

GIM INTERNATIONAL INTERVIEWS JÜRGEN DOLD, EXECUTIVE VICE PRESIDENT, HEXAGON

“Geospatial professionals play an essential part in bringing the real world into the metaverse”



At Intergeo 2022, 'GIM International' caught up with Jürgen Dold, at that time EVP of Hexagon, to hear his thoughts on the key changes in the geospatial sector.

Jürgen Dold, executive vice president of Hexagon, has been involved in the land surveying profession for about 30 years. At Intergeo 2022 in Essen, Germany, *GIM International* caught up with him to hear his thoughts on the key changes in the geospatial sector, including hybrid mapping solutions, digitalization and the metaverse.

You have been involved in the land surveying profession for about 30 years. What have been the key evolutions during that time?

I think the biggest evolution has been the digitalization journey. In terrestrial

surveying, we've gone from theodolites to total stations to edge computing, imaging and scanning. It has been a series of evolutionary steps, each one boosting efficiency and further enlarging the possibilities. But each time, the biggest challenge has been to make sure that the new solution has a powerful enough battery that it can remain fully functional in the field for eight hours a day. These evolutionary steps have been driven by a number of trends, particularly the increase in computational power, miniaturization, cross-functionality, connectivity and new communication possibilities. We've seen the shift from GPS to GNSS thanks to the opening up of all the satellite signals, which has resulted in more mobility. And then the solutions were fused with additional technology to enable scanning and imaging, which unlocked many more possibilities with the same instruments. Around 20 to 25 years ago, I remember some people saying 'Surveyors don't need point clouds,' but we went ahead and started to create a completely new market. Since then, reality capture has become a worldwide business. We've gone from bulky systems measuring a thousand points per second to today's solutions that can capture millions of points per second – that itself is quite an evolution. SLAM technology has been another great development, because it means you can do the maths in the field rather than afterwards, so once again that's an example of how the industry is being driven by efficiency gains. In terms of airborne mapping, over the past nine decades we've evolved from glass plates to film to digital and now we've got orthophotos that enable us to create a semantic photorealistic mesh in the digital world. Again, this evolution has tremendously improved efficiency; whereas it used to take several months to capture a thousand square kilometres, it can now be done in a matter of days. And we are constantly looking for new ways to help our customers work more efficiently, so things will continue to evolve at a very fast pace.

Many governments are working on ambitious 3D modelling and digital twin projects. What would be your advice to them?

At Hexagon, we have the advantage of being involved in not only the geospatial industry, but also in the industrial space, and there digital twins have been the de facto standard for many years. In fact, about 25 years ago, one of my first projects was to help Boeing with the digital twin of its 777 aircraft. Even that organization was challenged to adapt to the fully digital world, but the benefits of being able to switch back and forth between the digital twin – in that case, the product design – and the real-world situation in seconds soon became apparent. So what we're now seeing with digital twins in the geospatial world is similar to what the aerospace industry did 25 years ago, except now we're digitalizing our surroundings so that we can conduct all kinds of analysis. What does this mean for governments? When you have a comprehensive and complete picture of the real-world situation, you can apply simulations to predict what would happen in certain scenarios. This enables you to anticipate and prepare for problems. I'm excited to see that more and more concrete projects are proving the value of digital twins. For example, a digital twin of Hamburg is being used to analyse the possible building volume in the city versus the existing volume in an aim to make better use of the space. In partnership with Cyclomedia, we have basically created a digital twin of the whole of the Netherlands. And the Digital Twin of Germany project is in full swing: 8,000km² have already been captured at 42pts/m² to prove the concept and to prepare for all 350,000km² of the whole of Germany. Ultimately, this will create a unique dataset of all buildings, trees, infrastructure, water and so on, which will open up endless possibilities in terms of analysing flooding risks, biomass activities and more at a nationwide level. As we say as surveyors, 'If you don't measure, you don't manage', and my advice is that digital twins are excellent tools for visualizing all kinds of potential scenarios.



Jürgen Dold delivered the opening keynote at Intergeo 2022. (Image courtesy: Fokuspokus Media)

As digitalization of the architecture, engineering and construction (AEC) industry gathers pace, what is the current level of knowledge and understanding of geospatial technology in that sector?

