

HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM (A5)
Human Exploration of Mars (2)

Author: Mr. Leo Teeney

International Space University (ISU), United Kingdom, leo.teeney@community.isunet.edu

Mr. Adrian Eilingsfeld

International Space University (ISU), Germany, adrian.eilingsfeld@community.isunet.edu

Mr. Dallas Kasaboski

International Space University (ISU), Canada, dallas.kasaboski@community.isunet.edu

Ms. Lilia Pivovarova

International Space University (ISU), United States, lilia.pivovarova@community.isunet.edu

Mr. Robert Terlevic

International Space University (ISU), Croatia, robert.terlevic@community.isunet.edu

Ms. Séverine Van Ophem

International Space University (ISU), Belgium, severine.van.ophem@community.isunet.edu

Mr. Ramasamy Venugopal

International Space University (ISU), India, ramasamy.venugopal@community.isunet.edu

ONE-WAY MISSIONS TO MARS

Abstract

In recent years the idea of one-way Mars missions has started to take hold in the minds of the public and those involved in the space sector. The current interest is in large part due to the recent advancement of the commercial space sector, and initiatives such as Mars One. A one-way mission to Mars would give a permanent and growing human presence away from Earth, and poses interesting questions that are both technological and non-technological in nature. Human missions to Mars are the ultimate goal of most modern national space programs, with a group of 14 global space agencies agreeing on Mars as the ultimate destination in the ISECG Global Exploration Roadmap. One-way missions will likely follow, and solutions to the challenges unique to this kind of mission are required.

This paper is the result of a team project at the International Space University (ISU) Masters of Space Studies (MSS) program 2014. The paper aims to bring together all areas necessary in the planning and implementation of a one-way settlement, with a special focus on underdeveloped, non-technological areas. The analysis proceeds in an interdisciplinary fashion, by analyzing both technological and non-technological challenges that need to be addressed during the different phases of a one-way mission. Recommendations are given and solutions proposed to provide a useful guide for future work into developing successful human one-way missions to Mars.

A lack of understanding of many aspects of one-way Mars missions currently exists. Going to Mars one-way implies bringing along all necessary ingredients to permanently transfer to another planetary body. These ingredients include all essential technologies that would allow inhabitants of a Mars settlement to survive and thrive indefinitely. On the other hand, human civilization is more than just its technology. Cultural elements, such as governance frameworks, ethical considerations, and economic systems will be an essential part of the development of a viable settlement. Finally, realistic funding schemes and management practices also need to be established if such a complex program is to be embarked on.