

Jim Van Rens

***Editor's Note:** Jim supplied this well written response to my standard set of questions allowing me to use a different approach to highlight the career of this industry pioneer. Thanks Jim.*

The First Point Cloud

All of us in the industry have had that “aha” moment the first time we encountered a point cloud. Mine happened in 1997 at The National Robotic Institute at Carnegie Mellon University. Dr. Sanjiv Singh had taken a high speed laser rangefinder from RIEGL and coupled it with a scanning mirror. On a visit to his lab he fired up his machine. We were in a construction trailer with a big picture window. As his machine worked, a point cloud appeared on the computer screen that showed us standing in the construction trailer, the yard, a backhoe, roads, power lines a bridge, buildings ... in short it was a breathtaking revelation as to the power of the technology!

Earlier in the 90's I became involved in laser rangefinding by combining simple software solutions on a PDA to the Disto rangefinder and marketing the solution to steel mills, architects, carpet installers and a handful of commercial applications. I was aware of lasers from a study conducted by Motorola. The coming power of lasers was evident. The DTM's created by airborne LiDAR were remarkable. When I reflected upon this I realized that laser rangefinding was going to be an important contributor to the ancient quest to measure, record and analyze our world.



Growing Up

There was really nothing special in my background that prepared me for this industry. As a kid I was sent to work on neighbors' lawns, hauling trash, delivering newspapers. My father was a mechanical contractor and believed in hard work so all of us had to pitch in. Many of my friends were Boy Scouts and my mother made sure we all participated, probably because it was such an effective babysitting service and she had a lot of kids. Scouting was a lot of fun and the Merit Badge process was a hoot. You got to master a skill, get a badge and move on to learn something new. Scouting gave me a lifelong love of the outdoors and for a long time I was an avid camper and fisherman.

In my early life the thing that came close to providing me with a skill for this industry was reading. One of my brothers and I became very competitive in reading and we challenged each other

to read every book in our school library. Next was the local public library which was a classic Carnegie Library. We devoured the books and it provided us with a keen intellectual curiosity.

Life ensued with an education at Marquette University, getting that first important job in the 1970's, getting married and building up a career. In the various jobs I held over the years I always gravitated to new market and product development. This started immediately upon graduating from Marquette and has continued my whole life. The constant change was something that I was comfortable with and embraced. Given the fast paced development of the laser industry this has been a gift.

A Wide Range of Opportunity

One of the most exciting aspects of LiDAR is the number of applications and segments that are applicable for the

technology. Early on, it was very exciting to find applications in the commercial and industrial markets. You got an immediate impact by simply applying the technology.

As GPS, positioning systems and advanced computing arrived it was dramatic in terms of the potential applications that opened up such as wide area mapping, corridor mapping, surveying, industrial mapping, transportation sectors, forestry, bathymetry, robotics, monitoring and more.

The convergence of these technologies has re-created the mapping industry with the ability to provide more and better information faster. This fostered growth

The Need for Standards

The original efforts to address standardization emerged out of the National Institute of Standards with Dr. Stone, Gerry Cheok and others leading the pre-ASTM E57 efforts. This was a needed step to provide confidence to the customers and to provide the small but growing industry with the legitimacy it needed. It ultimately led to the formation of the ASTM E57 data interoperability standard.

Roughly at the same time a small but determined group of visionaries at the USGS, through the ASPRS organization also began the process of defining best practices, another effort at developing

ASPRS began the discussion with airborne LiDAR and also along the way they added the performance and specifications for mobile LiDAR. This was quickly absorbed onto the individual state DOT's setting their own specifications and standards for mobile and terrestrial LiDAR.

All in all setting the stage for more adoption of the LiDAR technology and helping to prove out the enormous value of LiDAR while assisting in the justification of these types of systems.

The LiDAR technology is on its own growth curve. We in the mapping industry have a tendency to ignore its implications in more sophisticated mapping aspects such as NGA applications and of course something such as a laser rangefinder in the headlight of an automobile to assist in collision avoidance.

That being said it is critical that we all work together in this very fluid environment to establish living standards to support user communities to rely on the output of the systems and to ensure that improvements in the technology are not hampered.

“The early stages of system integration was an exciting phase but now our customers need to have a seamless experience with our technology”

in all areas of our industry including sensor development and software.

