

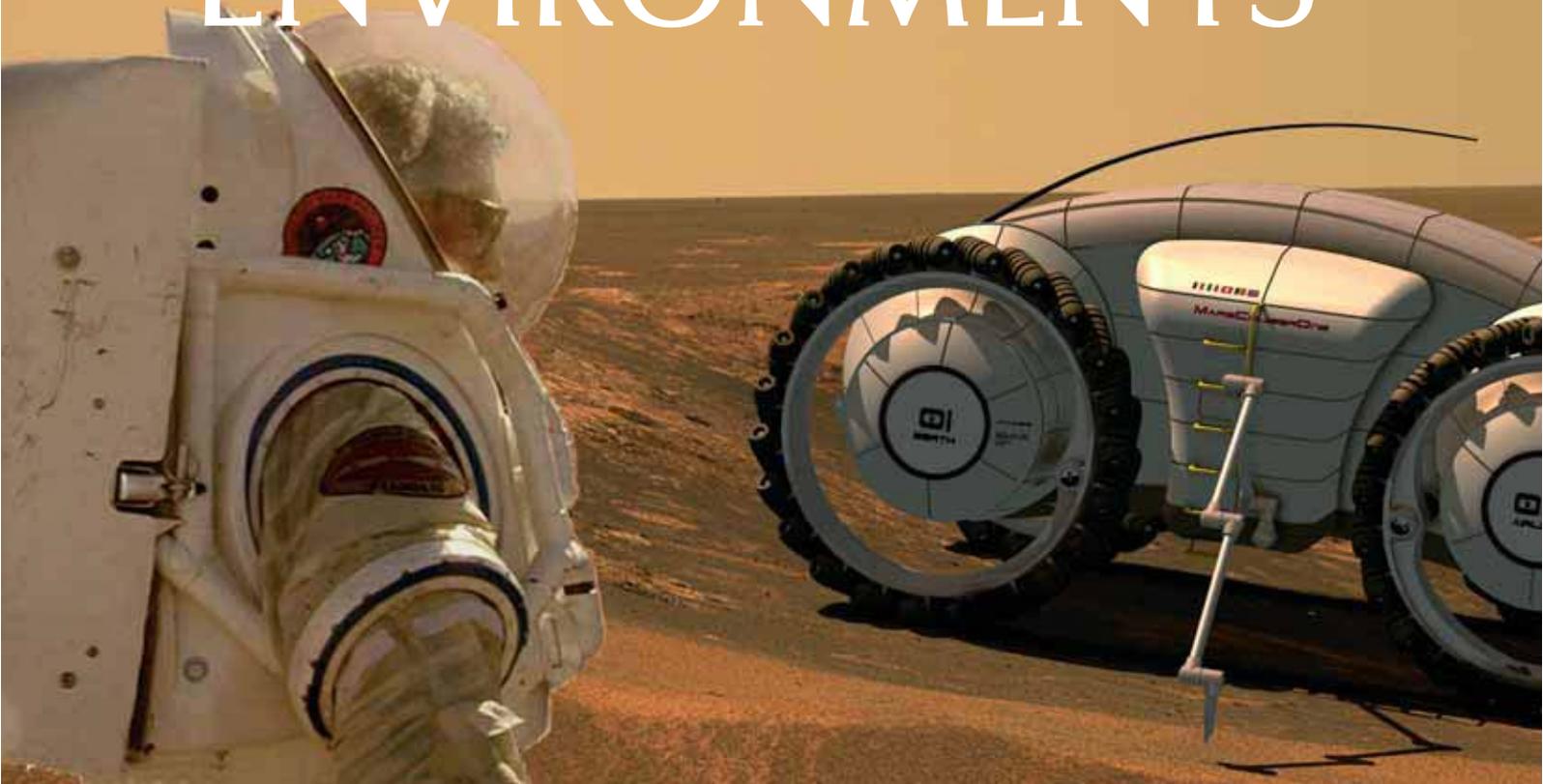
# WORLD ENVIRONMENT

- UN BANGKOK CLIMATE CHANGE □ MASDAR CITY: THE FIRST ECO SUSTAINABLE CITY IN THE WORLD □ BURMA: THE PROBLEM OF DEFORESTATION □ THE OIL SPILL CATASTROPHE □ AL-HIMA - A WAY OF LIFE □ MUNICIPALITIES AND WASTE MANAGEMENT IN LEBANON



