

## **Overview of NASA Mars Missions and Enabling Technologies**

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### Abstract

An overview of past, present, and future NASA Mars missions is presented. NASA's focus on the planet Mars has resulted in several historic and successful missions that have drastically changed the scientific understanding of Mars. The goal of recent missions has been to search for water in a strategy called "Follow the Water," which has resulted in the discovery of evidence for water on the surface of Mars.

NASA is taking the next step in that successful strategy by selecting sites from among those discovered to have evidence of water, and examining them for habitability conditions and even for the chemical signatures of previous life. Two missions presently under development will implement this strategy: the Phoenix lander, to be launched in August of 2007, and the even more capable Mars Science Laboratory (MSL), to be launched in 2009. Phoenix is scheduled to land in an area that has the possibility of 80 percent water-ice by volume within one foot of the surface. Its robotic arm will dig down over 3 feet into the red planet's subsurface to collect ice and soil samples while a camera mounted on the arm monitors the action. Selected samples will be heated to release volatiles that can be examined for their chemical composition and other characteristics. The Mars Science Laboratory carries significantly more science instruments; its landing site has not yet been fixed. The Mars Science Laboratory will collect Martian soil and rock samples and analyze them for organic compounds and environmental conditions that could have supported microbial life now or in the past.

NASA will launch a number of missions between 2010 and 2020, whose objectives will depend on the findings of Phoenix and MSL. System designers of these future missions will face a number of robotic and automation challenges, which will be a particular focus of the last part of the talk, along with science objectives and enabling technologies of the future.