

# Stuttgart Showcases Data Capture Technologies - INTERGEO 2015



Data is essential for any GIS. Fortunately today there is a vast array of rapid data capture technologies. GIS Professional's sister publication Geomatics World reports from the world's biggest exhibition of geospatial technologies.

Early autumn means a trip to Germany for the Intergeo event. This year it fell in Stuttgart (2016 is Hamburg then Berlin for 2017). As RICS's James Kavanagh observes, "The event is always a hothouse of new ideas, geo-technology and a great indicator of how... global geomatics is evolving."

The three-day show attracted a record 549 exhibitors occupying some 15,000 square metres and some 16,500 visitors of which over 30% were first-timers with half from beyond Germany. The new Stuttgart Messe could not have been

better located: right next to the airport.

At the organisers' press conference there was much talk of "Geospatial 4.0" which seems to be about intelligent networking. I must confess to having missed Geospatials 1, 2 and 3, although Esri in a press release defined 4.0 as "to integrate and link any information to space." Whatever attempt you make to define and categorise our business it is probably best to focus on the technology and more importantly, what it can do for users.

The following is little more than a snapshot of what was on offer at Intergeo. We will have missed plenty but we think we've captured some of the more significant developments from companies who are also players in the UK market.

## Droning Again. . .

If it is possible to discern particular technology themes then this year has to be drones and shrinking mobile mapping systems. The flying things certainly created a buzz. Drones, UAVs, call them what you will, enjoyed their own hot spot at Intergeo: the 'flight zone' where manufacturers were able to demo their craft in the air. It is extraordinary how these devices, both fixed-wing and multi-copter, have developed rapidly as data gathering platforms, encouraging an equally impressive evolution of lightweight sensors.

Some have focused on developing UAVs for dedicated applications. Riegl's RiCopter, one of the first with a LiDAR sensor, now has a bathymetric companion, the BathyCopter, which incorporates a green laser rangefinder developed by Riegl. The latest Aibotix multicopter UAV can now carry a multispectral sensor as well as enabled by RTK corrections via sister company Leica Geosystems' SmartNET service. Trimble meanwhile, has launched its first multirotor UAV, the ZX5 with a 16Mpx camera. Topcon too were showing their first step into this type of platform with the Falcon 8 Octocopter with a 36Mpx camera and the ability to be "backpacked".

## Mobile Mapping

Mobile mapping has also been moving ahead, helped by miniaturisation of sensors and more compact solutions. 3D Laser mapping, an early pioneer in this field, launched the compact StreetMapper IV system with just one connecting cable between the vehicle platform and sensor unit. The sensor package includes a high-resolution panoramic camera, laser scanner, MEMS inertial unit, GNSS and control unit, all of which fit neatly into a protective pod.

Leica Geosystems were showing the latest incarnation of their Pegasus mobile mapping system: a backpack version. Applications include BIM as well as 2D mapping; accurate positioning is achieved in GNSS restricted areas using Simultaneous Localisation and Mapping, or SLAM, technology. Together with a high precision inertial measurement unit, Leica describes this as a "position-agnostic solution". Sensors log position and time with full 360° views and Lidar plus a hardware light sensor, ensure that images are usable while other functions are verifiable and adjustable through the operator's tablet device.

The Trimble MX7 system mounts easily on a variety of vehicles. Controlled by a touchscreen tablet using WiFi technology, the

system captures 360° fully direct georeferenced imagery using a spherical camera and GNSS/INS technology. Imagery is calibrated for high-accuracy photogrammetry, allowing users to position, measure, annotate and extract information.

## GNSS

Designed for GIS and survey professionals, Trimble's latest GNSS receiver works with their handheld devices and iOS, Android or Windows mobile handhelds, smartphones and tablets using Bluetooth or via USB. When paired with a mobile device, the Trimble R2 receiver adds professional-grade GNSS capabilities to enable high-accuracy data collection.

## Totally Total Stations

Counting the many Chinese manufacturers, there must now be more than 20 different total station brands. Big players like Leica and Trimble even have two (GeoMax and Spectra Precision respectively).