**SPECIAL  
LEBANON**

# MARSCRUISERONE: EXPLORING EXTRA-TERRESTRIAL ENVIRONMENTS



by MADDALENA DALLA MURA

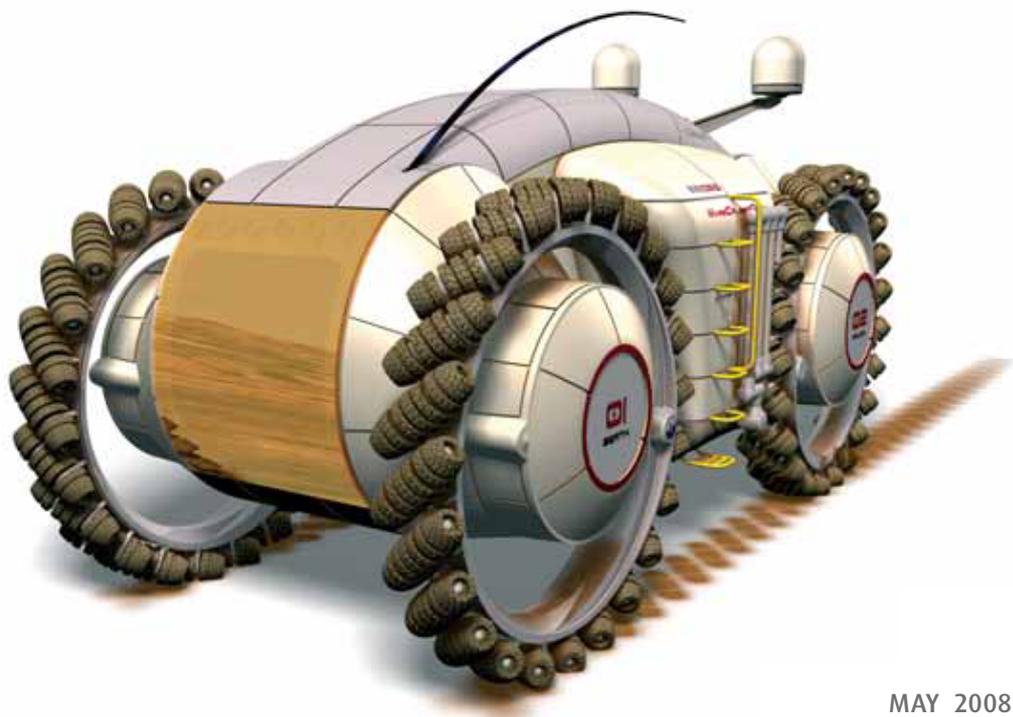
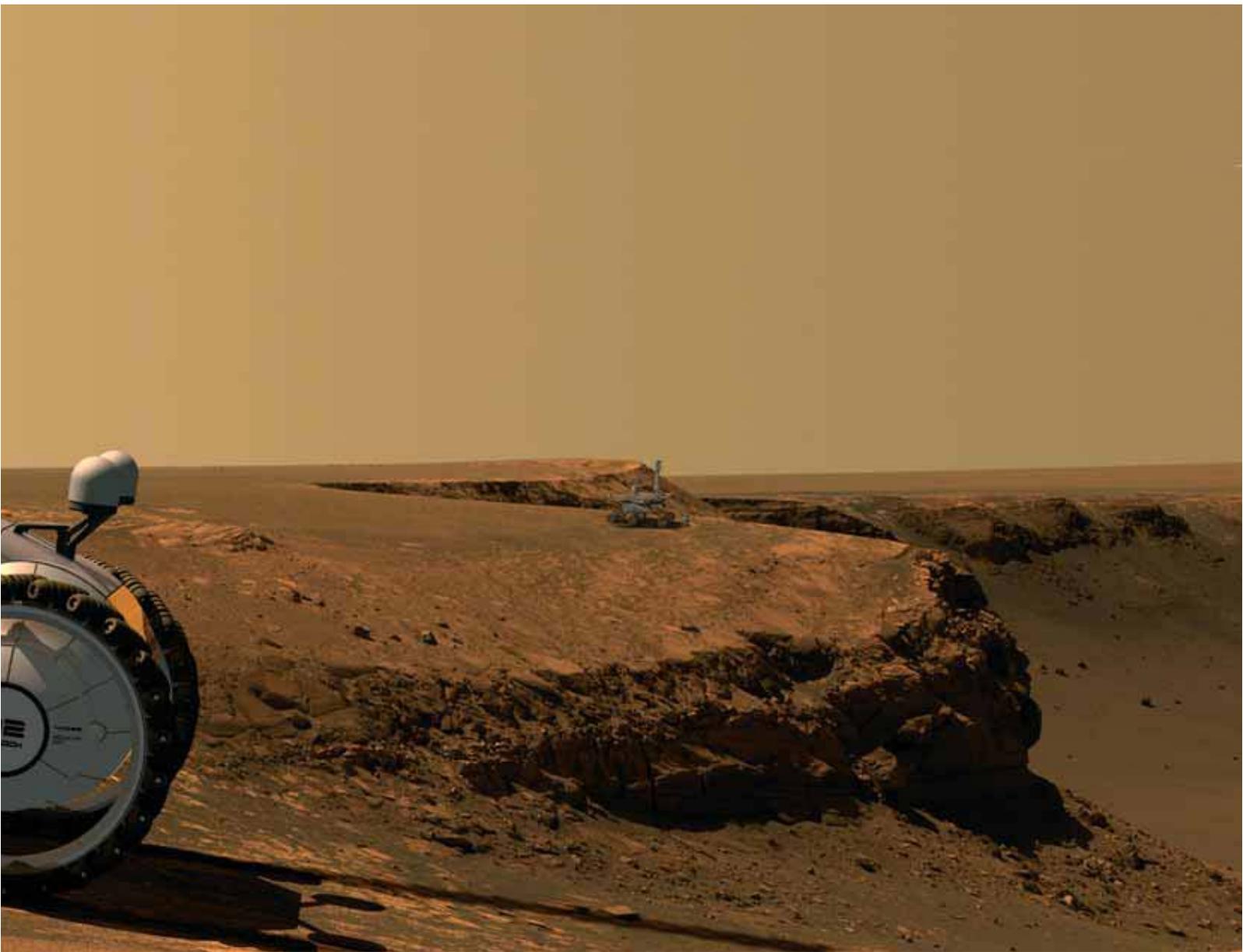
A buzz word of our new millennium-sustainability-takes on a new dimension once we leave our home planet. Wherever humans live, they need the basic provisions of air, water, food-resources our planet not only provides, but also constantly renews, powered only by our sun-the ultimate sustainable system. In a spaceship, a similar system of recycling and renewal can be provided only by means of technology, thus mimicking

