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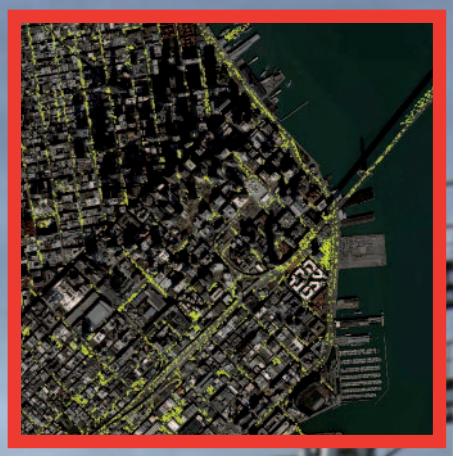

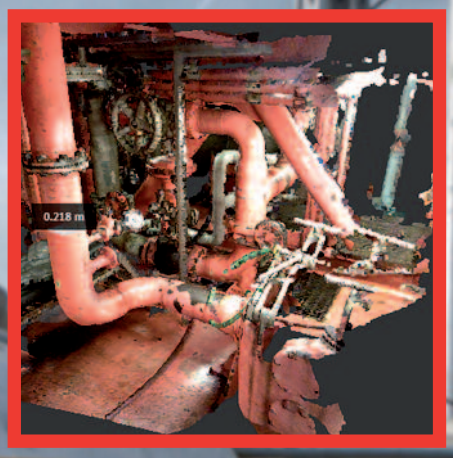

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It takes Two

Workers use a Motion F5m by Xplore rugged tablet PC to inspect an oil pipeline.

By Bob Ashenbrenner

Compatibility and adaptability aren't as easy to come by with consumer-grade devices.

Field service technicians – especially those working in the Oil & Gas, Mining, and Public Safety sectors – frequently call on mobile technologies to gain an all-access pass to critical data in the remote and rugged environments. They anticipate full geographic information systems (GIS) support no matter where they travel on foot or on four wheels.

But not all mobile devices are cut out for this very specialized job. Some are too fragile for the environments to which GIS directs them. Others can't handle intense data processing in real-time. Some, still, don't have the expansive storage capacity needed for regular GIS system updates.

So, many of these mobile workers have been trying to make do with mobile technologies better suited for an office environment. Unfortunately, simply extending a desktop experience to a mobile environment via a "portable" PC isn't enough. Since there isn't a single GIS app that will work on all devices or a single GIS solution that will suffice for all job descriptions, many field service technicians have started redefining their expectations for mobile technologies.

What a Field Technician Wants – and GIS Systems Need – Aren't Always the Same

It's becoming clearer than ever that the GIS requirements and mobile device preferences of each individual mobile worker vary greatly within a single industry – and even more from sector to sector.

GIS companies put a lot of effort into adding coordinates for power meters, water treatment plants, electrical power transformers, and other relevant infrastructure onto the physical map coordinates for a region. When a field technician is dispatched to a site to perform an inspection or repair, this overlay information helps to get the tech directly to the right place. But not every location of every device is fully mapped, and there are some errors. The tech's mobile PC needs to be able to scan the barcode of the equipment, look into the database for the predicted loca-

tion, and compare that to the actual GPS location sensed by the computer. That takes a tablet PC with a substantial "working set" – computer-eze for enough processing power (more than "speed", also the hardware-accelerated functions), cache size and storage size.

And, though mapping and location capture capabilities are standard GIS features in almost every market with outbound field components, the manner in which they're utilized is far from standard. Asset location, maintenance, and management are among the most common use GIS cases, as is workforce management. But GIS systems are also vital enablers of computer-aided dispatch in Public Safety, Transportation routing and Logistics optimization, and Hazardous Material location. Fire and Rescue crews increasingly rely on GIS data when evaluating potential loss analysis on the ground, and even cemeteries are finding GIS applications critical to planning and maintenance operations. Not to mention, federal, state, and municipal government agencies rely on GIS tools for tax appraisals, logging road conditions, sidewalk inspections, and roadside sign inventories, among other tasks.

Designing and fine tuning a user-friendly mobile GIS solution with long-term viability requires the right combo of purpose-built mobile PCs and workflow-specific software in a single platform. And even those criteria are constantly evolving.

How to Find All the Right Features in a Single Mobile PC Package

Commanding, yet agile. Rugged, but not unwieldy in the field. Capable of running complex data systems, yet able to simplify the data for easy access and interpretation. Large enough for easy full-screen viewing, but lightweight enough to carry in hand, on foot, for long distances and long hours. A workhorse that's always on the clock, always connected, and able to recharge without a break.

