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MAGAZINE FOR GEOSPATIAL TECHNOLOGIES

EN

SPOTLIGHT

Michael Baker and BPG Designs optimize workflow and processes for Telco Industry

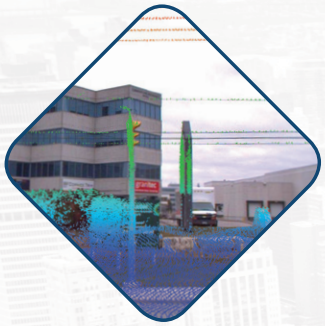
TRENDWATCHER

CEO TV Interview for WorldWide Business with kathy ireland®

SOLUTIONS

The Isle of Man:
TT Race Mobile Mapped for Highway Asset Management and Gaming

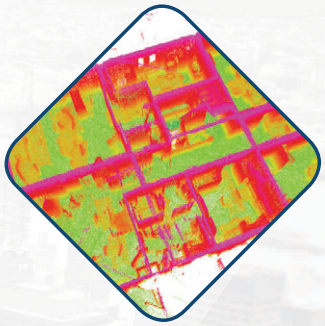
Tech Focus:
Mobile Mapping a Tunnel



MOBILE MAPPING

EVERYTHING MOBILE MAPPING

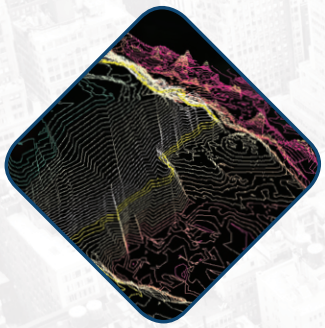
Get the most out of Mobile Mapping



INDOOR MAPPING

EMPOWERING INDOOR MAPPING

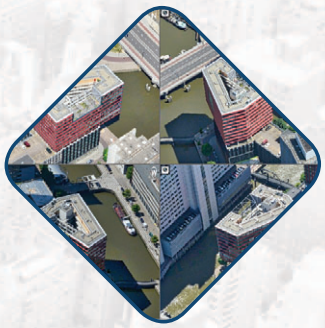
Facilitating and Streamlining
Indoor Mapping



UAS MAPPING

LEVERAGE UAS MAPPING

Professional Feature Extraction
for UAS Mapping



OBLIQUE MAPPING

MAKING OBLIQUE MAINSTREAM

Setting the Standards for
Oblique Mapping

orbit
GEOSPATIAL TECHNOLOGIES

EVERYTHING 3D MAPPING

CONTENT

COLOPHON

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September 2016

EDITORIAL

Dear Reader,

Welcome back! It's been a great year and it shows. The Telco Industry, road and rail administrations, and cities worldwide, have finally discovered Mobile Mapping as a thoroughly innovating way to optimize many different workflows and processes and start using 3D Mapping in a day to day use. At the other end of the spectrum, Orbit GT has earned the respect of every single manufacturer of Mobile Mapping hardware, and we're proud to say that we indeed support every system and configuration out there, not only through our engineering, but with direct support from our hardware partners.

This fall marks the release of version 17, a major upgrade offering automated and semi-automated detection of objects, and prepping your business for a whole new cloud experience. A few years ago, we started a journey on which many have embarked, but few have reached the destination. Orbit GT however is convinced and well prepared. It's a long and challenging journey, but a very exiting one. As you will notice in the testimonials in this magazine, our tools dramatically improve the way our customers work. And that's why we're doing it.

Not convinced yet ? See how world top service companies help the Telco Industry to roll out their Fiber To The Home programs; read how Mobile Mapping enters the Gaming industry. If you haven't joined us yet, it's about time. We are Everything Mobile Mapping.

Enjoy!

Peter Bonne

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MISSION ACOMPLISHED: WE HAVE INTEGRATION LIFT OFF!

WE LIVE IN A WORLD OF INTEGRATION.

Mobile Mapping spherical image view and coverage overview using Orbit Mobile Mapping Publisher. ©BPG Designs

Integration is central to the success of our individual communities, global businesses, and maybe most importantly to our prolific emerging-technologies (there is some kind of special punctuation needed to put "maybe most importantly" in a list). For the purpose of this article we will define integration, at its core, as the process in which two or more discrete objects are "tethered" together for an optimal solution. These objects can be as diverse as we can literally imagine. The process of integration can be applied between peoples, cultures, or even software and hardware solutions.

Now... Think back to this morning when you got out of bed. It is not uncommon to wake up these days, roll over, and fire up our smartphones. At a quick glance, this mobile technology has changed the way humanity navigates its future. In the palm of our hands we are now integrated with all the people we know and don't know through social media applications, we have integrated our work spaces with our home lives through the use of digital means, and we can even track our geographic position and plot the quickest route to work. While these are only a few examples, the importance and influence of this integration can be seen across the board and throughout our day-to-day lives. I might even go so far as to say that without this automatic integration, I fear that our younger generations might be completely lost!

Integration in the Mapping Business

The question then comes to my mind, why are we not as successfully integrated at work when it comes to the technology solutions we leverage every day to satisfy our client's needs? If my mother can send me a Snapchat, but I am unable to get two different mapping software packages to talk, we have a problem. It baffles me that we live in this world of "workplace technology interplay denial." Possibly you have a complex program directory or if you have ever worked on a CAD project, which needed to be quickly and properly integrated into a GIS, you know my pain!

This scenario was no different at my workplace, BPG Designs (BPG). To give you some background: BPG is a medium-sized design and construction company focusing mostly in the telecommunication and utility markets. The industries BPG works in are all fast paced, reactive, and need high-end attention to detail. The group I manage at BPG happens to

At work @ BPG Designs. Plenty of screens filled with Orbit GT software for optimal analysis and insights

be one of the four main departments out of the mapping, design, construction, and networking technologies teams. In the mapping group we specifically focus on survey, mobile mapping, static LiDAR collection, BIM, UAV dataset processing, and custom GIS-mapping solutions. Some of the programs we utilize on a daily basis include AutoCAD, ArcGIS Server, Geoclean, Mobile Mapping Office, Spatial Factory, Virtual Geomatics, Orbit GT, Carlson CAD, Pix4D, Revit and Cyclone. As you can see, we use a plethora of software and hardware solutions in our daily workflow. We are not tied to a single brand or process, rather we use the right tool for the job. However, having this many software packages has proven to be extremely difficult to manage. The integration of these systems, files, and services with a team of 20 mapping specialists and nearly 50 drafters has been a bit of a headache to say the least. We needed a better way to help manage this. Orbit GT was the solution to our problem.

Orbit GT Integrates...

Orbit GT provided a software solution that "plays nice" with the others. Orbit Feature Extraction immediately became our go to solution for LiDAR feature extraction, replacing other unstable programs. Orbit's software accepted LiDAR data from two different mobile LiDAR systems and two different processing software packages with no hassle. The data can be exported from Orbit in a variety of different formats that can be accepted by most other software that our company uses. The extracted data also went right into our previous list routines in Carlson CAD, meaning there was no change in workflow for QC and submittal processes.

Orbit also provided Mobile Mapping plugins for ArcGIS and AutoCAD that fit seamlessly into our workflow, and the Mobile Mapping Publisher software was the perfect tool to present our LiDAR data to end users, both inside and outside of our company. With point features cleverly created along our Mobile Mapping trajectories, we could easily calculate X & Y locations that plug into a hyperlink that would lead the user right to the exact location in the LiDAR data that they were looking for. This solution tied right into our ArcGIS web apps that we present to clients already, meaning the only change they saw in the deliverables was a better LiDAR viewer than Virtual Geomatics could provide.