the ecosystem of our planet. Ongoing research for Advanced Life Support systems (ALS) is crucial for future human space missions.

«As we stand at the threshold of becoming a spacefaring society, we are re-evaluating our place in the universe and facing the complexity of space missions. We begin to appreciate how relatively easy life on our home planet is and which “services” our “Spaceship Earth” is providing us,» point out Arturo Vittori and Andreas Vogler, founders of the architecture

and design studio Architecture and Vision (AV; [www.architectureandvision.com](http://www.architectureandvision.com)). In fact, no other planet in our solar system has such favorable conditions for life. Even the Moon, our satellite and nearest neighbor presents incredibly extreme environmental conditions. All resources have to be brought from the Earth to allow human survival there. For longer expeditions such as going to Mars-a two-year mission-the challenges become even greater.

«There is no such thing as a municipal infrastructure in a



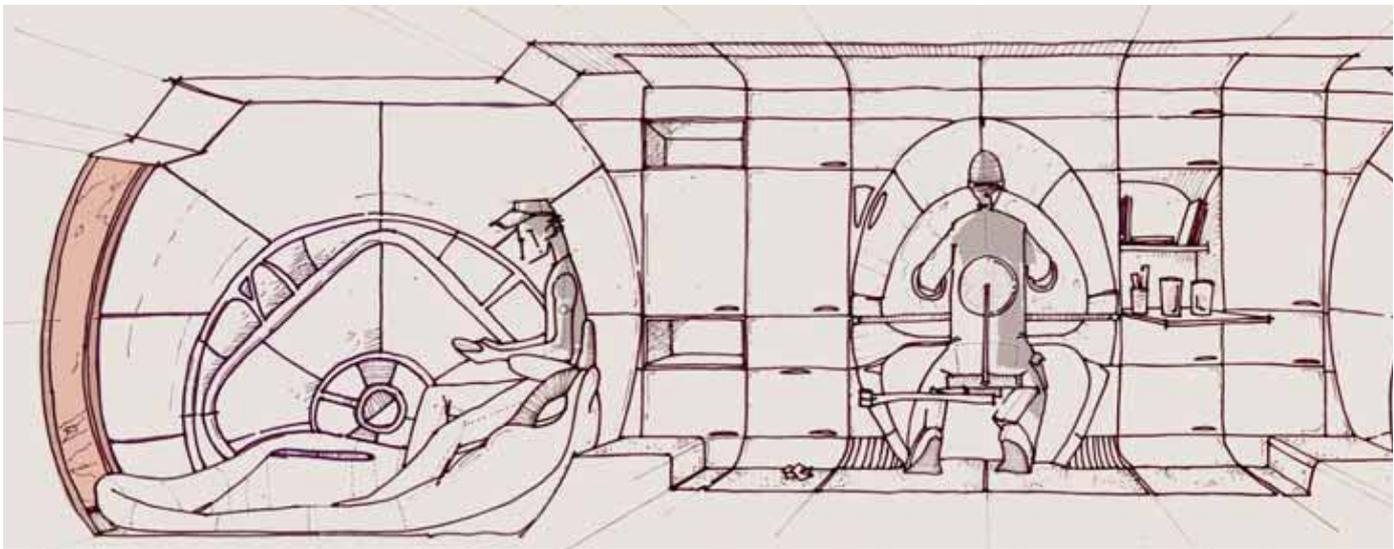
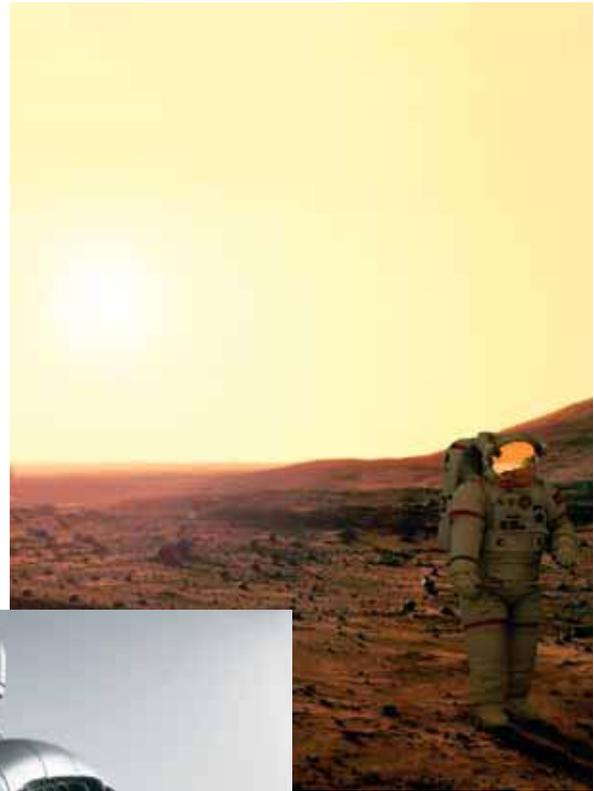
space-habitat or rover. The concept of waste will be completely redundant on future long-duration space missions: just like in nature, there will be resources in different states of processing. Everything will have to be reused, by means of devices powered by solar energy.»

