



## Guest Editorial

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and Marc Cheves, LS

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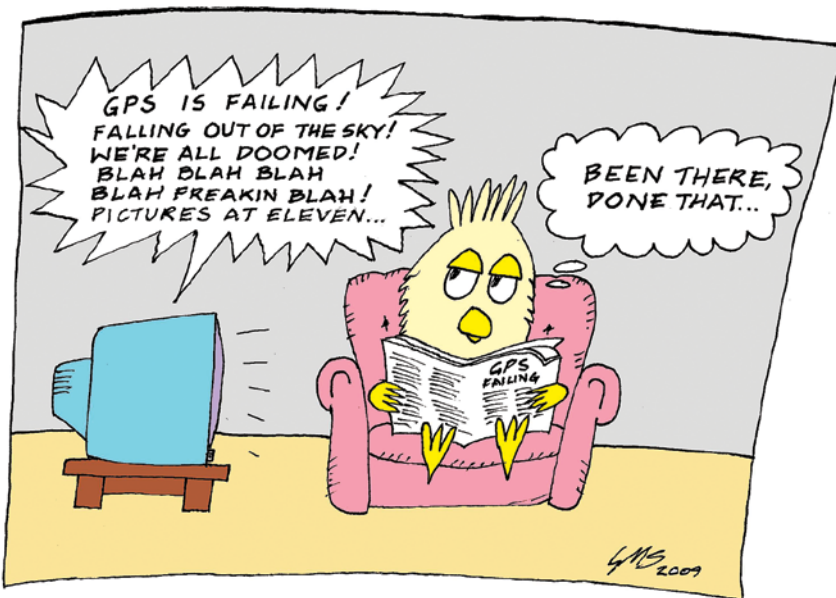


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## The Sky Is Falling!

Cartoon by Gavin Schrock



**W**hoa! Let's take a few deep breaths and calmly assess some of the news hype over April 30, 2009 Government Accounting Office (GAO) report on GPS. Firstly, read the actual report ([www.gao.gov/new.items/d09325.pdf](http://www.gao.gov/new.items/d09325.pdf)) and not the wildly imaginative interpretations recently spewed out by a hyper-reactive press. Note that report is titled "Significant Challenges in Sustaining and Upgrading Widely Used Capabilities," not "GPS is Doomed!"

The GAO report is assessing the risks, not predicting failure. In a related GAO report issued May 20, 2009, "DOD Faces Substantial Challenges in Developing New Space Systems," we see that it is not only GPS that faces these challenges. Some of the challenges to GPS have to do with delays in launch systems, budgetary constraints and the sad fact that no development contract has come anywhere near budget or timeline in decades. Foreign launches are out of the question due to the national security aspect of the system (though such launches could be at half the cost and without launch delays), until our space act is straightened out, the challenges mount.

It is true that the system is aging. Many birds have outlived their design life, some are past the pre-launch mean-estimate, and as many as 18 are one component from mission failure. As reported in the November 2008 issue of *The American Surveyor*, a presentation to the CGSIC in Savannah in Sept 2008 by the USAF added realistic risk assessment to those otherwise alarming numbers. Birds that are one component from mission failure, also known as a "single string" condition are mostly far from any such failure. These sophisticated machines are arguably one of most successful federal undertakings of all time; designed to last, outperforming and reaping benefits far beyond anyone's expectations. But more importantly they

are monitored more closely than any patient in an Intensive Care Unit. The notion that there could be widespread failures without warning could only come from the imaginations of the completely uninformed.

If we are to start believing folks like the writer from a computer technology magazine (that sat smugly on a cable news channel and predicted satellites falling from the sky), then we have far more to fear than the remote possibility of the degradation of service (that would surely drive a very loud and unanimous call for an advance of the launch schedule). It isn't just the blaring inaccuracies in such statements that are troubling (the satellites do not just fall from the sky when retired instead, as Marc reported in his visit to the 2nd Space Operations Squadron (2SOPS) at Schriever AFB in 2000, the retired birds are boosted into a "junk orbit") but that the responses from those closest to the actual truth are relegated to the "back pages". The most authoritative response to come close to mainstream media was issued (oddly enough) in a Twitter session from the Air Force Space Command ([www.af.mil/news/story.asp?id=123150625](http://www.af.mil/news/story.asp?id=123150625)). Please read the GAO report, and then read the USAF response...

