



Seeing Like a Rover: How Robots, Teams, and Images Craft Knowledge of Mars

By Janet Vertesi

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In the years since the Mars Exploration Rover *Spirit* and *Opportunity* first began transmitting images from the surface of Mars, we have become familiar with the harsh, rocky, rusty-red Martian landscape. But those images are much less straightforward than they may seem to a layperson: each one is the result of a complicated set of decisions and processes involving the large team behind the Rovers.

With *Seeing Like a Rover*, Janet Vertesi takes us behind the scenes to reveal the work that goes into creating our knowledge of Mars. Every photograph that the Rovers take, she shows, must be processed, manipulated, and interpreted—and all that comes *after* team members negotiate with each other about what they should even be taking photographs of in the first place. Vertesi's account of the inspiringly successful Rover project reveals science in action, a world where digital processing uncovers scientific truths, where images are used to craft consensus, and where team members develop an uncanny intimacy with the sensory apparatus of a robot that is millions of miles away. Ultimately, Vertesi shows, every image taken by the Mars Rovers is not merely a picture of Mars—it's a portrait of the whole Rover team, as well.

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Editorial Review

Review

"Offers fascinating insights into the work that goes on behind the camera, in terms not only of the production of an image, but also of the entire process that surrounds it, from how decisions about which image to take are made, to the calibration of images, colouring, etc. She describes interactions between team members, particularly the differing emphasis placed on images by scientists (who wish to understand Mars) and engineers (who don't want to place the rovers at risk). The balance between risk and investigation was one that had to be adjusted every day, and the fragments that Vertesi offers of conversations during daily Science Operations Working Group team meetings illustrates the constant trade-off and negotiations necessary to ensure the success of the rover traverses. . . . A most entertaining read."

(Times Higher Education)

"Recommended."

(CHOICE)

"In *Seeing Like a Rover*, Vertesi tells us little about scientific results - what the rovers saw. Her interest lies elsewhere, in scientific practice - how the rover images were taken, calibrated, manipulated, annotated and debated, and what this tells us about the nature of planetary exploration. Vertesi is an ethnographer embedded in a peculiar world where humans and robots work as equal partners - Margaret Mead among the Starfleet. *Seeing Like a Rover* examines the structure and sociology of science, using the MER mission as exemplar. Its meticulous observations and commentary will reward those with a serious interest in how science gets done."

(Times Literary Supplement)

"Fascinating. . . . Vertesi proposes a way of understanding image-making practices as a kind of teamwork: learning to see like a rover, here, is an embodied, skilled, social achievement. Building on Wittgenstein's notion of *seeing as*, Vertesi conceptualizes these imaging practices in terms of an analytic framework of *drawing as*: the Rover scientists 'use digital tools to *draw* Mars *as* consisting of different kinds of materials or surfaces, with implications for future viewings and for team relations.' From mapping Mars to robot funerals, it's a wonderful study for readers interested in space exploration, visual studies, sociology, and STS alike!"

(New Books in Science, Technology, and Society)

"Vertesi's account of the inspiringly successful rover project reveals science in action, a world where digital processing uncovers scientific truths, where images are used to craft consensus, and where team members develop an uncanny intimacy with the sensory apparatus of a robot that is millions of miles away.

Ultimately, every image taken by the Mars rovers is not merely a picture of Mars--it's a portrait of the team as a whole."

(Lunar and Planetary Information Bulletin)

"Vertesi takes the reader into meetings of the rovers' Science Operations Working Group, where the project team meets to plan the next day's activities by the rovers. . . . A fascinating look inside how a mission operates."

(*The Space Review*)

"Vertesi take us on a step-by-step journey through the image-making practices that produce those familiar reddish Martian landscapes. The outcome is a well-crafted, highly textured ethnographic account of how the team works with the digital images sent back by Martian rovers.

(*Technoscienza*)

"Since life on Earth is so hard, the utopian imagination likes to turn to space....In *Seeing Like a Rover*, Vertesi argues that Mars has already begun to make us better. The book presents itself as an ethnography of the researchers behind *Spirit* and *Opportunity*, the NASA rovers launched to Mars in 2003. Focusing on the rovers' photographic mission, it describes the tremendous feats of collaboration and planning necessary to take pictures 140 million miles away."

