

## *Diabologic: From Sputnik to SpaceShipOne (Notes from 2004)*

by Frank Dolinar

"These are the voyages of the Starship Enterprise..."

Humanity's quest for the stars probably began when hominids first looked up at the moon with curiosity. My fascination with space had its beginnings on October 4, 1957, and the launch of Sputnik I, the first artificial Earth satellite. It's a date that I celebrate each year as an important event in Earth's history.

The space enterprise has come a long way and affects our lives in myriad ways unknown to most people. I'll comment on three: computers, communications, and materials.

### Computers

It takes a thousand pounds of launch vehicle and fuel on the ground to put a single pound of payload (satellite, probe, or shuttle) in orbit. Worse, much of the launch weight is simply thrown away: dropped into the ocean or burned up in the atmosphere as it falls. From day one, that thousand-to-one cost produced a set of interlocking, and very high, priorities: the need to increase the function, flexibility, and reliability of the satellite, while reducing its weight and power requirements. These led directly to integrated circuit, the microprocessor, and their protean offspring.

Consider the computers on your desk at work or at home. These days, we -- as individuals, as organizations, and as a culture -- would be lost without them. Yet, for the most part, we are unaware of how powerful these tools have become as they continue to evolve more capability in progressively smaller packages. If you have a PDA -- something like a Palm V, for example -- you hold in your hand more raw computational power than went to the moon on Apollo 11.

### Communications

Telephones used to be clunky, black objects -- with rotary dials -- placed on a desk or shelf somewhere in a house and were permanently wired into a connector in the wall. There was only one per household and the phone company owned it. You just paid for the right to use it.

Fast forward to 2004: Computational devices designed explicitly for communications have led to cell phones (i.e. the Star Trek communicator) for wireless, worldwide communication; wired and wireless networks, including the Internet, that allow us to communicate with each other whenever and wherever we like or to gather information from disparate sources; email (and the regrettably ubiquitous spam that comes along with it); CNN; GPS; and other magical capabilities.

What's next?

- Voice and video over the internet so you can actually see and interact with the person you've "called". Maybe not quite as good as being there, but it's a start. There's a big payoff for individuals and businesses, but the transportation industry takes a hit.
- Automatic, real-time, language translation in phone calls. As the artificial intelligence software that provides this service becomes more sophisticated, will it help preserve the world's languages?
- Voice recognition and response in our computers and communications devices for everyday tasks (e.g. to do lists, appointments, letters, reports, presentations, etc.)

Actually, the three points listed above aren't what's coming next. These things are happening now, and the long term effects of such technologies will reshape industries, cities, societies, and economies.

### Materials

The problem of that launch to payload mass ratio demanded lighter and stronger materials with multiple uses. This effort to find new and better materials continues, but has succeeded in growing a discovery tree with many branches. The results have not been limited to the space program and large construction projects. As just a few examples, we now have:

- Composite materials of extraordinary strength and light weight being used in everything from tennis rackets, stereo speakers, bridges, aircraft, and replacement parts for the human skeleton.
- Light & strong materials being used in cars and aircraft reduce fuel consumption and cost.
- Adhesives that can bond nearly anything to anything else. This is significant in all kinds of construction but also is used in surgery (instead of stitches, thus reducing scars & scar tissue) and dentistry (to bond fillings and/or crowns to damaged teeth).
- Biodegradable materials, particularly plastic containers, being used everywhere.

All of this has led us to a recent event that, for me, is cause for even more celebration.

On October 4, 2004, Burt Rutan and his colleagues at Scaled Composites launched White Knight and SpaceShipOne. White Knight carried SpaceShipOne up to about 9.5 miles. SpaceShipOne's goal was to fly to the edge of space, defined for this effort as an altitude of about 62.5 miles. SpaceShipOne succeeded. With this success, Rutan and his colleagues became the first private organization to send a vehicle to space, to return it safely, and to do so twice within a two week period.

They were awarded the \$10 million Ansari X-Prize for this accomplishment.

The timing was deliberate and significant. The second, and prize winning, flight of SpaceShipOne was scheduled for the 47<sup>th</sup> anniversary of the launch of Sputnik I -- because, for Burt Rutan, that date in 1957 was of particular importance to his dreams.

The second flight of SpaceShipOne has become a landmark event and is being widely accepted as the launch of the Second stage in man's exploration and use of space.

None of this would have been possible without computers, communications, materials, and other capabilities that have come -- at least in part -- from the 47-year-old space program.

Who could have imagined, when Sputnik was launched, what the space program would become and what industries it would create?

Imagine where we will be in another fifty years?