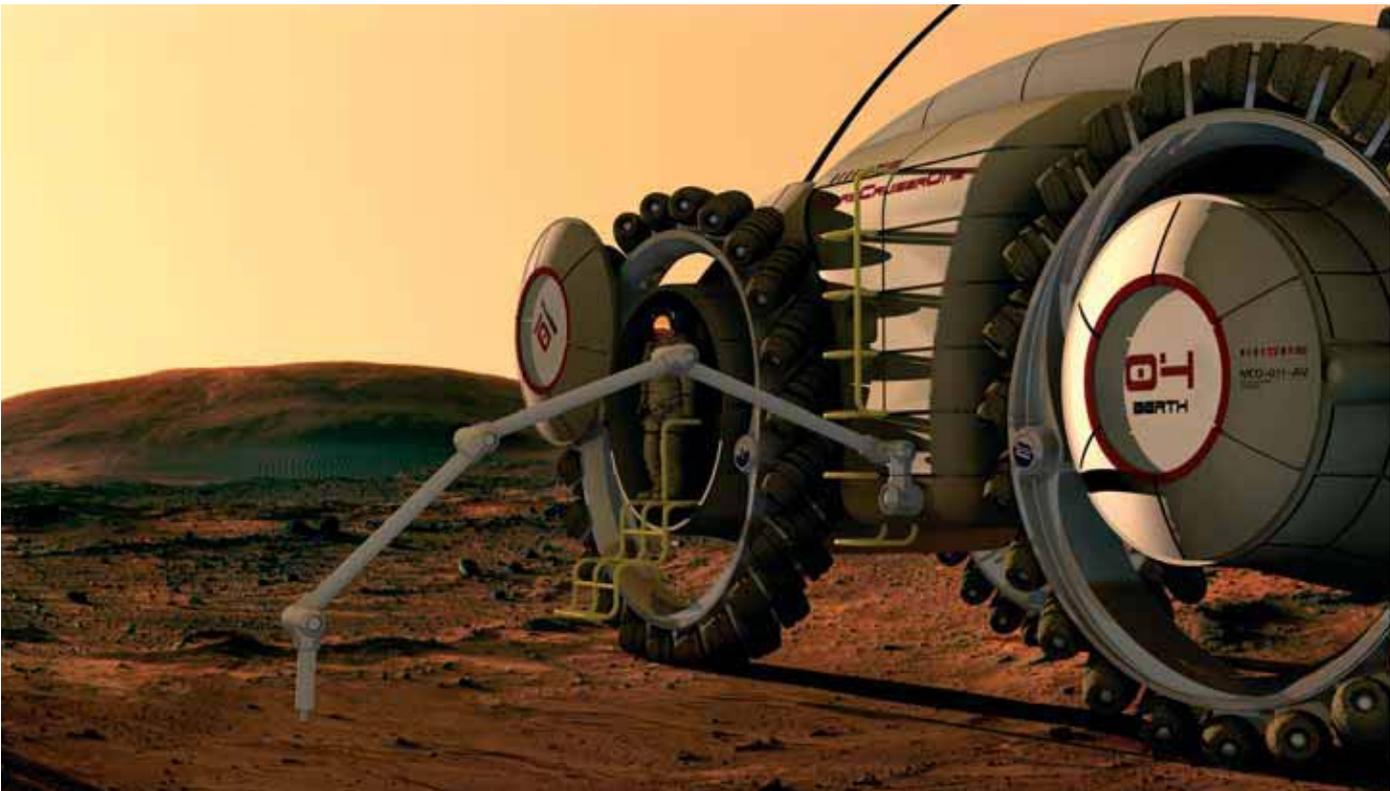
With a specific experience gained in the field of aerospace design, AV has come to recognize resources and energy to support human life as a key issue, developing a resource-driven approach that is also the guideline for the team's terrestrial projects, as exemplified in the "EcoUnit" (2003) mobile sanitation station or the extreme environment tent "Desert-Seal" (2004).

The recent aerospace research project, "MarsCruiserOne" (2007) has been informed by this philosophy as well. Conceived in light of the NASA and ESA Mars mission planned for 2032, "MarsCruiserOne" (MCO) is the result of a number of different development phases, begun with a concept

by EADS Space Transportation and culminating with key contributions from AV working in conjunction with the German company Stephen Ransom Consultancy, and the Italian companies G-Engineering, Explora and Self Group.

The pressurized rover MCO is much more than a vehicle. It is a mobile laboratory, which will be able to transport a crew of up to 3 astronauts for two-week-long mission before it needs to resup-





ply at a base station. One of the most innovative solutions developed by AV is the design of the omni-directional hubless wheels. The fixed-rim wheels allow an individual adjustment of the height and adaptation to the ground conditions, while their large diameter allows optimum usage of the interior space and

efficient use of the limited space available in the rocket used for transport.

The interior has been developed to ensure maximum functionality and comfort for the crew. A main challenge is to organize in a small volume diverse and even conflicting functions like kitchen, toilet, shower, working and sleeping zones. To save weight the rover relies on the recycling systems of the main habitat. Thus the systems can be kept very light and consume less energy. Liquid and solid waste are separated at the source. A resource compactor condenses renewable resources for processing in the main habitat. Managing the transport and processing of resources will be a major part of an astronaut's day, along with keeping the life support systems running.

What we can infer, then, is that future spacefaring will quite forcefully remind us of our co-existence with and within a closed-loop ecosystem, where nothing is lost and we will finally acknowledge that the main source for energy is our sun.

The concept for MCO has been presented at professional aerospace conferences and public lectures in Europe and the United States, and scale models have been exhibited at numerous venues, including *Air de Paris* at the Centre Georges Pompidou in Paris; *2057*, a special event celebrating 50 years of space travel at Cité de l'espace in Toulouse; and as part of the landing site of the "MoonBaseTwo" model commission for the collection of Museum of Science and Industry in Chicago.