One of the challenges for the construction industry has been that it is a fragmented market with lots of subcontractors which makes it difficult to adopt changes quickly. However, I think that the sector has gained a lot of ground over the past ten years. It's still not fully digitalized, but it is well on its way. The heavy construction industry is probably the furthest ahead in terms of digitalization with all the machine controls. Whereas it used to take maybe ten surveyors to stake out 50km, now only one surveyor is needed for programming construction machines. In terms of building construction, to achieve seamless integration between the digital and the real worlds you need the design data to be readily available on site. This means you need high-speed communication, a CAD model, sensor technology and mobile scanning devices that allow you to scan the building as you walk through it. Technological advancements like the mobile revolution and 5G have helped to overcome some of the connectivity and communication issues that previously made it difficult to implement digital technologies on construction sites. So it's not that professionals in the AEC industry didn't understand the benefits, but they were held back by the market structure and the technological possibilities. The technology is now available, so it's down to the construction companies to take the initiative. But it's a learning experience and you need to get your own organization on board first, and then you need to get your subcontractors on board too – and preferably in a short period of time. However, there are signs that the industry is catching up fast, with some progressive companies fully digitalizing their office bases and early adopters already using scanning in BIM (*building information modelling, Ed.*).

Hexagon is known for its advanced hybrid aerial mapping solutions. How are these solutions currently being used?

Hybrid sensors are simply a great way of multitasking; if you can combine nadir images with oblique images and Lidar to give you geometrical stability, even in urban canyons, then why would you do all those things separately? So a hybrid approach is a logical development which is good for efficiency, as I mentioned earlier, and also more sustainable because you no longer need to conduct multiple flights. Numerous cities are using this approach, and the Dutch government is a great example of how a hybrid solution has been used to capture the entire country. The data will ultimately become available as a digital twin, which will initially be used for land management at government level. But the utility companies could also use it for planning purposes, telecoms providers for 5G network optimization, and then there's a whole spectrum of other potential applications that could be built on top of the dataset, such as mobility, insurance and so on. One important step in this evolutionary journey relates to managing all the data captured and making the datasets available for everyone. That's where our HxDR initiative comes in, which is a cloud-based digital platform for storage, visualization and also collaboration.

How does Hexagon put sustainability into practice?

We address the topic of sustainability in multiple ways at Hexagon. It's not new for us as a company; we've been working to reduce the footprint of our own organization for many years in a multitude of ways. Besides that, there are countless examples of projects in which our solutions contribute to sustainability, such as by reducing waste in construction or mining, or where our mapping technology is being used to monitor biomass development. Our subsidiary called R-evolution, which is kind of a start-up within Hexagon, is focused exclusively on sustainability initiatives, with current projects related to solar farms, seagrass fields and more. We established this subsidiary because we truly believe that doing good things for the planet can go hand in hand with business success. Geospatial technology is fundamental to improving sustainability, simply because you can't manage what you don't measure. So we and all other professionals in this industry contribute to providing accurate and honest information as the basis for making the right decisions to change the world for the better.

How is the growing focus on data changing the surveyor's role?

Having trained as a surveyor, I can say that my first job would be completely different today! As survey instruments become increasingly automated, the same crews are much more productive than before, resulting in much more data which requires processing and analysis in the office, so data management and data science are becoming an increasingly significant part of the job. On top of that, artificial intelligence is playing a growing role and further reducing the chance of error in precise measurements – albeit not completely. Despite all the technological advancements and digitalization, we will always need people to go out into the field to measure and understand the physical world that forms the basis for digital models. And geospatial professionals will still need to have a basic knowledge of surveying and the geometrical logic of our planet, such as the ellipsoid and gravity, in order to combine that knowledge with data science. Therefore, I believe the term 'surveyor' will continue to exist.



Jürgen Dold: "Especially in that specific space in the metaverse where the real world matters, there is huge potential for the

geospatial profession to do something good for the future of society â€” and what could be more rewarding than that?!” (Image courtesy: Fokusfokus Media)

It is a major challenge for the surveying profession to attract both new students into relevant education and skilled professionals into the industry. What are your thoughts on how this could be done?

