Ron Bisio

Senior Vice President Trimble Geospatial

zfv | **INTERGEO 2022 will be highlighting the topic digital twins. In your opinion, what is the potential of the digital twin in the context of society's challenges such as sustainability and climate protection? Can you elaborate on this for the area of building, construction/BIM?**

Bisio | Digital twins will be central to addressing infrastructure needs across the world. Capturing the earth and converting it into a digital model, or digital twin, is integral to improving our roads, bridges, railways and airports. As the end game of scanning and mobile mapping workflows, the digital twin starts with the surveyor, who will capture the earth and convert it into a digital model. That model serves as a fully connected environment for planners, designers, engineers and workers in the field to operate in concert. This digital collaboration minimizes downtime from information requests and design and stakeout updates – and sets the stage for true digital twin representations for managing and improving physical assets. For instance, digital as-builts are a key part of a U.S. Federal Highway Administration program to identify and rapidly deploy innovations to make transportation systems adaptable, sustainable, equitable and safer for all. We also see cloud services as vital in enabling survey companies to deliver digital twins through the software driving these data capabilities.

The collaborative, connected environment of the digital twin also applies to BIM, where mixed reality solutions support a new way of working with architecture, engineering and construction models throughout the building lifecycle, from design and demolition. Mixed reality enables everyone to visualize the same desired result, so teams understand the project and the work to be completed. This enhances communication and coordination to improve productivity and reduce rework.

zfv | **How do you estimate the general market development in the next 5 to 10 years? What could be obstacles in exploiting the potential, where do you see potential drivers?**

Bisio | For almost any sector in our industry, two aspects of the market need to come down and two come up. First, costs and complexity need to come down, such as for mobile mapping and precision agriculture, so we can broaden the base of the user pyramid. Second, what needs to come up are availability of positioning, such as through wireless for cloud offerings, and the shift from technology providing positioning to technology providing answers. For example, a farmer or railroad manager doesn't care as much about satellites or scanning rates or GPS positioning technology as they do about how to make their crops healthier, where to apply their materials, or whether their train is going to make it safely through a tunnel. People are looking for these kinds of answers, and as our industry gets better at delivering them, we'll bring more people on board.

Changes in data collection and processing are another driver because they broaden the surveyor's role beyond simply capturing information in the field to providing data with better visualization, fidelity and meta information. The cloud enables these changes and allows us to work in an ecosystem in which all elements need to be in harmony for our customers to get their work done.

zfv | **In the future, DVW sees a big trend towards high-precision navigation for mass-market applications. Will this be the next hype and how are you preparing for it?**

Bisio | Autonomous solutions, together with Trimble's precise positioning technology with centimeter-level positioning accuracy for cars, tractors, heavy construction equipment and more, are helping push entire industries toward a fully autonomous future. At the heart of Trimble's autonomous solutions lie core technologies that include object recognition, satellite positioning, path planning and machine control. Our mobile mapping systems, such as the Trimble® MX9 and Trimble® MX50, are being used to create the base maps that autonomous cars use to navigate. In practice, these solutions mean users – from farmers to heavy equipment operators to regular drivers – can guarantee their machine or vehicle operates in a precise, defined area.

Trimble has a legacy in automotive agriculture activities, and in 2021 we announced a partnership with HORSCH extending a collaboration for autonomous machines and workflows in agriculture. We also are furthering collaborations with General Motors, Dynapac, Qualcomm, Roborace and others to put Trimble positioning and autonomy technology to work automating vehicles, equipment and tasks of all kinds.

zfv | **And a personal question at the end: What are you looking most forward to at the upcoming INTERGEO?**

Bisio | INTERGEO is one of the best opportunities Trimble has each year to meet with our customers – and not just from Europe but from around the world. These customers spur us to innovate and seek solutions that best solve their problems. For example, there is a lot of interest in mobile mapping as regions of the world rebuild infrastructure and invest in new infrastructure, such as broadband. Over the years, we've focused on data capturing technology and sensors to the various uses of the data, be it feature extraction or analytics. We are also seeing a rapid evolution in sensor integration and a migration of workflows to the cloud. In the past, surveyors and mapping professionals would capture information and then hand it over to a few users. With the cloud, they now can put this information in the cloud in real time and democratize that data. This is exciting for us. We want to stay out in front of these changes, especially during this generational opportunity to transform how construction is done and infrastructure is built.