...and improves our workflow beyond anticipation

But the real magic started when we

began to integrate Orbit, SQL Server, and ArcGIS.

By creating a database connection in ArcMap, to the SQL Server database that Orbit Feature Extraction already populates, we suddenly become Orbit power users. All feature extraction jobs could now be cast real time in ArcMap or ArcGIS Online, creating an abundance of new possibilities. Feature extractions could now be tracked from a performance standpoint, with up to the minute statistics of features extracted per minute or a calculated average of distances extracted over time. These XY and XYZ features can also be made in to ArcGIS Online Feature Layers, allowing extractions to be presented to non-ArcMap users through web maps and web apps.

Orbit Feature Extraction has now gone from "just an extraction software" to the highly integrated backbone of our department. Orbit did not drive, or change, our workflow. Instead, it nestled itself right into all aspects of it, and some places that we did not even anticipate. Orbit even managed to integrate aspects of our work that we couldn't have done without it.

Thinking back to the cell phone example that I gave you earlier, Orbit is now that piece that integrated things we knew and didn't know that we could do.

About the author

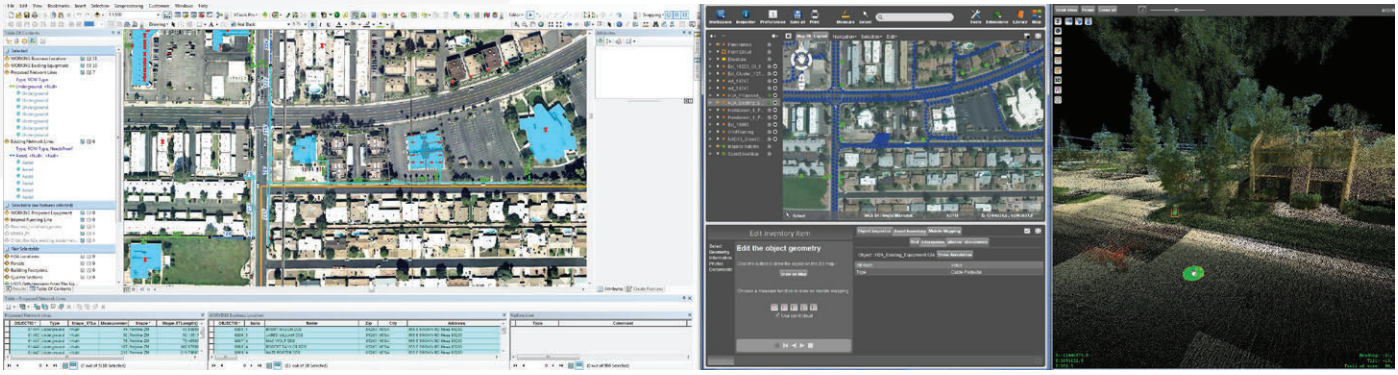
Nikolas Smilovsky is Mapping Department Manager at BPG Designs. He runs a comprehensive mapping team that is dedicated to providing high-end geospatial services. Some of the main services they provide are GIS asset mapping, custom online web mapping applications, mobile LiDAR collection, static LiDAR collection, and UAV data set processing.

ABOUT BGP DESIGNS

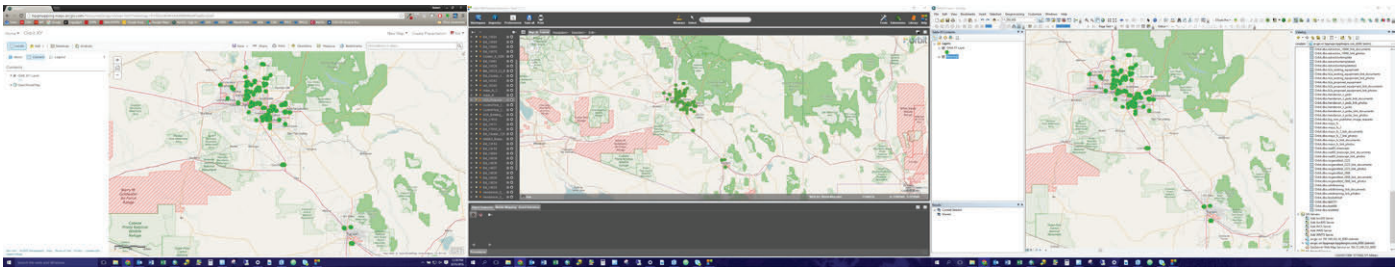
BPG Designs is a turn-key design build company, specializing in utility and telecommunication services. Over 16 years old, BPG Designs is known for their innovative approach with the adoption of new technology. Focusing on mapping, permitting, design, construction, and specialty networking services BPG Designs provides their clients the most robust and intuitive project support. No matter the size or complexity of the project, BPG brings a unique approach to the utility and telecommunications industries by providing cutting-edge deliverables.

Located in the southwest United States, BPG services clients globally.

www.bpgdesigns.com



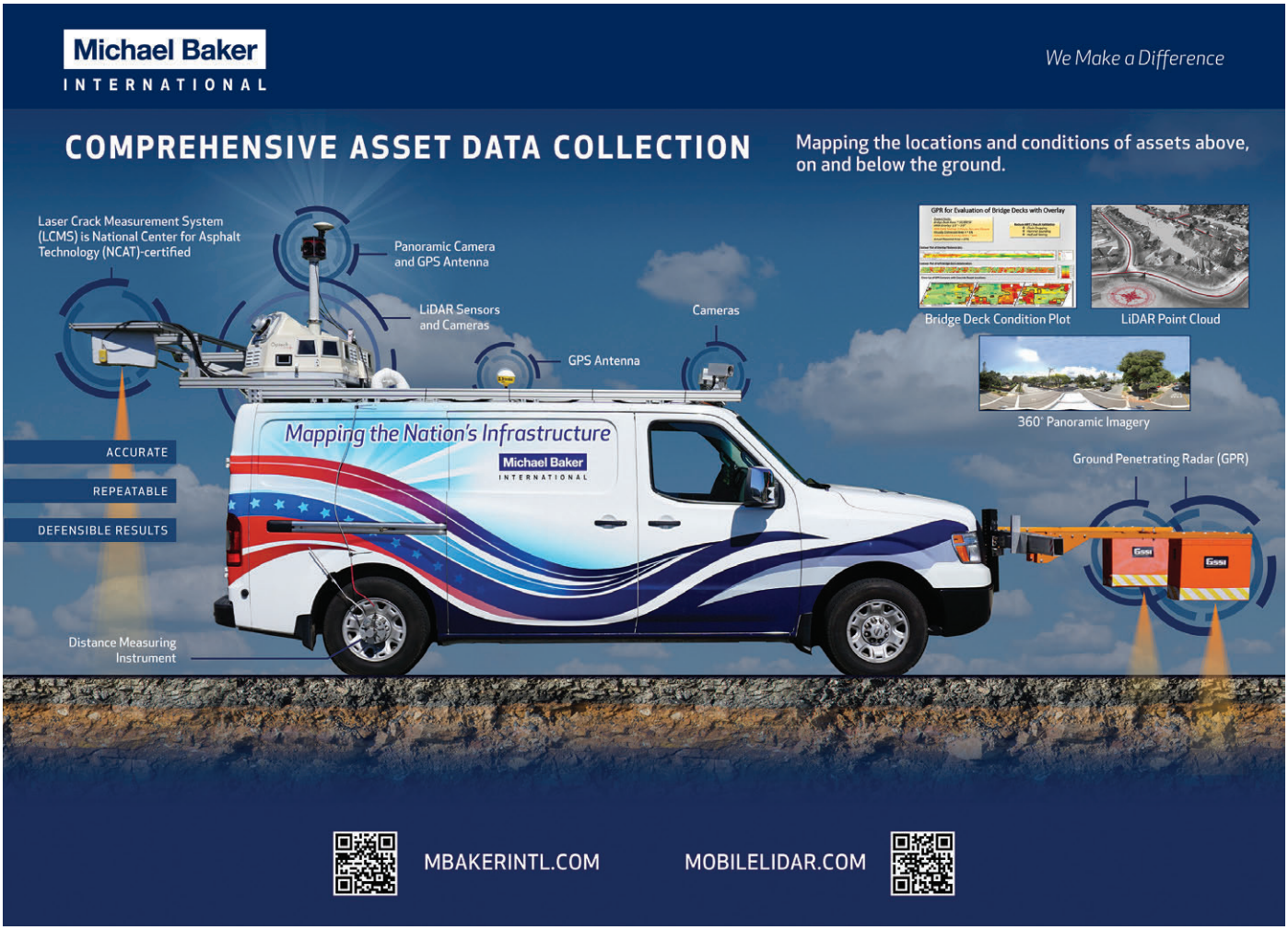
Double screen showing ArcGIS network design and Orbit Mobile Mapping Feature Extraction solutions working side-by-side



