

# Function analysis drives the development of a concept Mars rover

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Humans have walked on the Moon, and inevitably, according to NASA, humans will tread the Red Planet as well, possibly by 2037. An ergonomist and an industrial designer pondered the challenges of the Martian environment and developed an award-winning concept rover that could someday transport and house astronauts on the surface of Mars. The rover is described in an article to be published in *Ergonomics in Design: The Quarterly of Human Factors Applications*.

Using a human factors/ergonomics method called function analysis, part of a larger systems approach, Steven Casey and Gregg Montgomery considered the functional requirements of a future Mars exploration rover for use by people instead of robots. A number of questions needed to be answered before they could begin their design, these among them:

- What functions will the system perform?
- For what kinds of users is the system being designed?
- How will the system be used, and how might the system be misused?
- What might the user-system interfaces look like?

They conceptualized a vehicle that could withstand the extreme cold of Mars, with its pervasive dust, ultraviolet radiation, and seasonal storms.

Features of the concept rover include a nuclear power source; enhanced handling and traction on [Martian soil](#); robust, ceramic-matrix composite walls; maneuverability and visibility; lightweight, foldaway controls; and modular flexibility.

Conducting a function analysis early in the system development process is critical in ensuring that the vehicle can meet the demands of the environment and the users while also meeting constraints such as expense, weight, and shape.

Casey and Montgomery's concept [Mars exploration rover](#) received the GOOD DESIGN Award by the Chicago Athenaeum: Museum of Architecture and Design together with The European Centre for Architecture Art Design and Urban Studies. Future rovers may not resemble their rover concept in all details, but function analysis is certain to be part of the design, development, testing, and usability studies that theoretically should generate similar results and ensure the safety and comfort of the Mars explorers.

**More information:** [www.hfes.org/Publications/Product...il.aspx?ProductId=36](http://www.hfes.org/Publications/Product...il.aspx?ProductId=36)

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