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ROAD MAP TO THE STARS: ANTICIPATED AND REQUIRED TECHNOLOGY BREAKTHROUGHS MILESTONES

Abstract

Human deep space travel is a perpetual journey that started with the first people venturing outside their tribe comfort zone. With the beginning of the space age, gradual advancing travel concepts started developing, where lunar, interplanetary, and even interstellar trips, became expeditions awaiting the appropriate science and technology developments to be realized.

Maneuvering a tangible master plan for human travel to the stars considers certain milestones in space travel technology and scientific discoveries. Such approach depends on assessing the requirements for a functioning spaceship, based not only on current science and technology, but also on futuristic advancements. Since the middle of the 20th century, many have depicted futuristic progressive projections in space travel from landing humans on the moon to settling on Mars, and traveling beyond our solar system, as steps of a journey to other stars. The Integrated Space Plan, for example, has been updating such plan for the upcoming hundred years, for decades.

Recently, related advancements in studies and travel plans took place. The Breakthrough Starshot project by Hawking and Milner to build a prototype for a micro light-propelled interstellar spacecraft, and the accelerating discoveries of exoplanets are the most noticeable progressions in this field. The reason is that they are directly related to the sequence which would affect the deep space travel required advancements and milestones.

Charting a blueprint integrates numerous design factors including: 1. Addressing deep space structural, environmental, and human needs. 2. Defining destinations and missions. 3. Completing a sequence of gradually advancing probes and deep space missions within our solar system and beyond.

So what do we need to achieve and when? How many probes are needed to scout and explore? How will the crewed trips intensify as technology and distance surge with time? When do we need such missions completed, and where too?

Combining the factors of discovery, technology, and gradual space travel, and accounting for future developments is illustrated in the roadmap to the stars, from conception to realization, and from Earth's suborbit to interstellar navigation.