Triple screen showing ArcOnline, Orbit Feature Extraction and ArcGIS sharing the same content from BPG Designs' servers and databases

MOBILE LIDAR AND ORBIT GT

PROVIDING THE USER WITH THE BEST TOOLS FOR THE JOB.



Michael Baker International's fully equipped all-purpose data collection van

Michael Baker International possesses the most comprehensive asset data collection capabilities in the industry. To help our clients maximize their resources Michael Baker has implemented a web-based solution on our BEAST environment (Baker Enterprise Architecture for Spatial Technologies) that leverages the Orbit framework to link panoramic imagery, GIS/CAD features, and LiDAR point clouds into a single integrated solution that can be accessed from any of the most popular internet browsers.

Here at Michael Baker we have embraced the Orbit framework and have implemented it for many of our clients. One of our projects involves the use of the full range of Orbit visualization tools to identify and calculate measurements for a telecommunications customer. As part of this single initiative, Michael Baker collected hundreds of miles of point cloud data for an area of interest and almost 1 million individual panoramic images. One project of this sort will consist of with both totaling over 25 to 50Tb of remotely collected data.

The best tools

By publishing the LiDAR and vector data with Orbit, our end users are provided a user-friendly platform to view, collect, and interact with various forms of field-collected data. Michael Baker's Quality Assurance (QA) team is utilizing Orbit to closely examine the information

extracted from the LiDAR and pictures. As seen in Figure 1, Orbit provides a client and our QA team with multiple views of the data to conduct spot measurements and interrogations using both overhead and panoramic representations.

For more intensive data extraction and review, Michael Baker utilizes the Orbit GT Desktop Client tool (Figure 2). The panoramic imagery / point cloud section has a robust selection of tools through which we can toggle on/off layers and explore GIS data. The desktop client gives us the ability to open multiple viewing windows to simultaneously observe the same location from various perspectives. 360-degree pan/zoom functionality is standard as are measurement tools including: positional location, distance, line (single and multi-segment), area, and volumetric calculations.

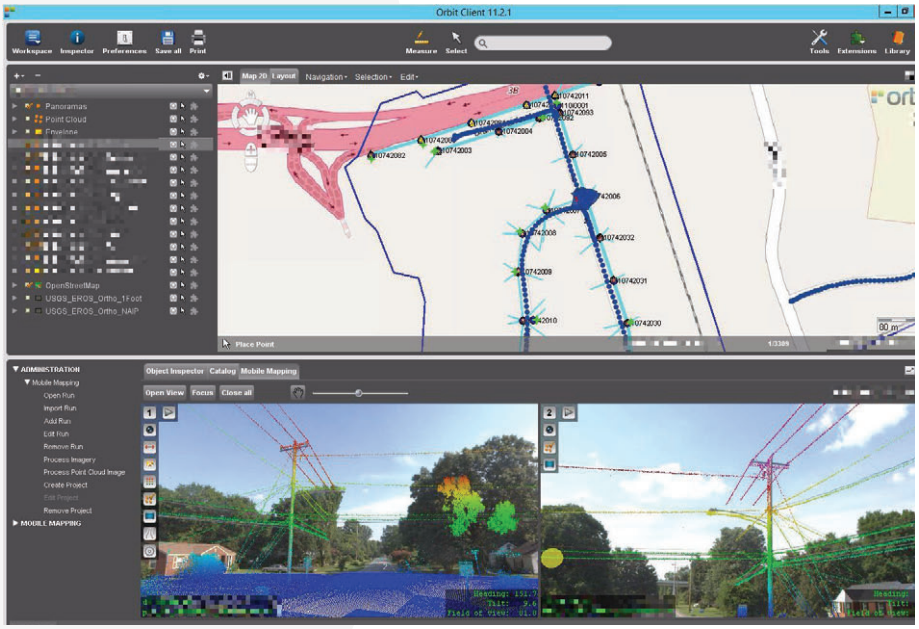


Figure 1: Orbit's Feature Extraction tools in Client/Server setup providing analytic insight of telco network and asset inventory.

Figure 2: Analysing poles and equipment and catenary wire extraction to inventorise telco network shared with customer using Orbit MM Publisher.

From Piecemeal System to Single Productivity Platform

Before we adopted the Orbit platform, we used a piecemeal system of panoramic image viewers and CAD-based point cloud rendering tools. Orbit has allowed us the ability to integrate these tasks into a single productivity platform. This has dramatically reduced the effort required to disseminate our LiDAR data to users and consumers. The beauty of the solution is the ease of use. Anyone that's ever used an online map will be self-navigating and making meaningful observations using Orbit within minutes – and all without any other special software.

Typical workflow

The typical workflow for one of our major telecommunications clients includes the collection of the raw LiDAR point cloud data and panoramic imagery in the field; the processing of the data into LAS and jpg format; conversion of the imagery locations to an ascii file for loading as Orbit sphericals and the conversion of the point cloud data into the Orbit .opc data format for optimal performance. The majority of our clients utilize the panoramic and point cloud data via Orbit Publisher web pages through our **www.poledata.net** website. This website provides an extra layer of security for the data yet allows for easier dissemination of the data resulting from Michael Baker's feature extraction, analysis and engineering teams . We utilize these pages in a number of ways, including data identification and extraction, quality assurance, and as a final delivery format.

Michael Baker is the recognized leader in the Mobile LiDAR profession. Michael Baker's Mobile LiDAR Team is the most experienced, well-respected, proficient, well-travelled, and active within the profession. Our Mobile LiDAR Team has successfully performed hundreds of projects throughout 24 different U.S. states, guided many USA Department of Transportation's through their adoption of Mobile LiDAR deliverables. We are the current provider of Mobile LiDAR products and services for many US state DOT's, the US Army Corps of Engineers and federal agencies. We can take our systems and capabilities worldwide. To learn more, please visit our weblog at **www.mobilelidar.com**.

