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Crew selection and training

“Men wanted for hazardous journey. Low wages, bitter cold, long hours of complete darkness. Safe return doubtful. Honour and recognition in event of success.”

Advertisement rumored to have been posted by Sir Ernest Shackleton before the launch of his legendary 1914 Imperial Trans-Antarctic Expedition.

The advertisement allegedly placed by the great Anglo-Irish explorer Ernest Shackleton may be apocryphal, but its content applies equally to those selected for a Mars mission, an expedition characterized by extreme temperatures, galactic cosmic radiation, high-speed micrometeorites and a host of physiological and environmental stressors. The expeditions embarked upon by Shackleton, Fridtjof Nansen and Douglas Mawson almost a century ago resemble in many ways the conditions of isolation and confinement which will be experienced by future space travelers traveling to and living on Mars. The conditions will be different, but many of the problems confronting future space explorers will be the same ones that troubled explorers in the past, a reality that will be reflected in the unique selection criteria applied to those lucky few chosen to go to Mars.

This chapter describes how Expedition Class crews may be selected and trained, how space agencies will decide who has the ‘right stuff’ for a long duration mission and what factors, beyond technical skills and education, should be considered for selecting a crew for what will be the most arduous human expedition to date.

CREW SELECTION

“The human factor is three quarters of any expedition.”

Legendary Norwegian polar explorer, Roald Amundsen.

In common with the crewmembers of Nansen’s and Shackleton’s expeditions, the austere and isolated conditions facing future Mars explorers will impose significant hardship upon those selected. While it will be assumed an astronaut has the skills and knowledge necessary to perform the duties of a crewmember, these abilities will
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count for nothing if he or she cannot get along with others for four months in the confines of a vehicle the size of school bus! Given the unique characteristics of such a mission, the issues of crew composition and crew compatibility clearly become factors almost as important as the selection process itself. Due to the potential for these issues to impact negatively upon a mission, it is important to address them before moving on to discussing the selection process itself.

Crew composition

Crew Size
The European Space Agency (ESA) plans to send a crew of four to the Red Planet, NASA is preparing to send six astronauts, and the SpaceWorks Engineering Inc. (SEI) architecture is designed to transport just three crewmembers. Regardless of which mission plan is ultimately adopted, it is likely the size of the crew will fit with the current belief that smaller is better. Such a policy was implemented on many of the most successful polar expeditions such as Nansen’s three year Fram venture which comprised just thirteen crewmembers and Shackleton’s Imperial Antarctic Expedition, which consisted of just twenty-seven. Despite extreme isolation and prolonged confinement, Nansen’s and Shackleton’s expeditions were characterized by few interpersonal problems, thanks largely to the small homogeneous crews, a lesson unlikely to be overlooked when it comes to defining the composition of a Mars crew.

Crew roles
The occupational role of each member of the Martian crew has yet to be determined, but it is almost certain one crewmember will be a pilot and it is likely, given the extended duration of the mission, another crewmember will be a medical doctor,. The role of commander will be assigned to the crewmember with the most experience and will not necessarily be the pilot, as has been the case in so many space missions. Given the science objectives of such a mission, it is inevitable the crew will include at least one scientist, and other crewmembers will be cross-trained in various scientific disciplines.

Crew gender
The issue of whether a crew should be all-male, all-female or mixed remains a contentious matter. Some have argued a female crew would exhibit preferable interpersonal dynamics and be more likely to choose non-confrontational approaches to solve interpersonal problems, whereas others have made a case for a mixed crew, claiming crews with women are characterized by less competition and seem to get along better. Evidence from Antarctic winter-over crews supports each of these arguments and suggests the inclusion of women in space crews would serve a socializing purpose, in addition to their mission function. However, the introduction of a single female into a male group may have destabilizing effects because of sex issues, a topic that space agencies are reluctant to discuss. What effect would a passionate affair during a mission to Mars, for example, have upon other