(*Public Books*)

"Possessing the sensibilities of an ethnomethodologist of scientific work, Vertesi crafts her narrative without resorting to the specialized language that sometimes obscures ethnomethodology's accounts. Vertesi tells her story and writes her theory of work in plain English. The result is a first-rate and detailed account of how scientists who work with images of Mars transform those images into credible knowledge. In the space allocated to a book review, I cannot hope to impart the wealth of details that one learns from Vertesi....What I hope I have done is whet your appetite to read an important and interesting new book. *Seeing like a Rover* will be of considerable interest to sociologists of science, organizational theorists, students of technology, and scholars of work and work practices. It is also an exemplar of what ethnomethodological sensitivities have to offer each of those audiences."

(*ILR Review*)

"Vertesi has been embedded with the Mars Exploration Rover team for nearly a decade working to understanding the manner in which modern science and technology is advanced through collaboration, individual initiative, and the power of big questions. *Seeing Like a Rover* is an outstanding example of what may be accomplished by a talented sociologist asking sweeping questions and analyzing data both mundane and exciting."

(*Quest*)

"Vertesi has written a compelling account of how the images of Mars secured by the rovers were planned and then transformed into scientific artefacts together with the host of conversations, meetings and decisions that went into these activities."

(*British Journal for the History of Science*)

"Vertesi offers a remarkable account of 'trained judgment' in the production of scientific images. In clear prose and with ample illustration, she shows how sophisticated technology is not enough to create scientific meaning; visualizing Mars involves collaboration, expertise, and a human hand calibrating images and interpretation at every stage. *Seeing Like a Rover* shows how a planet is rendered visible while a technoscientific community is made vibrant, revealing scientific visualization as an energetic form of world making."

(*American Journal of Sociology*)

"Janet Vertesi had a front-row seat for the Mars Exploration Rover project, and for the first time she brought a social scientist's keen eye to the way we operate rovers on Mars. In *Seeing like a Rover* she doesn't just describe how we did what we did. She gets inside our heads to describe *why* we did what we did, offering insights that wouldn't have occurred to even the mission engineers and scientists ourselves. It's a fascinating

read."

(Steven W. Squyres, Cornell University)

"Part academic ethnography, part exploration science and technology primer, and part just plain fun storytelling, Janet Vertesi's *Seeing like a Rover* takes you deep inside the thoughts, hopes, and habits of the men and women who set out to explore the Red Planet through the eyes of a pair of high-tech robotic emissaries. As one of those explorers, I've relived many of the highs and lows of remote planetary investigation through her distinctly social, and sociable, lens. Vertesi places what many incorrectly perceive as a purely technological, asocial, non-interactive activity—robotic planetary exploration—squarely in the context of human behavior. Her analysis is thoughtful, insightful, and timely, and is sure to influence future explorers, human and robotic alike."

(Jim Bell, member of the Mars Exploration Rover team and author of *Postcards from Mars: The First Photographer on the Red Planet*)

"The outstanding contribution of the book is to bring a richness of ethnographic detail—regarding what was clearly an extraordinary scientific project—into generative relation with contemporary theorizing within science and technology studies. While the premise that the material practices of science are at the same time always also social is by now well established within the field, this book demonstrates the profound and subtle ways in which that holds in this particular case. In the process, *Seeing like a Rover* extends and deepens our understanding of scientific practice as the conjoining of humans and nonhumans in relations of mutual transformation."

(Lucy Suchman, Lancaster University)

About the Author

Janet Vertesi is assistant professor of sociology at Princeton University.

Users Review

From reader reviews:

Donna Gray:

Why don't make it to become your habit? Right now, try to prepare your time to do the important behave, like looking for your favorite reserve and reading a guide. Beside you can solve your trouble; you can add your knowledge by the book entitled *Seeing Like a Rover: How Robots, Teams, and Images Craft Knowledge of Mars*. Try to face the book *Seeing Like a Rover: How Robots, Teams, and Images Craft Knowledge of Mars* as your pal. It means that it can for being your friend when you experience alone and beside associated with course make you smarter than previously. Yeah, it is very fortunated for you personally. The book makes you more confidence because you can know every thing by the book. So , we need to make new experience and also knowledge with this book.

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James Longo:

Playing with family in the park, coming to see the marine world or hanging out with close friends is thing that usually you have done when you have spare time, after that why you don't try point that really opposite from that. A single activity that make you not feeling tired but still relaxing, trilling like on roller coaster you are ride on and with addition associated with. Even you love Seeing Like a Rover: How Robots, Teams, and Images Craft Knowledge of Mars, it is possible to enjoy both. It is excellent combination right, you still would like to miss it? What kind of hangout type is it? Oh seriously its mind hangout folks. What? Still don't get it, oh come on its known as reading friends.

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