About the author

Scott Peterson has worked in the geospatial industry for almost 20 years specializing in geospatial systems and database systems such as Oracle, SQL Server, and Orbit GT. He is responsible for administering and maintaining Michael Baker's Orbit Desktop and Publication infrastructure.

ABOUT MICHAEL BAKER

Michael Baker International, Inc. is a leading global provider of engineering and consulting services which includes geospatial, planning, architectural, environmental, construction, program management, and full life cycle support services as well as information technology and communications services and solutions.

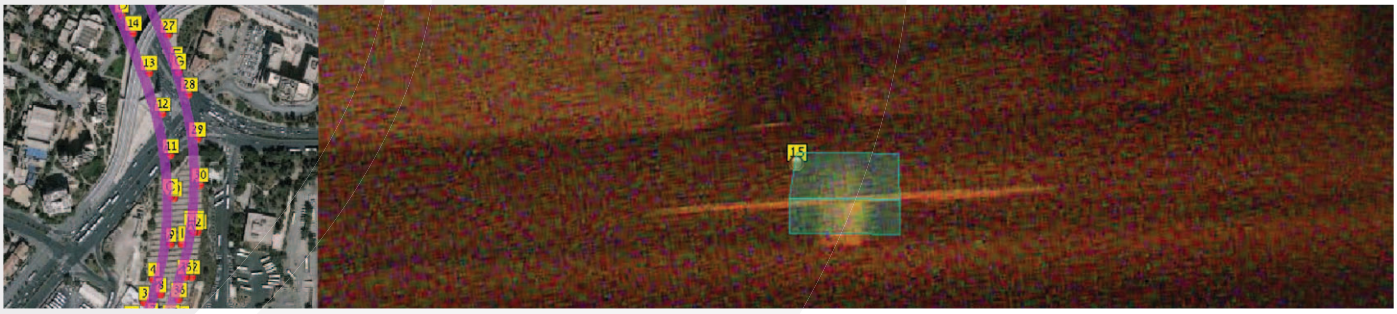
The company provides its comprehensive range of services and solutions in support of U.S. federal, state, and municipal governments, foreign allied governments, and a wide range of commercial clients. Michael Baker International has more than 5,000 employees in over 90 locations located across the U.S. and internationally.

www.mbakerintl.com

MOBILE MAPPING A 600M TUNNEL

APPLYING ACCURATE MEASUREMENTS INSIDE A TUNNEL USING CONTENT MANAGER TRAJECTORY ADJUSTMENT FEATURE.

Photogrammetry is one of the most fundamental task's Ofek Aerial Photography is doing on a daily basis. In almost every aerial mapping mission, there is a need in ground survey to complete the sampling of obscured objects.



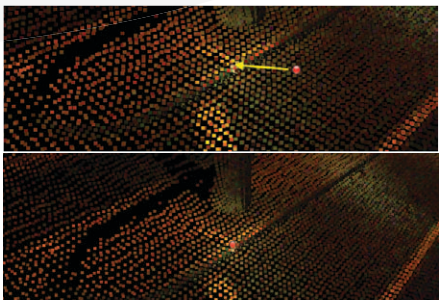
GCP's inside the tunnel: every second GCP was used for adjustment and the rest was used as check points. Marking the GCP with white "X" on the edge of the curbstone helps to identify its position even if the image is dark.

Mobile mapping is our preferred choice for doing such measurements, but what if the Area of Interest of the survey includes a 600m tunnel without GPS reception at all ?

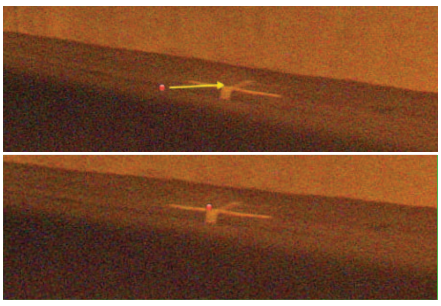
To solve this situation we used 40 high accuracy GCP from inside the tunnel acquired using total stations and applied the Trajectory Adjustment feature in Orbit's Content Manager.

The 40 GCPs were spread along the tunnels. Each one of them was measured on the edge of a curbstone and was marked with 10 cm white X. Every odd point was measured using the Orbit GCP extension, and every even point was kept as check point, and was not involved in the adjustment process.

The average deviation inside the tunnel before the adjustment was 75cm and reached a maximum of 1.22m for XYZ in



GCP on Curbstone, Before adjustment (Upper image) and after Adjustment (Lower Image) - Both Images in 3D view

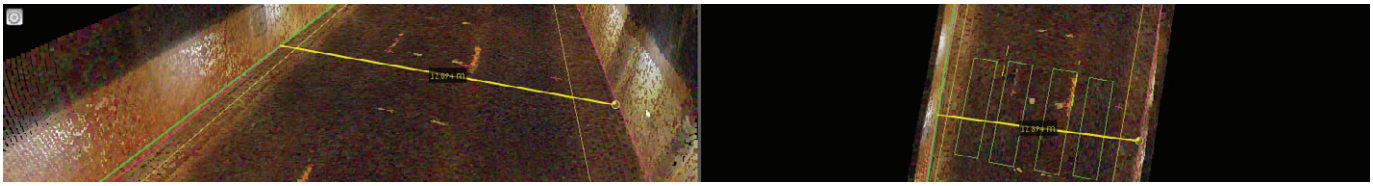


GCP on Curbstone, Before adjustment (Upper image) and after Adjustment (Lower Image) Both Images at Mobile Mapping View

