

## HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM (A5)

Going Beyond the Earth-Moon System: Human Missions to Mars, Libration Points, and NEO's (4)

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## PROPOSITION OF A EUROPEAN ARCHITECTURE FOR CREWED NEA-MISSIONS

**Abstract**

A likely scenario for future human spaceflight is the realization of Near Earth Asteroid (NEA) rendezvous missions. Recent investigations at the Institute of Space Systems of the German Aerospace Center (DLR) have included this kind of missions on a broad scale – from precursors to the crewed spacecraft that eventually travels towards NEA targets, which has preliminarily been dubbed European eXtensive Personnel Laboratory fOr REmote Research (EXPLORER). In DLR's 27th Concurrent Engineering study and beyond a possible mission architecture for EXPLORER's utilization has been investigated. In this paper we describe the components that are required for such missions, namely i) the spacecraft EXPLORER, ii) its transfer stages, iii) and the launch vehicle (preliminarily labelled SIRIUS), based among others on the study's results. Mission scenarios, including target options, mission analysis, launcher options and launch strategy considering a one-month launch window for departure from Earth orbit are further described to establish the possible "how to" for such a mission. We explain various trades, e.g. the utilization of a single launcher type or several and using a multi-transfer option to send resources ahead of the crew or sending a single vehicle. Throughout the study the European perspective has been kept up and technology has been selected according to that. We elaborate on how the mission can be accomplished, how a mission series could be strategically planned and explain development needs to achieve this. The timeframe for our investigation has been the period from 2020 to 2040.