Topcon's DS200i direct aiming motorised imaging station is compatible with Autodesk BIM 360 Layout app for the Apple iPad and is the second total station that Autodesk and Topcon have collaborated on. The DS200i offers noncontact reflectorless measurement up to 1000 metres and builtin wireless WLAN connects the iPad with the BIM 360 Layout app. But no Android yet.

A new range of motorized total stations was announced for Trimble's Spectra Precision brand. The Focus 35 RX robotic instruments move the user from the instrument to the detail pole. Speed of observation and precise positioning is provided by patented StepDrive motion technology controlling horizontal and vertical motion.

## Laser Scanners

Driven by Building Information Modelling (BIM), 3D laser scanning and imaging software are behind many geospatial applications as well as construction planning and design. Trimble's latest scanner, the TX8 3D offers greater accuracy (down to 1mm) and streamlined onboard operation in measuring to longer ranges, decreasing field time for capturing high-accuracy data.

Topcon has refreshed its laser scanner range with the announcement of three new models. Using Topcon's Precise Scan Technology II, the GLS2000 models are designed to emit pulse signals three times faster than their earlier scanners. The scanners feature dual 5Mpx cameras, including one with a 170degree wide-angle lens for highspeed imaging, as well as an 8.9-degree telephoto camera coaxial with the measuring axis.

Austrian company Riegl has five decades of experience of developing lasers. Their latest terrestrial scanner, the VZ400i offers scan rates up to 1.2mHz with 5mm accuracy. The range is 800 metres and operation is via a touchscreen. An integrated gyroscope, accelerometer, compass and barometer help reassure users that conditions are right for data collection.

But perhaps, whilst the VZ400i is an evolutionary product, the most interesting development from Riegl is the VUX1UAV, an ultra-lightweight laser scanner designed for use with a UAV. Described as a "survey grade scanner" and operating at 200 swathe scans a second, it captures data at 500k points a second. Impressive from a unit that weighs just 3.5kgs and is sized at only 227 × 180 × 125mm. Accuracy is quoted at 10mm and precision 5mm. Data is stored in a 240Gb memory and power consumption is typically 60W from a 1132V DC supply. More powerful versions offering higher scan rates and designed for use with light aircraft and helicopters or terrestrial mobile platforms are also available using the same lightweight sensor.

FARO Technologies updated its laser scanning software PointSense. This is a surveying and as-built documentation software suite. With the release of Version 16.5, PointSense now includes additional tools and functionality for efficiently processing of 3D laser scan data in AutoCAD and Revit packages. The functionality for AutoCAD includes simultaneous fit of multiple polygon cross-sections, single click plane extraction, and auto boundary detection.

We've already mentioned SLAM technology, which is helping mobile systems stay on track when GNSS is weak or unavailable. Readers may also be familiar with the ZEB1 handheld laser scanner, which has featured in past issues of GIS Professional's sister titles Showcase and Geomatics World. The SLAM technology behind ZEB1 was developed through a joint venture between CSIRO (Australia's National Science Agency) and 3D Laser Mapping from Nottingham (now marketed through Geoslam Ltd). The same technology has also been built into a tiny laser scanner weighing only 1.2kg: the GeoSLAM ZEBREVO, which can be mounted on a variety of platforms to capture up to 40k points per second. Once the data is captured users have to upload it to Geoslam's cloud for processing into a 3D model. The potential applications and integration into mobile and aerial systems are exciting but will users want to be limited by the vendor's cloud-only processing?

## Airborne Mapping

CMOS (Complementary Metal Oxide Semiconductor) sensors have been around for a while in consumer cameras. Now Leica Geosystems has introduced the DMC III with the industry's first large format CMOS airborne sensor. Based on new CMOS, imaging sensor technology, the DMC III offers the world's most efficient coverage in a single frame sensor at 25,000 pixels – 25% more than any other camera on the market say Leica. The camera uses a single monolithic sensor providing 391Mpx. The new technology also includes benefits like 78dB dynamic range and extremely low image noise level, allowing customers to fly more hours per day. The design of the DMC III supports Leica's common sensor platform with Lidar and oblique sensors to minimise operating and training costs.

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