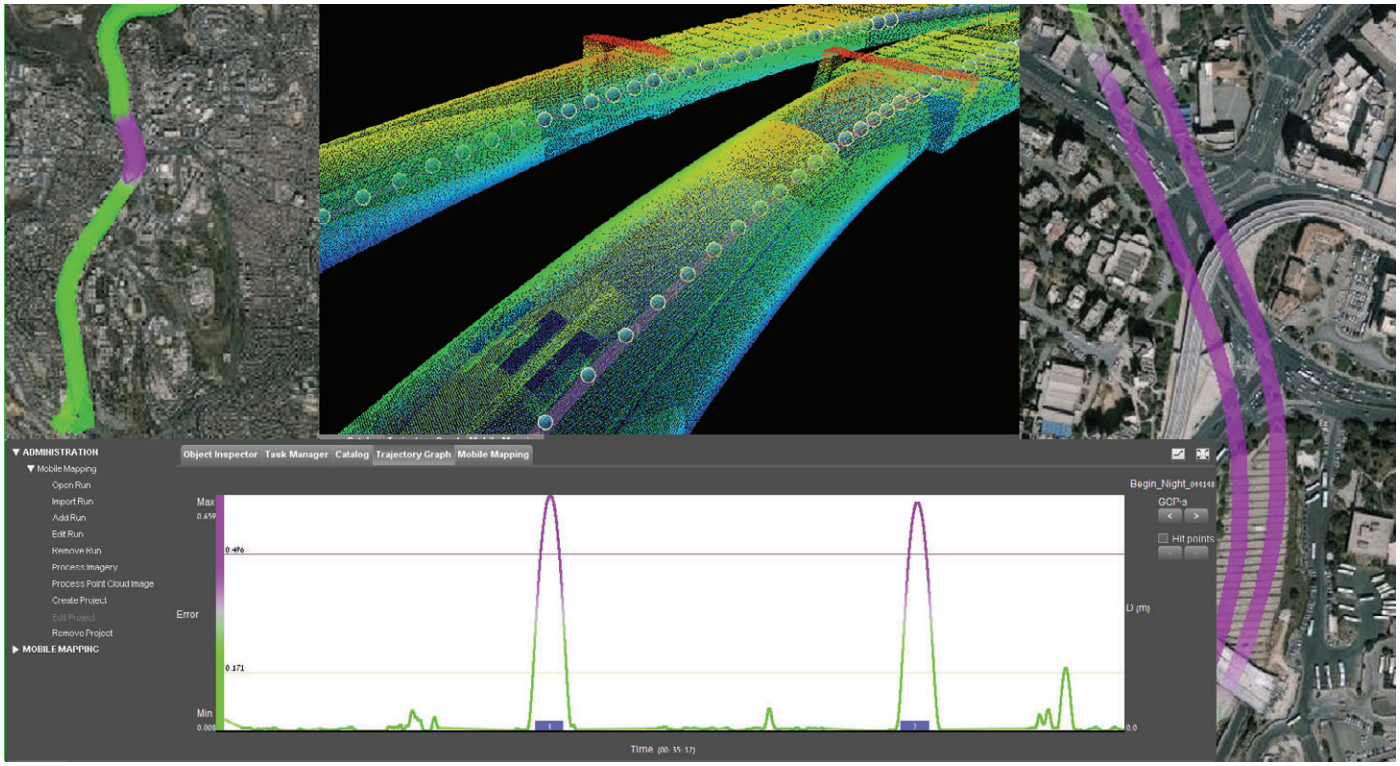
20 CHECK POINTS DEVIATION IN XYZ

before adjustment
0.75m (0.28 SD)

after adjustment
0.038m (0.03 SD)



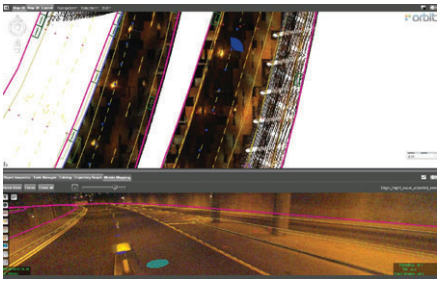
Clipped Tunnel Roof - In order to make the sampling work more clear, we removed the top of the tunnel. In that way we created an orthophoto of the inside of the tunnel. (right image)



Trajectory inspection- It is very clear from the run's trajectory profile that there are two areas with no GPS reception. Those are the two sides of the 600 m tunnel. On those areas no measurements can be taken without Trajectory Adjustment.

the middle of the tunnel. After applying the trajectory adjustment the average deviation was dropped to 3.8 cm! with maximum deviation of 10cm.

After Assuring the Trajectory Adjustment processing went well, we proceeded with extracting features from inside the tunnel. Eventually we merged the features from Photogrammetry and Mobile mapping from inside and outside the tunnel into single topographic map.



General look of extracted features from inside the tunnel

It took us just a few days to extract all necessary data, without stopping the traffic and without putting the surveying team at risk.

Combined view of contour lines from photogrammetry overlay the panoramic image and connected the lines from the tunnel.

About the author

Ori Isenberg is Head of the Mobile Mapping Department and Orbit Solutions specialist at Ofek Aerial Photo. He analyses projects. builds solutions and manages the use of and production with Orbit GT software within Ofek-air and for its customers. His expertise also includes Oblique Mapping and the Orbit Oblique solutions.

ABOUT OFEK AERIAL PHOTO

Ofek Aerial Photography is the largest company in Israel, and one of the leading companies in Europe, in the field of aerial and satellite mapping and geographical applications. Founded in 1987 and over 100 professionals strong, Ofek operates state-of-the-art mapping cameras, LiDAR, Thermal, Hyperspectral and other airborne sensors, as well as mobile and terrestrial sensors, supported by the most advanced data, image processing and GIS hardware and software tools.
www.ofek-air.com

LANDSCOPE ENGINEERING

USING THE AUTOMAP SERVICE AND ORBIT MOBILE MAPPING TECHNOLOGY TO MAP THE TT AND SOUTHERN 100 ROUTES.

The Isle of Man Tourist Trophy, the annual motorcycle race, has certainly placed the Isle of Man firmly on the map offering one of the most challenging and exhilarating events on the international racing calendar.

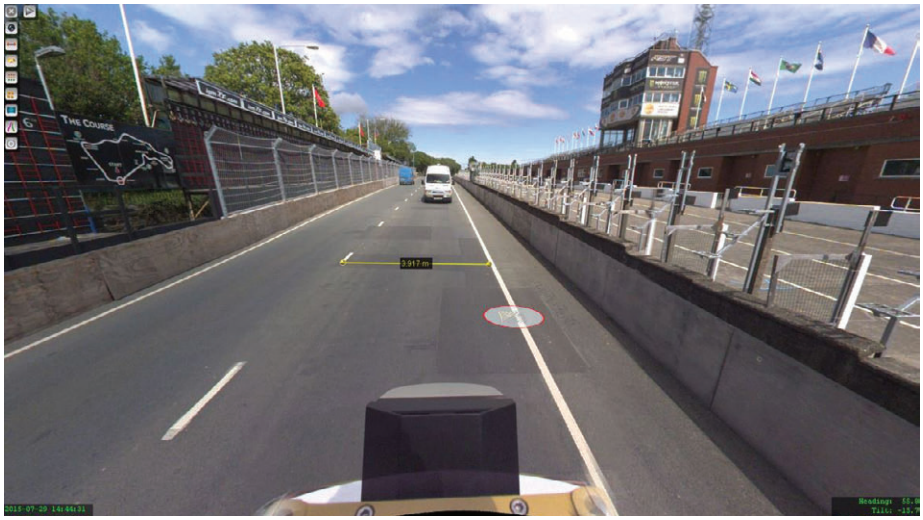
Therefore, when LandScope Engineering was commissioned by the Isle of Man Government to accurately map both the TT and Southern 100 routes for the purposes of highway asset inventory and visualisation and to meet future 3D gaming and simulation requirements, a compelling and innovative solution was required.

The autoMAP mobile mapping system captures geo-referenced high density LiDAR point cloud and high resolution 360° panoramic imagery both rapidly and simultaneously from a vehicle travelling at normal highway speed. Hence, a single autoMAP data acquisition campaign provides an exceptionally rich data-set, enabling multi discipline access to the mobile mapping content which clearly lends itself to satisfy the full project requirements in an efficient and cost effective way.

Challenging Environment

The very nature of the tree lined section of the TT route put demands on the GNSS feed and hence the positioning accuracy of the trajectory. However, LandScope was able to obtain good accuracies and geo-referencing through the use of the systems dual frequency GNSS augmented with the Honeywell inertia navigation system and odometer sensors providing the best available vehicle trajectory positioning and pose accuracy.

To further constrain and ensure the highest order of achievable accuracies throughout the model, LandScope Engineering installed ground control points. This involved high accuracy coordination of unambiguous hard topographical detail (e.g. corners of road markings, gullies etc..) to allow constraining and verification of the LiDAR point cloud.



Back view on TT track using spherical image and measuring the lane width.

