

Unfinished Business

All good things must come to an end. At which point, if Fortune smiles on us, other good things begin or continue.

Case in point: as of year-end 2017 I am promoting myself to Editor Emeritus of *Inside GNSS* and turning to some unfinished business that I have with life. Of course, after 28 years I still have some unfinished business with GNSS, this amazing technology and industry that has more growth ahead of than behind it, more prospects for innovation, more unfinished business than ever.

The *Inside GNSS* business itself — magazine, webinars, website, and so forth — will be advanced, expanded, and undoubtedly improved by my long-time partner in GNSS publishing, Richard Fischer, who entered the field in 2000 and has brought energy, intelligence, and expertise to the enterprise. The success of our sister publication, *Inside Unmanned Systems* (now entering its fourth year), bears further witness to his skills.

Richard's leadership will be complemented by managing editor Stan Goff, and the long-time contributors to *Inside GNSS*'s success: our editorial advisors, our Washington and Brussels correspondents — respectively, Dee Ann Divis and Peter Gutierrez; the editors of *Working Papers*, *GNSS & the Law*, and *GNSS Solutions*; and the many members of the global GNSS community itself who have never been shy about sharing their ideas, insights, and opinions with us.

As for the unfinished business of GNSS, well, these are the topics that I will be watching most closely in the months and years ahead:

Achieving Full Capability. China and Europe must still build out their full global constellations and services. Meanwhile, Japan has to decide whether to fund an expansion of the Quasi-

Zenith Satellite System to provide an independent regional capability.

Modernization. Russia still needs to overcome technology embargos and manufacturing issues to produce a next-generation GLONASS capability, while the United States works to finish an overdue upgrade of its operational control segment and third-generation GPS satellites.

GNSS Vulnerabilities. In the foreseeable future, jamming and spoofing will not magically disappear. But engineers, system integrators, and product designers will also have to consider the cybersecurity aspects of systems with which GNSS is combined. Signal encryption and authentication are necessary but probably not sufficient solutions.

Not by GNSS Alone. Assured PNT (positioning, navigation, and timing)

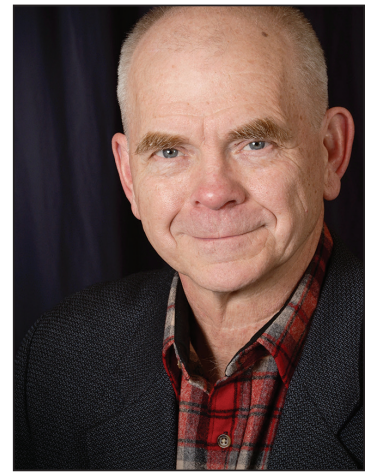
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remains to be ensured, depending in large part on successful integration with other PNT technologies.

GPS Launch Costs. The United States should reassess the trade-offs between continuing to include the Nuclear Detonation Detection System on GPS satellites and the weight and power requirements that make them so expensive to build and launch.

International Cooperation. Consensus and collaboration among GNSS providers — e.g., in spectrum, interoperability, interference detection and mitigation, performance monitoring, and mutually beneficial business initiatives — must continue to transcend the national politics that may afflict their relations in other areas.

Global View. Reciprocal recognition and acceptance of other GNSSes'



operation within national boundaries remain a sticking point and stumbling block to full exploitation of this critical infrastructure.

Integration on New Platforms. Autonomous, unmanned, and remotely piloted vehicles, vessels, and aircraft are only the latest, not the last, new places that we will find GNSS.

Technology Synergy. GNSS integration with other sensors, robotic systems, big data, and artificial intelligence has, in many ways, just gotten going.

Penetration into New Application Markets. Just when you think there's no stone left unturned, a landslide of new uses for GNSS rumbles into view — disrupting old ways of doing business, bringing new precision and cost-effectiveness to new realms of human endeavor.

With such an abundance of unfinished GNSS business, I won't stray too far. Readers can still reach me at <glen@insidegnss.com> with inquiries, suggestions for authors and articles, and your own perspectives on this remarkable world of GNSS.

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