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Createspace Independent Publishing Platform, United States, 2017. Paperback. Condition: New. Language: English . Brand New Book ****** Print on Demand ******. The currently known resources on Mars are massive, including extensive quantities of water and CO2 and therefore C, H2 and O2 for life support, fuels and plastics and much else. The regolith is replete with all manner of minerals. In Situ Resource Utilization (ISRU) applicable frontier technologies include robotics, machine intelligence, nanotechnology, synthetic biology, 3-D printing/additive manufacturing and autonomy. These technologies combined with the vast natural resources should enable serious, pre- and post-human arrival ISRU to greatly increase reliability and safety and reduce cost for human colonization of Mars. Various system-level transportation concepts employing Mars produced fuel would enable Mars resources to evolve into a primary center of trade for the inner solar system for eventually nearly everything required for space faring and colonization. Mars resources and their exploitation via extensive ISRU are the key to a viable, safe and affordable, human presence beyond Earth. The purpose of this paper is four-fold: 1) to highlight the latest discoveries of water, minerals, and other materials on Mars that reshape our thinking about the value and capabilities of Mars ISRU; 2) to summarize the previous literature on Mars ISRU processes, equipment, and approaches; 3) to point to frontier ISRU technologies and approaches that can lead to safe and affordable human missions to Mars; and 4) to suggest an implementation strategy whereby the ISRU elements are phased into the mission campaign over time to enable a sustainable and increasing human presence on Mars.

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