Highways Inventory

LandScope was initially commissioned by the Isle of Man government to create a highway drainage asset inventory with individual feature snapshots, attribution and metadata. This was completed using Orbit Asset Inventory through a simple "point, click and map" technique from the 3D environment (panoramas and / or point cloud). An accurate geo-referenced data holding was created to determine what highway drainage assets they have, where they are located and what condition they are in, contributing to the development of effective maintenance planning and strategic maintenance programmes.

Without quality data that is fit for purpose, Councils find themselves unable to develop robust strategies lacking sufficiently detailed evidence for funding or to achieve a high banding through the Department of Transport's (DfT's) Maintenance Capital Funding Self-Assessment.

When serving this inventory together with the mobile mapping data within an Orbit environment, the user community is able to inherently link:

- asset spatial dimension i.e. where the assets are and their proximity to other features and other assets;
- asset geospatial intelligence through from the 3D measurement domain; and

LandScope's mapping car ready to map the curcy roads of the Isle of Man.

- assessment and evaluation capabilities through the visualisation similar to 'Google StreetView'.

More than ever, highway asset management requires increasingly detailed asset data. Highway Managers are seeking ways of visualisation, capture, analysis, sharing and modelling and this is where LandScope Engineering and Orbit Technologies are certainly adding value to this process.

Although the original requirement for the Isle of Man Government was the production of a highways drainage inventory, this innovative approach brings benefits in that one campaign may satisfy many different objectives namely:

- Scalable highway asset inventory, to include other feature such as street furniture, street lighting etc, providing detailed and configurable asset information for use in spatially enabled / mapping / GIS software.
- Point cloud dataset to facilitate planning and highway engineering functions.
- Simulation, gaming and 3D modelling, just because, it's the TT after all.....

LiDAR view of a dangerous turn using Orbit MM Feature Extraction

Technology for Visualisation

Creating a reality based model with the ability to add visualisation was a key requirement for the Isle of Man Government. The use of Orbit GT Software in-house provides the platform for instant access to high definition, geo-spatially referenced digital 3D panoramic images and point cloud in an intuitive interface.

Bringing the outside in unlocks the potential for efficient site viewing, verification, validation, measurement and design, without the need to visit site.

The ability to serve the mobile mapping data across platforms and departments enables user access to the Orbit measurement / data acquisition interface. The user community can interpret the panoramic imagery using standard GI tools for zooming in and out, panning around etc and engage in a 'virtual walk' through the entire TT and Southern 100 routes.

Simulation for the Latest Generation Gaming Development

Due to the accuracies achieved constraining the mobile mapping data to the targeted control campaign, LandScope are now working with a racing games company, commissioned by the Isle of Man Government, to reproduce this iconic track environment with high end visual representations.

About the author

Sarah Jones is the GIS Manager for LandScope Engineering where she is involved in the autoMAP Mobile Mapping Service mainly working with Topcon and Orbit Geospatial Technologies.

Having previously worked for over 10 years in GIS in Local Government, Sarah was involved in corporate GIS and Land and Property Systems. Sarah was lead officer for a number of E-Government integration projects and had overall responsibility for the infrastructure, development and implementation of location based systems.

More recently in her current role, Sarah is responsible for managing a wide spectrum of autoMAP mobile mapping projects and deliverables through the use of innovative tools and techniques. Last year, Sarah was a speaker at a number of conferences, showcasing how mobile mapping plays its part in efficient highways management.

Sarah is a Fellow of the Royal Geographical Society, with a first class BSc honours degree in Geography and Computing.

ABOUT LANDSCOPE ENGINEERING

LandScope Engineering provides an integrated survey and data management service to the engineering, built infrastructure and environmental sectors. Employing a multi-disciplinary approach, we are able to channel extensive geospatial and geophysical data acquisition and management experience in to the highest quality deliverable for our customers.

A strong core geomatics competency enables our customers to derive maximum value from a range of established application technologies. We aim to simplify the process of obtaining and managing critical data throughout the life-cycle of our customers' projects. The planning, management and performance of projects has served to demonstrate that quality of service is inextricably linked to measures taken to safeguard the integrity of and maximise the value of data. It is on this premise that the development of LandScope has been based. LandScope has aligned itself with various established quality providers to ensure that the best technical support, latest technology and adequate resources are built in to the service.

www.land-scope.com - www.auto-map.co.uk

THE FUTURE OF 3D MAPPING

MR PETER BONNE, THE CEO OF ORBIT GT, RECENTLY APPEARED ON WORLDWIDE BUSINESS WITH KATHY IRELAND®, AN AWARD-WINNING BUSINESS TV PROGRAM BROADCAST GLOBALLY. HE SHARED HIS INSIGHTS ABOUT THE FUTURE OF 3D MAPPING AND THE CONSTANT STRIVES OF ORBIT GT. ENJOY READING ABOUT ORBIT GT'S PERSISTENT EFFORTS IN THE FIELD AND HIS THOUGHTFUL VISION.

Kathy Ireland: Modern technology has brought disruptive changes to the professional mapping industry, with 3D mapping making the biggest waves. Orbit GT has harnessed the power of 3D mapping to bring the outside reality right to our desktop. CEO Peter Bonne is here to explain how this works.

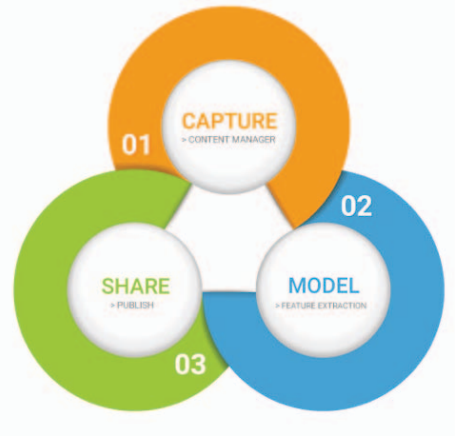
Peter, can you describe why 3D mapping is such a disruptive technology?

Peter Bonne: For ages, surveyors have gone into the field in person to visit the site to be mapped. The first change came about a century ago with the dawn of aerial photography. For the first time, people could look from a distance and overlook a large area from a distance.

But what is happening today is that sensors that are mounted on cars, drones or other vehicles, can collect the outside reality in 3D. For the first time, the surveyor can sit behind his desktop and have all that information available. This is a fundamental change in how a surveyor works and how maps are being made today.

What are some of the challenges your customers are facing on a daily basis?

With these new techniques, our customers collect enormeous volumes of data. In 3D mapping, you have imagery, laser scanning, and optionally other types of sensor data, and you bring all that together. This is quite complex. Managing that data and assessing the real world features that really matter for the job done, is a big challenge.



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Mr. Peter Bonne, CEO of Orbit GT, recently shared his insights about the future of 3D mapping on Worldwide Business with kathy ireland®. The program is broadcast globally and reaches over 180 million people worldwide.

So everybody in the mapping and surveying business is looking for better tools to work faster and safer, to work more efficient and streamline their work in a much better way.

We've solved the problem of working with these huge volumes of data, so that discussion is over.

So how is Orbit GT solving these issues?

We deliver end-to-end solutions. We have solved the problems that are so challenging for this 3D mapping business. We help professionals identify and monitor critical infrastructure and share their analysis with their entire organizations. We optimize workflows and reduce

overhead, and basically take away the headaches in starting with 3D mapping.

We help them assess the objects that they need to register, and to share information within their organisation or to their customers so that also they can bring such rich data into their day-to-day operations.

Peter, please tell us more about Orbit GT and what you are doing for your customers.