Many sectors are currently suffering a talent shortage, so this is not only a problem in the geospatial industry. But I think that one of the extra challenges we face is that many people still don't know what geodesy is; it has somewhat of an image problem. I know that some educational institutions are changing the name of their degree courses from 'geodesy' to 'geospatial engineering' which could help to broaden our reach. And there are lots of examples of promotional initiatives, such as short one-minute social media videos that are specially designed to appeal to youngsters, and many governments, universities and companies have become increasingly active in targeting local high-school pupils. But maybe we could also inspire people by explaining that, by creating 3D models and digital twins, they can help to connect nations within the European or global community and help to do all kinds of good things for the planet. So it's about communicating the social value of the surveying profession. Besides that, there is something very fascinating about the connection between the real world and the digital world. We're already seeing digital twins leading to the metaverse. As a geospatial engineer, you can help to shape that part of the metaverse where the real world matters. If that doesn't grab people's attention, I don't know what will!

Talking of the metaverse, how do you expect it to transform the mapping profession?

The metaverse is definitely a nice buzzword that is currently attracting attention. But what it really means is that the next generation of the internet will provide more intense, real-time experiences based on a smart digital reality. The geospatial profession will have an essential part in bringing the real world to life in that digital world, because there will be a greater need for more frequent – and in some cases real-time – updates to maintain the digital reality. Once the smart digital reality is up and running, we will be able to add intelligence to the digital world for simulations and analysis. For example, in urban planning, we could run wind simulations to see how a new building would affect the airflow in a city, simulate the movement of real-time assets to improve mobility, or explore how green spaces could be created to combat overheating in the summer. I see this as a great opportunity for our profession.

What are your ambitions in terms of Hexagon's growth and future direction?

Our history is based on the combination of an entrepreneurial approach and very grounded engineering capabilities. We are pragmatic rather than bureaucratic and have a forward-looking strategy. I would perhaps even describe it as being fearless, because there's a lot of room for pioneering; our company culture allows us to take risk as long as we manage that risk. This approach has enabled us to grow and stay ahead, so we intend to continue along this path. Additionally, our company is always thinking about the 'make versus buy' decision; we try to do as much as we can ourselves, but we're not afraid to acquire companies if they can add value. In the mapping sector, we have developed the first 'flying sensor', which will empower other industries to apply our technology. Besides pursuing growth in our existing markets, we're also always keen to expand into new ones. The surveillance market is one example. Surveillance traditionally revolves around video cameras, but there are considerable challenges with measuring at night time and capturing the third dimension. We believe that 3D sensor technology could revolutionize that by reducing the dependence on human interpretation of the images. Another market with interesting growth potential is the autonomous market and there are countless possible applications that we're building out – not only in autonomous driving, but also mining, agriculture and machine control, for example.

How do you view the general market outlook for the geospatial industry in the years ahead?

When the global financial crisis occurred in 2009, I was CEO of Leica Geosystems at the time, and I remember reading somewhere that almost every generation of senior executives has to manage a crisis because there's roughly one per decade. But nowadays, it seems like we're facing a never-ending stream of crises; just as we're emerging from one crisis, another one starts. So that's pretty challenging for everyone. However, you can learn something from every crisis. For example, despite all the tragedy, the COVID-19 pandemic showed us that digitalization and rethinking certain approaches can help us in many more ways than we realized, and has resulted in more efficiency and more sustainability. Ultimately, whether there is a pandemic or a financial crisis, we still need to manage the world's space – and I believe our industry will continue to be part of solving the challenges. So the geospatial sector is actually a very good place to be compared to many other professions.

Do you have a message for our worldwide readers?

Even though we don't have the huge budgets of the BigTechs such as Apple, we are the ones who have gone ahead and made the real world 'machine readable' – because that's what digital twins are, right? Therefore, especially in that specific space in the metaverse where the real world matters, there is huge potential for the geospatial profession to do something good for the future of society – and what could be more rewarding than that?!

About Jürgen Dold

Jürgen Dold, executive vice president, has been with Hexagon since 1995. He has served in various management roles at Leica Geosystems and was division president of Hexagon's Geosystems division for ten years. Most recently, he has held strategic leadership roles across divisions, including overseeing Hexagon's Geosystems and Safety, Infrastructure & Geospatial divisions and leading Hexagon's focus on the content and platforms necessary to power and operate digital reality applications. In mid-November, it was announced that Dold will leave Hexagon as of 1 January 2023. "While it is with mixed emotions that I announce my resignation from Hexagon, I am very much looking forward to spending more time with my wife and family," states Dold. "I am proud of all Hexagon has accomplished. It's been an unforgettable experience full of countless memories and unique achievements working with incredible teams around the world."



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