These are the qualities that are ideal for GIS workflows on a mobile PC. Yet, finding a solution that delivers that feature combination, without compromising on other critical mobile computing capabilities, may prove to be a daunting task – if you don't know where to look.

That's why some organizations may initially revert to familiar consumer-brand devices and try to force-fit a field service software solution onto that platform. It's also why they end up reversing course and re-starting with GIS mobility solutions driven by rugged tablet PCs. While consumer-grade mobile solutions often prove incompatible with either the customized software needed for GIS workflows or the harsh climate conditions in which they operate, rugged tablet PCs are purpose-built for both.

Rugged tablets are built to be dropped and shocked. They are ready for long shifts in the rain, snow, dirt, and sunshine. They can even withstand the constant vibrations of heavy machinery and constant exposure to corrosive elements. Their larger screen size is conducive to full-screen document viewing in bright sunshine, and their easy transport options mean they're truly mobile.

Of course, one could argue that rugged laptops and notebooks boast similar portability and durability. But mobility and portability are not the same, which is one reason why notebooks are losing market share to rugged tablets in GIS sectors (VDC). Laptops and notebooks weigh almost double a rugged tablet as well. That makes them more difficult to manage by workers who don't have the luxury of setting their device down on the job. At the end of the day, rugged smartphones – despite being mobile – aren't right either. Their screens are just too small to support most of the necessary field service workflows, especially GIS. Rugged tablets are the only platform truly built to support the expansive physical requirements of field service workflows.

Though, to be fair, even some rugged tablets come up short in providing the right features for GIS applications. Good looks and physical strength aren't the only considerations that should be taken when making a long-term commitment to any mobile platform.

It's imperative to see what a mobile PC is really made of on the inside and evaluate its growth potential. GIS applications mandate certain levels of OS capability, battery life, processing power, storage capacity, connectivity, security, software expandability, and data capture. While GIS applications run best on an Intel i5 core processor or better – a CPU with at least 8GB of memory – you may need more processing power if your area and/or GIS database is large.

You need to establish standards that will support your long-term goals – and find solutions that meet those standards without compromise. Using an aesthetically appealing tablet that has limited processing capability will result in long waits for GIS results, frustrated users and demands for something that doesn't slow their work. Underestimating the need for RFID readers, capacitive Glove Touch, or a sealed True Serial I/O port, for example, can result in fast failure of your intended GIS workflows. You can also create costly incompatibility issues by selecting your mobile PC before considering GIS software criteria – or vice versa.

That's why it's so valuable to collaborate with a rugged tablet manufacturer that does more than just design devices; someone that will help you architect a cohesive end-to-end mobility solution beyond the PC they're selling. The right partner will support multiple software options on their rugged tablet platform so that you have the flexibility to expand and adapt your GIS workflows as needed. They'll also help you anticipate future mobility requirements so that you don't derail near-term hardware and software investments.

Making the Right Connection – The First Time and Every Time

Matching your mobility requirements to the "perfect" technology solution isn't always as easy as matching a criteria checklist to technology specs. Just because you're able to collect piecemeal hardware, software, and accessories to address your needs doesn't mean it will sync easily with existing back-office systems or perform well when brought to life.

You may be able to use a USB dongle to rig a connection with your RJ-45 inspection device, but making a direct connect with a built-in and weather-proofed RJ-45 port would be more sensible.

Technically, you can plug a drivers' license barcode scanner into one of the many USB ports available on a rugged tablet and run immediate background checks. But does an extra wire and second device in hand bode well for your officers' mobility? Do the cost savings of adding-on a less expensive peripheral scanner outweigh the safety and productivity gains from having access to all tools on a single rugged device?

While you can try to add on the right I/O ports – or more I/O ports – to your mobile PC as you introduce new workflows to the mobile envi-

C1D2/C1Z2 or ATEX compliant rugged tablets are ideal for use in Hazardous Locations, such as an oil refinery.

ronment, it's always best to anticipate all of your I/O connectivity requirements up front. USB ports can't make every connection every time. GIS environments typically benefit from sealed I/O ports as well.

Serial ports have been around for decades. Their value has been in their simplicity. USB isn't as common because it requires a tiny but real chip to communicate with the host PC. In utility equipment, serial has been the interface of choice because the signals can be routed directly to internal circuits. There is a "standard" for serial port protocol, something that USB-to-Serial dongles depend on. But in reality, many industrial equipment applications didn't use the standard; they used the flexibility in how the signals could be used. That's why True Serial ports are needed in many applications – they work with any serial port implementation, not just those that had followed the standard.