We are a software company, but our services are equally important. We have a lot of expertise in this domain, and we want to bring that expertise across.

We know it's not a simple job to start working in the 3D mapping space. Entering into this disruptive way of mapmaking is not just buying some hardware and some software. It also requires a new way of thinking, and changes the way your business operates. We can help our customers to really shorten their learning curve and get them started faster.

Can you highlight some of the features that separate Orbit GT from other 3D mapping software providers?

By supporting all hardware vendors and all of their sensors, we truly are hardware agnostic which puts us in a unique position worldwide. Many other software tools only focus on one part of the job. Providing an end-to-end solution is really making a major difference.

For example, our Content Manager is a very important product for the people who collect the data. It helps them to optimise their workflow to manage these huge datasets, which they could not do without Content Manager. It is really an indispensable tool for them. I do not see any other product in the market that can do that.

Talking about feature assessments, there are some tools on the market that do a really good job. But again it is only a part of the job, and we provide integrated tools with an optimized workflow. So it simplifies the variety of work that a team has to do, and it adds flexibility for the production teams.

Finally, we have our Publisher product which brings everything online. Analysts and the production team can bring their results and their 3D maps together to share with their co-workers inside the organization as well as the customers outside the organization. That is a whole new way of doing business.

That's quite a large and complete portfolio and, to the best of my knowledge, this has not been done before.

Peter, who are your services for?

We work for Government agencies, for transportation organisations be it by rail, road and also for telecommunications and energy companies. From there on, we drill down to all the service companies that do contracting, construction and engineering, analysis, maintenance and so forth. Within each of these business domains, we support contractors and

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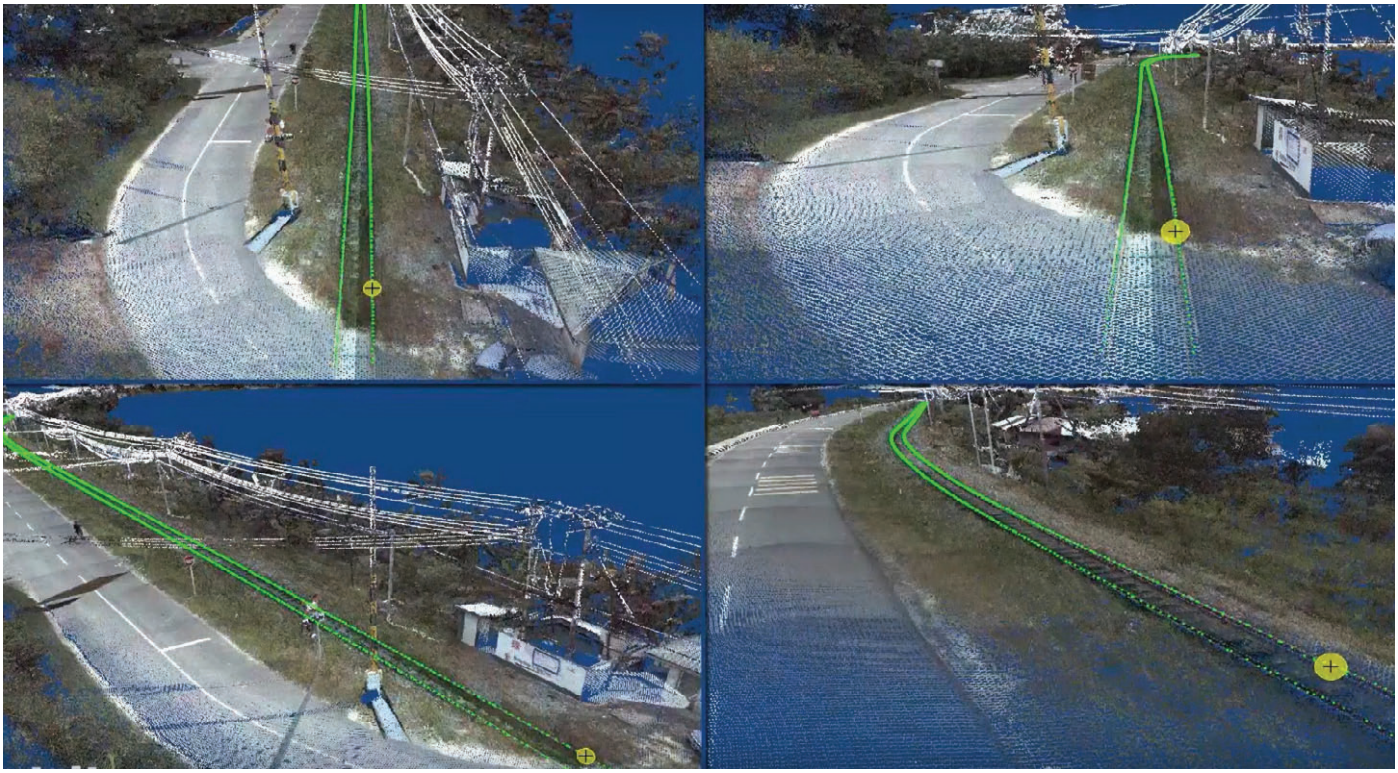

We optimize workflows and reduce overhead, and basically take away the headaches in starting with 3D mapping.

operators from data collection to analysis to publication.

Peter, please explain how your customers are using Orbit GT.

Transportation organizations use it to monitor construction, assess road surface and pavement quality, detect decaying infrastructure, optimize their priorities for maintenance, and to inventory and manage their road-side assets.

In telecommunications, the current wave of fiber optics being rolled out throughout the world which drives telecom companies to inventory their assets, poles, cables, and other equipment in the field, and align that with the demand. So you also need to know where your customers are. To make a solid business forecast, it is imperative that you plan according to up to date maps of service areas. Orbit GT plays a key role in helping them to do that.

Government agencies have the most varied use cases: from management of the public facilities, to property taxation, to validating construction projects and many more.

Essentially, a government has two things to do: taking care of its people and taking care of the piece of ground that they are responsible for. So that piece of ground is a large part of the government's task and having a good insight in 3D from their desktop of fantastic value. Even just being informed about the situation on a certain spot is highly valuable. Again, that's where many other solutions fail.

Peter, what are some of the benefits your customers are receiving from Orbit GT?

I think one of the most important benefits is the safety of personnel. A surveyor no longer has to go onto busy roads or in hazardous environments. To get the job done, he can just collect it from a vehicle or drone and Orbit GT brings it to the desktop.

Next to that, you have more eyes on the job. So the interpretation of what you see can be done by different qualified people. You can integrate the quality control process. Bringing the representation of the outside physical world inside, has many different benefits indeed.

Can you please talk about Orbit GT's ease-of-use? How easy is it to use?

Well, there is a saying by Leonardo da Vinci. It says, "Simplicity is the ultimate sophistication." I value that greatly. Because indeed it is very easy to make things hard, but it is very hard to make things easy. At Orbit GT, we are prepared to go the extra mile..

In my personal career, I come from development to project design, documentation and training. When you stand before a class and you have a hard time to get your message across, you know there's something wrong. That problem needs to be solved at the very beginning with the design of your product.

We do a lot of work designing and testing our software for ease of use. It optimises development, simplifies the user interface, decimates the documentation and in many cases eliminates the need for training. It's a task we take very seriously.

Are there other components that you offer to your customers?

