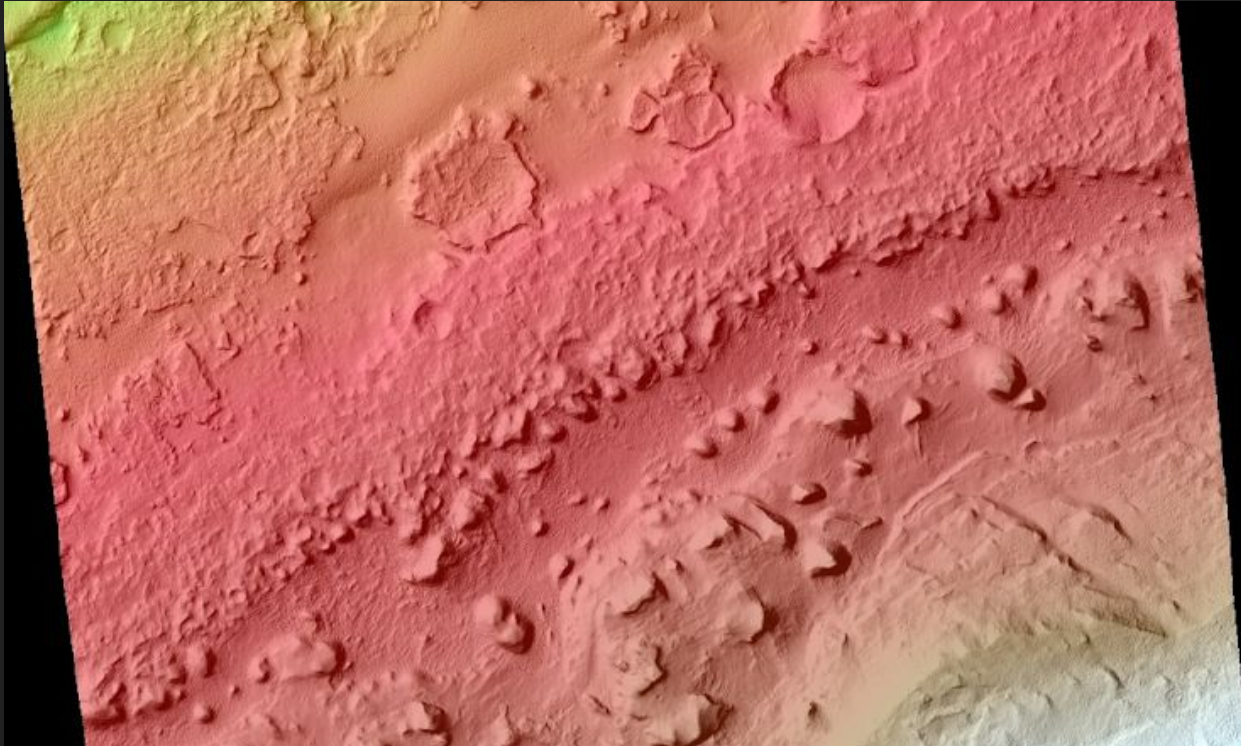
HiRISE DEMs of Valles Marineris, Olympus Mons

Emphasizing extreme planetary scales

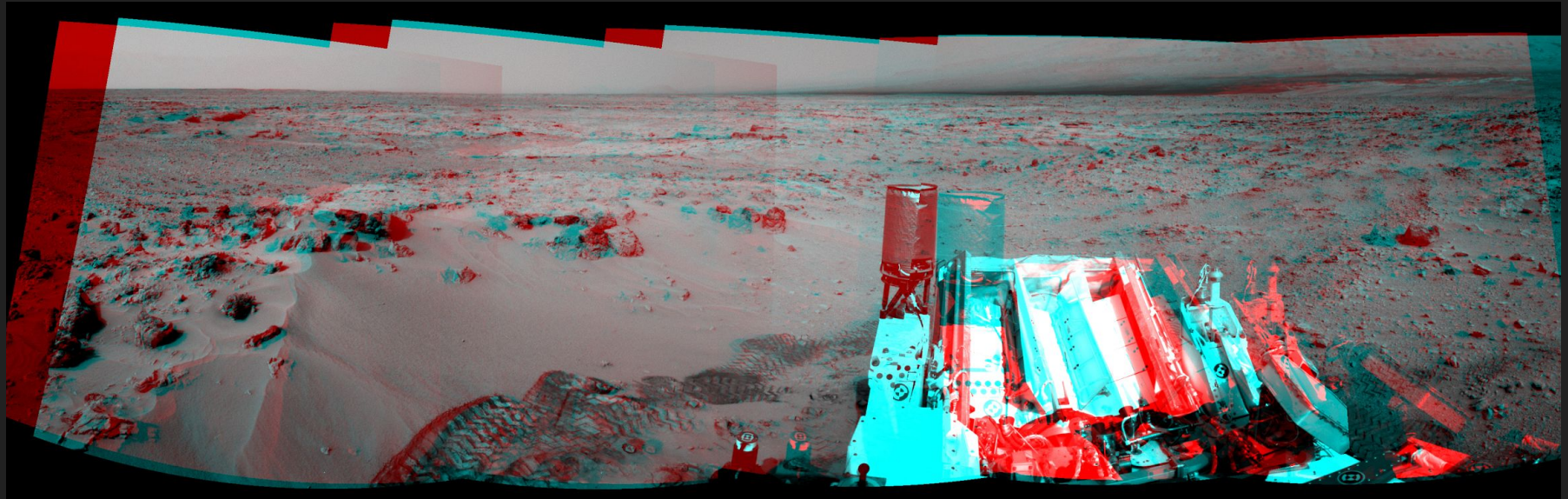
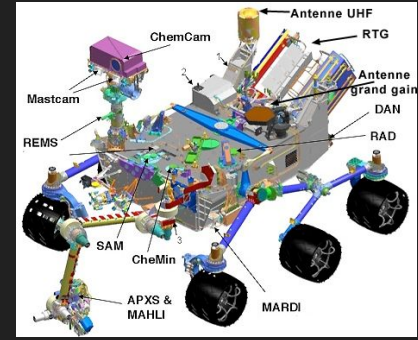
Experiment with human perception of features



HiRISE DEM of MSL Landing Site, Gale Crater



MSL NAVCAM Photogrammetry



Photogrammetry and/or Esri Drone2Map Workflow of Mars Descent Imager (MARDI) Video



“Vehicle horizontal offset between images within descent sequence may permit Digital Elevation Models (DEMs) to be created from descent images.” -NASA JPL

Proposed VR Technology

Rendering

Unity3D, Blender

Destinations Workshop Tools, Reality Capture

Esri Drone2Map

Display

SteamVR

HTC Vive

Learning Outcomes

Retrieval of planetary science data from NASA's Planetary Data System

Photogrammetric processing of rover camera images

3D Reconstruction from video using Esri software

C# programming language for spatial data analysis

3D geospatial data handling in multiple rendering technologies

Immersive and interactive potential of 3D visualization using HTC Vive equipment

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Discussion