

## Preface and Acknowledgements

So I must confess that I missed the conference this year, but I have a good excuse. On August 5, 2012, I, along with hundreds of my science colleagues (the VIPs were in another room), crowded into a small auditorium at the Jet Propulsion Laboratory, and anxiously watched the huge screens lining the wall. We were living the “Seven Minutes of Terror,” the approximately seven minutes that it would take the Mars Science Laboratory spacecraft to complete entry and descent through the martian atmosphere, going from 13,000 mph to zero in that time, firing up a descent system never before tried on another planet, landing a rover wheels first. Honestly, most of us were terrified. Many of my engineering friends gave the rover no better than even odds of surviving. But she did. And I, along with the Curiosity rover, survived the seven minutes of terror. And now we have a half-ton avatar on Mars, big and beautiful, strong and capable, returning the most glorious science data nearly every day.

We all know the old adage: with great risk comes great opportunity. But this mission, with all its new technology could easily have gone the other way, and if it had, what then?

Well, I was there when it went the other way. On December 3, 1999, Mars Polar Lander was lost during entry, descent and landing operations. And let me tell you, I like it a great deal better when we land safely. But I can say from experience that if it had gone the other way — if we had lost Curiosity, then it still would have been worth it. Why? Because either way, the entire conversation — in aerospace engineering, in technological advancement, in scientific growth — is different than it would have been had we never tried. And the conversation we had after the crash of Mars Polar Lander was one of the most important factors in the safe landing of Curiosity. We talked, we listened, we learned, we improved, we tried again. That’s what science and engineering are all about.

Innovation isn’t safe. When you push the envelope, sometimes it doesn’t open. But innovation, imagination, creativity — all of these things are the wellspring of progress. No matter how many bumps there might be along the way, the way forward goes through risk. I am proud to be involved with these proceedings because each paper, to a greater or lesser extent, represents an individual or a group taking a risk in order to stretch our knowledge. Thank you for your courage, and I encourage everyone in the Wisconsin aerospace community to continue taking those risks because they continue to be the very best way to advance the human condition.

Conferences don’t occur in a vacuum, and the Wisconsin Space Grant Consortium office especially thanks our host for this conference, the University of Wisconsin—Whitewater, starting with Conference lead Dr. Rex Hanger and his staff of helpful volunteers. We are grateful to everyone at UWW who made our conference run so smoothly. Thanks must also go to our session moderators and to our poster judges for their conscientious work and their strong support for our students. Our keynote speakers are also to be thanked for adding so much to our conference: Dr. Robert Benjamin who presented, *A Visitor’s Guide to the Milky Way*, and Dr. John Delano who presented, *Astrobiology: NASA’s Multi-Disciplinary Search for Life Beyond the Earth*. And once again, I especially appreciate all the scientists, engineers, students, educators and others, who contributed papers to this volume. Those papers represent the hard

work and the risks that each contributor has taken to advance their field, and to each of them, I say, thank you, and, as always....

Forward!

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Director