

Fact Sheet

The Martian Mindset

A Scarcity-Driven Engineering Paradigm

Applicant University

University of Bremen

Spokespersons

Prof. Dr. Marc Avila

Prof. Dr.-Ing. Kirsten Tracht

PD Dr.-Ing. habil. Daniel Meyer (Deputy Spokesperson)

Participating Institutions

Leibniz Institute for Materials Engineering (Leibniz IWT)

Fraunhofer Institute for Manufacturing Technology and Advanced Materials (IFAM)

German Research Center for Artificial Intelligence (DFKI)

German Aerospace Center (DLR)

MaTeNa innovate! Center

University of Duisburg-Essen

Research Project Leaders

32, of whom 34% are female

Funding Period and Requested Funding Amount

7 years (2026 to 2032), 57.3 million euros

Number of Researchers Involved

74, of whom 36% are female

Background/History

The University of Bremen and its partner institutes have decades of scientific expertise in the fields of materials science, process engineering, manufacturing, aerospace engineering, and robotics. Since 2021, the “Humans on Mars” initiative has combined these areas of expertise with behavioral sciences and communication technology, forming an interdisciplinary consortium from which the cluster emerged.

Research

Resource scarcity is becoming a central challenge for humanity. Accordingly, many research projects worldwide focus on achieving more sustainable, efficient, and automated production processes. In our cluster, we are pursuing a radically new approach aimed at a long-term paradigm shift. To achieve this, we are placing ourselves on Mars, a potentially habitable but inhospitable planet devoid of fossil fuels and abundant water resources, enveloped only by a thin CO₂ atmosphere. Based on these extreme conditions, the Martian Mindset is establishing a new scarcity-driven paradigm for the production of enough-to-use materials and parts.

The Martian Mindset is guided by scarcity constraints in four dimensions – natural resources, electric power, human workforce, and information. The research will focus on the sourcing of materials, the processing to parts, and the design of operating concepts.

We pursue three main objectives:

1. to develop (bio-)electrochemical methods that do not rely on fossil fuels and can extract metals, plastics, and other vital raw materials, such as oxygen, from low-grade resources;
2. to design and demonstrate low-energy process chains that use these raw materials as input to produce a variety of enough-to-use parts, such as replacement parts and tools;
3. to devise adaptive and flexible concepts for production facilities jointly operated by human-robot teams under conditions of high uncertainty and limited information, which will be supported by digital representations of the processes and production.

Further Information: [Research - University of Bremen](#)



Contact

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Press Releases, Photos, and Videos

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Cooperation Partners

- UK Centre for Astrobiology, Edinburgh, UK
- German Space Operations Center, Oberpfaffenhofen
- University of the Arts Bremen

U Bremen Excellence Chairs

- Prof. Dr. Nicola Marzari, Swiss Federal Institute of Technology, Lausanne
- Prof. Dr. Charles S. Cockell, University of Edinburgh, UK
- Prof. Dr. Anna Valente, University of Applied Sciences and Arts of Southern Switzerland