As the last century passed away the emergence of the terrestrial survey systems exploded on the scene. RIEGL was fortunate to have a solid design and manufacturing process in place. This helped as the reliability of the systems were a standard for many. All of us were struggling to get the software to catch up with the hardware capability, searching for new and innovative 3rd party software for different applications, incorporating cameras and other sensors into the system and once again re-creating software to enhance productivity.

standards. The team at USGS saw the power but needed to bring the quality of the product to a point of usability. This culminated in the 2010 USGS LiDAR Guidelines and Base Specification. That effort has continued with the USGS Eros Telecom process to identify issues relating to LiDAR quality.

USGS was instrumental in the original LiDAR for the Nation efforts at USGS headquarters in Reston in 2007 and 2008. That and other efforts resulted in a more widely coordinated start to develop a national LiDAR policy with other agencies joining such as NOAA, USACE NSA FEMA and NRCS.

The Role of Government

Understanding the role that an ever expanding government plays is also important for us to be able to grow domestically, but also to compete internationally. A clear example of this is how the FAA favors government and university activity over commercial activity. This is putting the commercial mapping sector of the United States a generation behind the learning curve versus the rest of the world. The famous innovation that America is known for is being shut down in favor of bureaucratic caution. Common sense solutions are

easily developed so that our vibrant commercial sector can grow, develop the technology and jobs.

The impact of declining government budgets to support the GPS networks, the incursion of other market areas on the band width of GPS, the FAA's issues with UAS and more all speak to a great need for the industry to become more cohesive, speak with one voice and to clearly set our priorities so that we can assist the government in making effective policies that support the growth of the country.

By the year 2020 the development of the sensors and systems will demonstrate more of an integrated and

growth and impact on survey is better understood within the context of these integrated systems.

Human Resources

It is more important to note that all of this technology has been put together by people. The number of people who have impacted my growth and the growth of the technology are too numerous to list here. There are many important and critical names that will be missed not intentionally but because of space. The number of people that have had an influence on markets, products and performance requirements are the true

of RIEGL as a company and of course has provided me with the confidence and superb products to apply to our markets and serve our customers.

The contribution of Dr. Andreas Ullrich to this effort has been profound. The breakthrough development of applying full waveform signal processing in a digital mode to LiDAR has in the short term been revolutionary and its impact on the longer term are continuing to unfold. With the rise of the GEO portals and the ubiquity of RGB/XYZ data the strong basis that Dr. Ullrich has provided for advanced digital signal processing are contributing to the development of 3D analytics. In a world of XYZ/RGB ubiquity, the precision and analytics available from his ground breaking efforts will make the work of professionals more significant and ultimately refine our ability to define our world.

The future of the LiDAR industry from my vantage point looks incredibly exciting. The large national labs are experimenting with Flash LiDAR and arrays such as Geiger Mode Systems. These are quite exciting. The emergence of multi-spectral LiDAR is very exciting with its potential impact on our mapping activities.

The systems are more powerful than ever, smaller, faster and finding new applications. Mapping and robotics are using the same technologies of mapping systems and its impact on our lives will be powerful. The rise of the Drones will be a revolution in mapping. It is my fervent hope that every surveyor gets a drone with a camera system, becomes a photogrammetrist and in the process of turning pixels into points they will be better prepared to understand and adopt LiDAR technology. ■

“As we continue to map the world it becomes imperative that our analytics provides a deeper analysis to our customers.”

incorporated state or set of tools. The speed and simplicity of the systems, sensors, software and work flows will be nothing short of remarkable.

Laser scanning is on a similar trajectory as GPS. Modern mapping, as an example, is the incorporation of GPS, position sensors, advanced computing power, powerful software within the system as well as outside of it, passive sensors and active sensors. GPS has been an enabling technology for the dramatic advancement of mapping and laser scanning has been able to grow and develop partly because of GPS. GPS also is a part of that symbiotic relationship and prospers as well. So the often talked about corollary of LiDAR to GPS

pioneers of the industry. Many commercial firms, National Labs, Universities, agencies such as NOAA, NIST, NGA, USGS, FEMA, organizations such as MAPPs, ASPRS and so many others have worked hard and contributed to the effort.

The most influential people on my career happen to be with RIEGL. One of the little known talents of Dr. Johannes Riegl is that he is a superb technologist in all aspects; the core technology, the intuitive sense regarding the maturity of LiDAR to the application, understanding the nature of the system as a tool and his passion for quality. This developed or innate sense has been a critical factor in the success