Developing a
NEW WORLD VIEW
Interview with Google Earth's Rebecca Moore

by Melissa Hartman

Rebecca Moore is exactly the kind of person you'd expect to work at Google. She earned her bachelor's degree in computer science from Brown University, then worked as a software engineer at Hewlett-Packard and at a company called General Instrument before heading off to graduate programs in computer science and cognitive psychology at Stanford. She completed her masters in cognitive psychology and was well into her PhD work in computer science when she took a leave to join a startup company.

But her computer science background is just part of what led her to Google Earth, the virtual globe program that is revolutionizing the way we see the world. Here, Rebecca explains how Google Earth has become much more than her career.

Rebecca on the day her team took photos of the logging company's land. She used Google Earth in the helicopter to navigate.

What spurred your interest in digital mapping?

I live in the Santa Cruz Mountains of California, at the summit of the mountain range between Silicon Valley and Santa Cruz. My community has a frontier feel to it—we get our water from local creeks and share community wells that we maintain; we live on shared private roads that we also maintain. But no one had any good maps of our roads and water systems. When a neighbor of mine called 911 due to a medical emergency, the ambulance driver got lost and did not show up for two hours (fortunately my neighbor was okay). During the summer, we are exposed to high risk of wildfire, and the fire department gets lost and is unaware of our water systems, which can be used to fight fires. I thought it could be useful to map some of these things.

I also thought it would be fun to create a Community Trail Network to share our lands with one another, connecting the old logging roads and deer paths we each own to make a trail network. My neighbors got excited about this, and we began to use GPS to map and create these trails.

As I taught myself the software and capabilities of modern digital mapping technology, I realized that it was a powerful tool that could help all sorts of people and communities.

How did you come to work at Google Earth? What exactly do you do there?

In 2004, some friends told me about a software application called Earth Viewer that combined 3-D imagery of the earth with accurate topography and the ability to "fly" anywhere in the world. In all my mapping explorations, I had never seen anything like it. Of course, I first "flew" to my home. I was amazed at the new insights I got about our mapping projects when I saw our data on top of the photo-realistic imagery and 3-D terrain.

Earth Viewer became Google Earth when Google acquired Keyhole, the company that developed it. But there were some issues. Google's mission is to make information universally and easily accessible to everyone, but Earth Viewer was sold primarily to professionals. Some of the features were not well designed for ordinary people. I wrote to Google with some of my insights about how, with a few changes, Earth Viewer could be a fantastic tool for individuals and communities if they made a few changes. Google invited me to give a tech talk, where I presented these ideas. Eventually they hired me to join the Google Earth engineering team.

As the technical lead for the Google Earth Layers, I'm responsible for the layers of information we publish on top of the imagery, such as roads, borders, historic maps, 3-D photo-realistic buildings, user-contributed photographs, and geo-tagged Wikipedia posts. Integrating this rich content into Google Earth is a dream job.

In a nutshell, what does Google Earth do, and how does it do it?

Perhaps the most magical aspect of Google Earth is its ability to let you start in outer space, looking at the whole earth, and then zoom quickly and seam-

lessly to any place on the planet. We have such high resolution in certain places, including some National Geographic aerial images of Africa, that I like to say you can zoom in seconds from outer space to the eyelashes on a camel.

We have created a pyramid of imagery tiles over the whole earth, at different scales and resolutions. At the top of the pyramid is an image of the whole earth. As you zoom in, the Google Earth client communicates back to the Google Earth server and fetches the progressively more detailed image tiles just for the area you are looking at, and it stitches them together. Because it is so selective in what it fetches, it can offer the high performance experience that people love.

How has your work changed over time?

When I joined Google in 2005, my job was to find sources and develop tools for publishing better roads, place names, and borders—what you would think of as a geographic atlas, only in 3-D. But then I began to develop the idea that Google Earth could be a new kind of browser, a geo-browser. I thought you should be able to fly anywhere and see not only imagery, but also stories and information about what is happening in that place, with images, video, and Web links for more information. That idea led to our Featured Content folder, a collection of the most interesting content for that place on earth.

Are there things that you wish the program could do that it currently cannot?

Of course! The famous oceanographer Dr. Sylvia Earle came to visit us, and while she spoke glowingly about what we have accomplished so far, she noted, "You call it Google Earth, but it is really Google Land." She wants us to do a better job of portraying the oceans and issues related to marine conservation. There are lots of ideas like this for extending Google Earth; the trick is to set priorities.

I read that you've used Google Earth yourself to help protect the environment. Can you share an example of that with our readers?

Recently, a local logging company announced plans to log more than 1,000 acres of towering redwood trees in the Los Gatos Creek Watershed—the largest stand of coastal redwoods left in Santa Clara

Rebecca used Google Earth to create a flyover that shows the true impact the logging company's plan would have on surrounding areas and (below, left) on wildlife.

