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TO: Minet and Barry Phillips, Editor  
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RE: Article for June 2024 issue of Benchmarks

### **Artificial Intelligence (AI) and the Continuing Impact of the Digital Revolution**

I am a “digital immigrant,” not a “digital native.” Even so, I found artificial Intelligence (AI) to be helpful in writing this article. Although the volume of information available on AI is overwhelming, a summary of the impact of AI on uses of spatial data is posted at <http://www.globalcogo.com/ChatGPT.html>.

A consequence of the digital revolution is that surveyors, engineers, and others use 3-D digital spatial data extensively. Using a 3-D model for 3-D spatial data is logically compatible with the analog-to-digital transition. But old habits die hard, and it is more comfortable for many to continue using separate horizontal and vertical datums. An integrated 3-D datum is becoming more commonplace as geospatial technology continues its headlong rush into the realm of AI. Many surveyors are dabbling in and using AI but, in spite of the allure of AI, we also need to be aware of “snake oil” pitfalls.

To me, AI is an oxymoron, sharing the stage with other self-contradictory expressions such as awfully good and old news. While adapting to AI concepts may come more easily for the natives, new methods for handling digital spatial data are an on-going challenge for others. Impressive progress has been made in sensors, data collection, and processing capability but natives and immigrants alike share common ground in that **the underlying geometry of 3-D digital spatial data does not change.**

It takes a huge database to support AI inquiries. Billions of patterns and prior consequences are interrogated to develop an AI response. In many cases, the probability of reaching an acceptable conclusion is acceptable but AI has no independent thought capability. Like lemmings running over a cliff, if the database contains imperfect or defective information, the integrity of an AI solution could be compromised. In some cases, a user may be able to update the database with “better” information in which case the statement is made that AI has the ability to learn. To me, that is misleading.

Last fall I read the book, “Elon Musk” by Walter Isaacson in which he describes reasons for the success of SpaceX and Tesla. I don’t share Elon’s brashness or tolerance of risk, but I relate to his insistence on starting with basic principles and questioning the need for each requirement. Notorious for establishing “impossible” completion schedules, Elon’s contributions to operational efficiency are legendary.

Some years ago, a professional mentor told me, "Asking the right question is more important than having the right answer." With that in mind, I posed the following question to ChatGPT:

“What two factors are most responsible for the success of SpaceX and Tesla?”

The ChatGPT answer, posted at <http://www.globalcogo.com/Musk.pdf> came back within 30 seconds. In

summary, ChatGPT replied that, of various contributing factors, two key factors include:

- The Visionary Leadership of Elon Musk.
- Technological Excellence.

I was gratified to see the similarity between the ChatGPT answer and what I had learned otherwise.

The October 9, 2023, issue of Time magazine contains a comprehensive article about Elon Musk and his “fight and fears for the future of artificial intelligence.” Whether or not you are a fan of Elon Musk may be irrelevant, but he has proven himself successful in challenges many have felt to be “impossible.” For example, landing a spent rocket booster on a predetermined target is an impressive use of measurements and 3-D geometry. In what way might professional licensing and registration be instrumental in Musk’s efforts to prevent misuse of AI? And what about requiring drone pilots to be licensed as a surveyor to offer drone mapping services?

The stated goal of licensure is to protect the public against incompetent practice of service professionals. That system of “checks and balances” works quite well, but constructive tension arises between the proven status quo methods and disruptive innovations driven by new technologies and practices. Enterprising entrepreneurs routinely advocate recent technological solutions for traditional problems. Admittedly, I am a bit skeptical of the following item posted recently on LinkedIn.

*GeoAI is revolutionizing GNSS-based heighting by enhancing geoid models, allowing for more precise transformations from ellipsoidal to orthometric heights. This optimization results in more accurate height measurements, crucial for a wide range of applications.*

*By leveraging GNSS-based heighting, organizations can achieve unparalleled precision and efficiency in elevation measurement, surpassing traditional surveying methods with centimeter-level accuracy. This technology proves particularly valuable in areas lacking extensive height reference infrastructure, enabling accurate and efficient elevation measurements over large distances, especially when coupled with precise geoid information.*

*The impact of GeoAI on traditional surveying methods is profound, enhancing both accuracy and efficiency by optimizing geoid models for precise height measurements. This advancement streamlines data analysis and accelerates surveying processes, ensuring reliability and avoiding data reduction discrepancies, especially in joint surveys involving nearshore and offshore geophysical surveying.*

Geometrical integrity is the basis of my overall concern with AI. It is no secret - AI has been undergoing development for some years. Using AI for facial recognition technology was adopted prematurely by law enforcement agencies and resulted in gross miscarriage of justice in some cases. Undoubtedly the LinkedIn quote above contains an element of truth but I would not stake my professional reputation on that information without independent testing and verification. My thoughts on the importance of geometric integrity are summarized in an item posted at <http://www.globalcogo.com/3D-and-AI.pdf>.