Another fear of GPS failure that gets a lot of cracker barrel talk is the fear of a big solar storm (especially since the recently aired sci-fi movies on the subject.) Here is another case where the shepherds of the GPS systems are a step ahead of the hazards. Such radiation hazards would not come without enough warning for the USAF to put the already hardened GPS birds into a safe mode to ride out the storm. Other satellites would be in greater danger and if such a storm were powerful enough to "knock out" the GPS sats, we would have more to worry about than our positioning needs.

Just how much of service loss would we see? There are many institutions scrambling to assess such risks based on the various report's lists of "endangered" satellites. One study, by Richard Langley of the University of New Brunswick and posted on the CANSPACE archives: <https://listserv.unb.ca/cgi-bin/wa?A2=ind0905&L=CANSPACE&T=0&F=&S=&P=20729> shows outages (defined as falling below 4 sats) at a 20 degree mask for an average handheld in the ranges of 10


minutes at a 24 sat level, an hour at 23 sats, and up to two hours at 21 sats. Ok, this is a cause for concern, but maybe not panic (of course a little panic might have a residual benefit).

Is it possible that the parties involved would allow the system to fail? Many have jumped on the opportunity to start blaming this or that administration but the warning signs and alleged mismanagement threads go back too far and are more complex than any simplistic volley in the perpetual blame-games would lead us to believe. Who are the parties involved and what prompted the recent rash of introspection for GPS? While the DOD has been the actual masters of the system from inception, there has not been an official cross-departmental coordinating body until just a few years ago with the formation of the National Executive Committee on Positioning Navigation and Timing (PNT) that reports directly to the Executive Branch. An October 2008 report from the PNT Office ([pnt.gov/public/docs/2008/biennial2008.pdf](http://pnt.gov/public/docs/2008/biennial2008.pdf), which some say glosses over the risks) did play a role in prompting many on the Hill to view this as a national security issue, like congressman Tierney (see his remarks at [nationalsecurityoversight.house.gov/story.asp?ID=2427](http://nationalsecurityoversight.house.gov/story.asp?ID=2427)) to push for the recent GAO review. In the past, much of the advocacy for the commercial use of the system had been coordinated by such entities and the Department of Transportation and Space Security Office, now we are seeing stronger voices from such entities as the Commerce Department (no surprise). The GAO report hints at the need for coordination on the level of a kind of GPS czar. I would not be surprised if Commerce were to have a leading role in any such institution.

The most telling factor to be considered in assessing the recent "GPS-mageddon" news is the sheer number of stakeholders, a body so broad both domestically and internationally that would surely sic the dogs of hell on the parties involved if the system were to degrade. Think 500 million units with GPS chips in them (the majority domestically), huge investments in remotely operated military systems, the commercial navigation systems (e.g., airlines); while not wholly dependent on GPS for safety of life do rely on GPS for optimal cost/performance benefits. Then the big one: timing. Our network computing

systems and communications systems (e.g., cellular) depend on the timing services of GPS in numbers that dwarf by tenfold any other use, either directly or by extension.

Does this mean we should stand idly by and let the upgrade of this valuable system continue to fall behind schedule? No, this is a good opportunity to ride on the wave of this recent "heightened awareness" of the GPS system to push through whatever channels we have (e.g., associations, elected officials, etc.) calls for an improved plan.

But please beware of what the media dishes out. It's like airplane glue sometimes—if you get too close and inhale too deeply, you might feel good for a little while, but may end up passing out and finding your nose stuck to the table. 

*Editor's Note:* I have been attending the CGSIC meetings since 1996, and have repeatedly written about the status of the GPS constellation. Each satellite contains redundant systems: for example, three atomic clocks and three reaction wheels (gyros). Should one component fail, another is brought online. When only one of the three components is left, that component is said to be in single-string failure mode, that is, if that remaining component fails, the satellite will no longer be able to fulfill its mission. Repeatedly, the Air Force has provided detailed reports about how it exceeds the performance specifications for the constellation, and in fact, the Air Force has done a marvelous job of managing the system and wringing unbelievable usefulness out of each satellite. At the CGSIC meetings we've heard about the number of satellites that are sitting in a warehouse, waiting their turn to be launched. When Col. David Madden spoke at the ESRI Survey Summit last year, he commented about the high cost of launch vehicles and indicated that finding a launch vehicle and a launch time is more difficult than finding a bird to launch. I find it reprehensible that the ignorant press, in its quest to trumpet bad news, has succumbed to misinformation and sensationalism. Our hats should be off to the men and women of the Air Force and all the contractors (satellite builders and technical support) who have provided us with the premier GNSS on the planet.—*Marc Cheves, LS*