Country in a watershed that supplies drinking water to more than 100,000 people. The map they sent out was just a grainy sketch and did not convey what was at stake.

I remapped the plan in Google Earth, showing in vivid 3-D imagery how close the logging trucks and chain saws and helicopters would be to schools, daycare centers, and public open space; where endangered red-legged frogs had been spotted; and specific locations of magnificent old-growth trees that would be cut. When I presented this virtual flyover at a community meeting, people gasped with recognition. All the issues were much more clear. It has galvanized opposition to the plan by the community, local policy makers, and even Al Gore. The flyover has been featured on TV and radio news programs. As a result of the organized and informed community opposition, the plan was withdrawn. *[Editor's note: see* **www.mountainresource.org/nail** *for more information about this story.]*
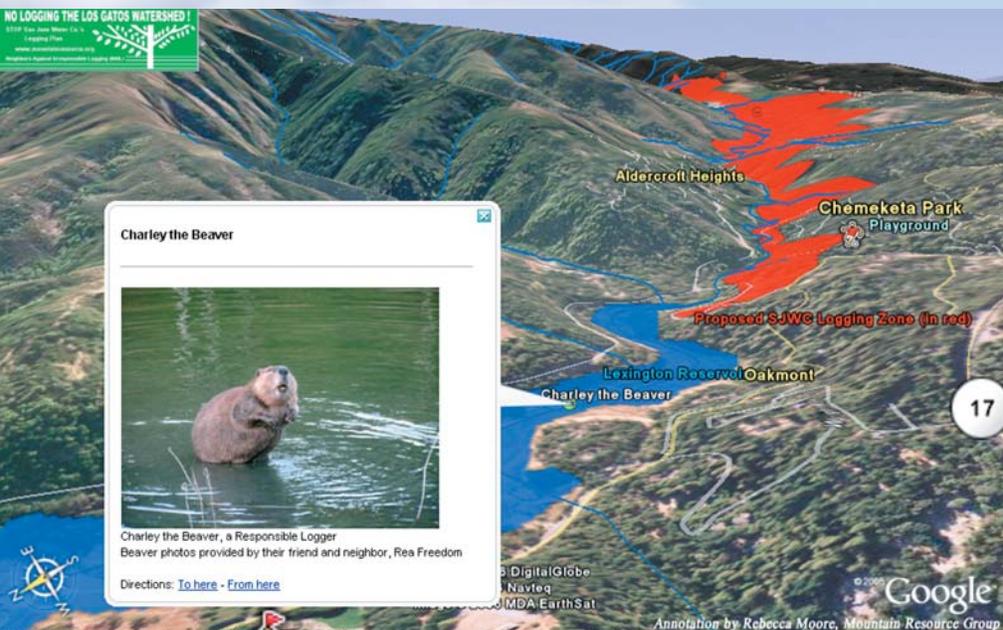
What are some of the most interesting ways you've heard of people or organizations using Google Earth?

An Italian man made an archeological discovery using Google Earth, finding a previously unknown ancient Roman villa by noticing an odd shadow in our imagery. During Katrina, rescue personnel used Google Earth to locate and save the lives of more than 4,000 people trapped on the roofs of their homes by rising flood waters. The Sierra Club created a visualization in Google Earth of the areas that would be underwater if the sea level rose due to gobal climate change. A group of German students tagged a giant whale shark, named him Schroeder, and created a special link that allowed more than 200 million Google Earth users to follow Schroeder's peregrinations around the Indian Ocean. I like seeing these applications that are educational, humanitarian, creative, and dynamic.

Do you hear from privacy advocates or other users that they find Google Earth somewhat scary or invasive?

People sometimes worry that the imagery is real-time, that you could use it to monitor someone or something, but in fact the imagery is typically at least a year old. We probably need to do a better job explaining this.

This representation of King Tut's tomb is an example of what an ordinary user created—and what anyone can do with Google Earth's free software tools.

What do you see as the biggest benefits of Google Earth?

Increasing geo-literacy, elevating our common understanding of complex issues, making the world a smaller place in a good way, giving everyone a greater intimacy with the earth and all its denizens. We face complex challenges such as global climate change, and Google Earth can be a tool to help people understand and tackle these issues. And it's fun. I like to think that there are kids who would otherwise be playing video games who are instead flying around in Google Earth.

Anything else you'd like to add?

I sure wish Google Earth were around when I was learning geography in school. ∎

The Jane Goodall Chimpanzee Institute uses Google Earth on its Gombe Chimpanzee Blog:
http://gombechimpanzee.blogspot.com

Word Wise

Writers Around the World

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