The focus on Mobile Mapping is simply because it's the hardest of the domains we cover.. In doing that, we have laid the foundation to bring in drone mapping, aerial photography or indoor mapping. Bringing all those data sources together is something really new for our customers. But for them it's very important. So we fuse that data together and give them more insight, more capability of decision-making and analysis. This is really bringing them to the next level because they now see a more complete picture of real world.

Could you please share the breadth of Orbit GT's expansion?

Over the last 3 years, we've built up a global partner network. We now have representation all over the world, including India, China, Russia. Our growth and success requires us to come closer to our partners and customers. Being based in Europe, that is why we establish an Orbit GT presence in the US and in Singapore. This way, we provide global support to our partners and customers within their timezones.

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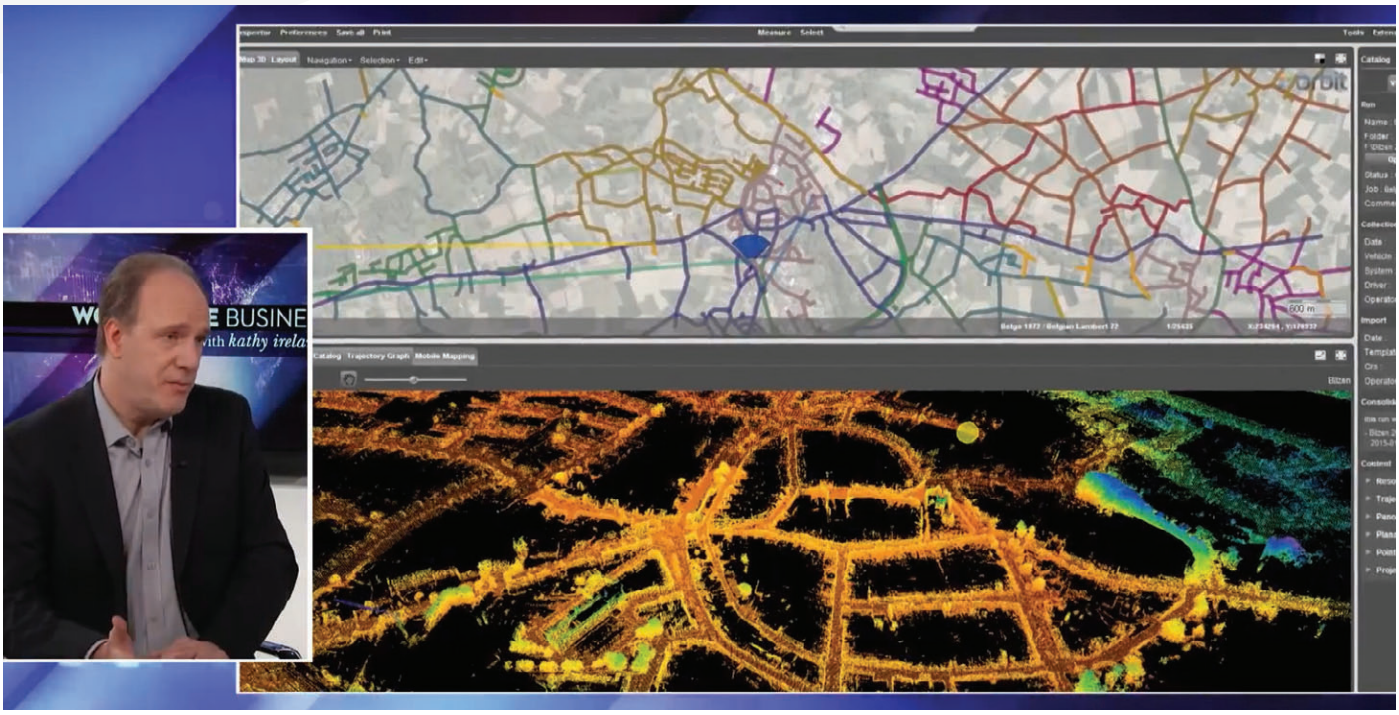
Where do you believe the future of mapping is going?

We have always been blazing new trails. We have always been on the lookout for new developments and new technologies that we can bring into our business.

As we have many years of experience in this business, we fully understand our



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customer's needs. Innovation drives us ahead, and as innovators do, we try to look years ahead and invest heavily in R&D. For example, we have been involved in the early stages of Mobile Mapping and Drone mapping, now more than ten years ago, while that business has just become of age the last few years.

The future of 3D Mapping for sure will be cloud based, facilitating much more computation power, data integration and sharing capabilities, and bringing 3D mapping to the everyone's desktop, way beyond the surveying and mapping business. I've been convinced that in a couple of years, a professional street-level image will be inevitable and omnipresent for everyone in government, transportation, energy or telecommunications.

What is next for Orbit GT?

We are migrating solutions to the cloud and will bring a variety of tools available step-by-step. That will facilitate our customers to have easy access to huge datasets of various kinds, more computing and analysis power. Data fusion and sharing will be key, as well as providing more and easier integrations inside customer's workflows and enterprise systems.

The road ahead is very promising and I'm excited about it.

Well, lastly Peter, can you please tell us how we can contact you about your 3D mapping services?

You can look us up on LinkedIn, YouTube, Facebook or Twitter @orbitgt, or go to the website to have a more elaborate information about our products and services at www.orbitgt.com. We will be happy to answer any questions of course.

Peter your 3D mapping services are fascinating. It is clear that Orbit GT would be a critical partner in keeping our environment safe and well maintained. Thank you so much for joining us today.

Kathy Ireland: Peter, can you talk a bit about the history of your company?

Peter Bonne: It has been a long ride so far. My late father founded it over 50 years ago. We have been in map-making all along and worked locally. Only a couple of years ago, we founded a new business unit to expand the 3D Mapping business globally. So we are kind of a start-up within an existing company.

What was your father's vision when he began the company 50 years ago?

Peter Bonne: At that time, the map-making business was very manual. The instruments were optical and mechanical. The business my father started the first company making photogrammetry tools in our country.

Photogrammetry enables to make maps of large areas through aerial photography with a consistent accuracy. In that process, my father started to convert the mechanical way of producing maps into a digital way of producing maps. We generated the first digital map in 1978. To give you an idea of the timing, the PC was only invented in 1982.

So we have a long history in innovation. In the early days one had to include hardware innovation. That's is not necessary anymore. We evolved over years to a software company only, where we focus on bringing the best software to the people. Being in the map-making business for basically a lifetime, we know what our customers need, we know what the problems are, and we think we can help them do their job better.

Clearly Peter, you and your father both visionaries, your passion shines through. Can you please talk about your background and experience in the music industry and how it impacts your work here today?

Well, it is true that for a couple of years, I have been a professional musician. It taught me a lot, in the way that in the music business you make a certain product, which is a song and album, and then you give it to somebody who has to market and sell it. If he doesn't do his job then you as a musician are likely to fail.

The music industry is the only industry with which you have to give away your baby and rely on other people to become successful, without any control. In the mapping business however, you have the possibility to get in touch with the end-user personally and control the marketing and sales channels.

Secondly, I think that what I have learned in the music industry is that you have to be very precise with the products that you make. It is very challenging to make a simple song and be happy with it. That's OK. But you probably what to make sure that your customer, which is the listener, is also happy with it. That requires you to step into their shoes and also understand what they would like. Without loosing your artistic identity of course. If you stop being relevant, you're out of grace instantly.

But it's an important lesson. If you do not feel what people want to hear then there is a gap between the musician and your audience. That is also very key in the business that we do, and basically I think in every type of business.

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