Thomas Harring

President of Hexagon's Geosystems division

zfv | INTERGEO 2022 will be highlighting the topic digital twins. In your opinion, what is the potential of the digital twin in the context of society's challenges such as sustainability and climate protection? Can you elaborate on this in more detail in relation to "Digital Worlds"?

Harring | Digital twins are merely digital representations of reality. At Hexagon, we prefer to talk about smart digital realities, which are much more impactful. Smart digital realities are real-time – that is, continuously updated – digital representations of an object or an environment where the real and digital world fuse into one reality. They are intelligent because they include relevant information and insights and drive our vision of an autonomous future in which industry, people and the planet sustainably thrive. Smart digital realities enable policymakers to solve complex challenges, such as tackling urban overheating. The models enable simulation of various scenarios such as wind circulation and air exchange and inform decisions for structural measures to improve the urban climate long-term. Smart digital realities also allow decision-makers to make errors before investing – without affecting lives, damaging the environment and wasting resources. More accurate geospatial data, easier access, automated processing and interconnected systems will make many industries more productive, more efficient and less wasteful, reducing the overall environmental costs of business operations. Sustainability will be an integral part of our business and, more broadly, the geospatial industry and will provide additional potential for customer solutions.

zfv | How do you estimate the general market development in the next 5 to 10 years? What could be obstacles in exploiting the potential, where do you see potential drivers?

Harring | It seems predictions have become even more difficult in recent years amid geopolitical tension and increasing market uncertainty, which are undoubtedly challenges we see. However, we do not doubt that the next five to ten years will be exciting for the geospatial industry. Because of that, we have to tackle the talent shortage – another one of the industry's obstacles. It is our job – as a company and as an industry – to make young people aware of the attractive career opportunities in the geospatial industry. Mid- to long-term obstacles are the pace of technology adoption and innovation diffusion. Still, easier-to-use sensor technologies and more intuitive software continue to make geospatial technologies more accessible and expand its user base. To further facilitate adoption, policymakers need to adjust the regulatory frameworks more dynamically, and the geospatial market players need to continue working on open architectures and interfaces. Artificial Intelligence (AI), machine learning, edge computing, cloud processing and more will support the real-time collaboration and transformation of data into intelligent information. Turning technology into opportunity will accelerate: Many new applications that support sustainability and productivity will emerge in industries applying geospatial technologies. We firmly believe in Amara's law (1960) that "we tend to overestimate the effects of technology in the short run and underestimate the effects in the long run."

zfv | In the future, DVW sees a big trend towards high-precision navigation for mass-market applications. Will this be the next hype and how are you preparing for it?

Harring | We expect a growing demand for high-precision navigation – outdoor and indoor – for professional and mass-market applications. I would not describe it as a "hype" though. The integration of navigation technology has been an established mass-market application since the introduction of smartphones. Outdoor mass-market applications will be driven by autonomous solutions, for example, to improve the efficiency of last-mile deliveries. Exact locations and positioning enable autonomy: Autonomous machines need location information to perform the work while ensuring safety. Indoor applications will include navigation and guidance for mass markets alongside professional applications such as predictive asset health management. New technologies such as spatial anchoring provide solutions for real estate as well as media and entertainment. High-precision positioning should offer reliability and maximum availability. It must work in all environments, be easy to use for nonspecialists, seamlessly integrate with software and be globally deployable. At Hexagon, we are well prepared with our innovative positioning and location intelligence solutions, both indoor (spatial anchoring) and outdoor (GNSS).

zfv | And a personal question at the end: What are you looking most forward to at the upcoming INTERGEO?

Harring | I have attended INTERGEO for 20 years and always enjoy meeting the geospatial community and other professionals interested in geospatial technologies. INTERGEO is a fixed event on my agenda. It is the time to reconnect with long-standing customers and colleagues and also to meet new people from the industry. I look forward to discussing long-term trends, concrete business ideas and shared challenges in face-to-face conversations. Seeing many customers and business partners again will be great. It is always a pleasure to put our latest technology into their hands and watch them discover our workflows. The fair and the conference program offer so much information that the days at INTERGEO are always entertaining. I have always learned a lot at this event. Also, it is great to be in Essen, a growing and livable city in the middle of the Metropole Ruhr. A city that is making itself fit for the future. From grey to green, from coal to culture, Essen has undergone a significant transformation in recent decades.