Same goes for wireless connectivity. Wi-Fi hotspots aren't always available, and neither are 4G LTE networks. Select a rugged tablet that offers multiple connectivity options for seamless communications across rural, remote, and urban job sites.

Protect Yourself and Your People

Of course, personal safety and security always come first in life. In mobile work environments, device safety and data security also come into play. GIS applications often lead to Hazardous Locations and otherwise extreme environments where extra precautions must be taken to protect your most critical assets: employees, information, and infrastructure. Though almost all rugged tablets can withstand the impact of extreme climate conditions, only certain rugged tablets are deemed intrinsically safe in explosive environments. Mining, oil & gas, manufacturing, and even some transportation operations can create atmospheric conditions at risk for dust or spark-ignited combustion in proximity to electronic devices.

Leaving rugged tablets at the perimeter of such Hazardous Locations (Hazloc) is counterintuitive when the inspection or repair assignment is reliant on the tablet's GIS tools. The only way to minimize risk is to ensure your rugged tablet is either C1D2/C1Z2 or ATEX compliant for Hazloc usage.

Physical and internal security measures are also essential to protecting the hard work done by field service employees and sensitive data being shared in the field. Multi-factor authentication is emerging as a mandatory security measure by almost every mobile organization, with many turning to rugged tablets' optional fingerprint scanners and Common Access Card (CAC)/smart card readers for additional authentication layers. Both software and hard drive encryption solutions provide internal safeguards, and external tools such as Kensington cables can physically lockdown devices in the vehicle while docked or stored.

Revising Your Route

So you've found the right hardware-software team for your typical GIS workflows. But will they be accepted – and adopted - by both the tech-savvy and mobile novices alike? It's a question that you must ponder in the early stages of any mobile technology implementation.

Even once you've find "the one," it still takes some trial-and-error to find and fine-tune the GIS software solution that best meets your expectations. The rapid expansion of GIS applications has created the need for smarter, end-to-end mobility strategies and more tailored technology

Android-powered rugged tablets, such as the Xplore XSLATE D10 fully rugged tablet PC, are increasingly used for public safety GIS applications.

solutions. Striking the right balance of hardware expandability, software flexibility, and GIS adaptability to the vast number of possible use cases takes time and patience.

Fortunately, there is a great deal of collaboration occurring between hardware vendors, software creators, and vertical industry visionaries. Organizations like Esri, Clevest Solutions, TC Technology, and MarMak are leading aggressive research, design, and development efforts to deliver more customized and cohesive mobility solutions in response to growing GIS demands worldwide. They're cultivating new ways to execute GIS applications in remote and rural locations, and they're leading result determination programs to assist with more proactive industry refinement of GIS efforts.

As you evaluate key performance indicators of your own mobile technologies, don't be afraid to invite such organizations to evaluate your progress as well. Tap into the daily experiences of your field service technicians frequently, and trust that they know best about what's working and what's not. They'll also identify gaps in your GIS capabilities that may be easily introduced using existing mobility investments. Though you've mapped one way forward, constant innovation is opening up new and improved routes to full GIS mobility every day.

Utilities Often First Out of the Gate, Set the Pace for Other Industries

GIS departments in utilities have always been an early entry point for Windows-based rugged tablet PCs in particular. They have significant map databases that demand a fairly large storage capacity and a more powerful processor than is found in many mobile PCs running other operating systems. They also gain significant efficiencies from GIS applications that keep technicians in the field longer without frequent return trips to the central service center for equipment or information.

As a result, utilities – as early adopters – have served as great test cases for various GIS applications and the supporting role of rugged tablet tools. When FieldNotes (now Bentley Field) first came to market, they embraced the tablet form factor and digital pen functionality in their GIS applications. That provided early validation for both rugged tablets and pen-based data entry. Subsequent acceptance of similar solutions has afforded thousands of field service technicians worldwide immediate access to their utility's GIS system. They've gained more concentrated job completion capabilities, such as the ability to track target inspection locations, locate underground pipes, and review any additional data necessary to recommend maintenance or repair actions. And they've enjoyed productivity improvements, time savings, and overall operational cost savings unforeseen during early GIS deployments.

It's no wonder so many field service sectors are following suit, working expeditiously to employ the right mobile technologies for their unique business demands.

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